London School of Medicine and Medical Specialties

NHS
Health Education England

Clinical Guidelines Update for the Returning Medical Registrar

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Contents

The following are updates to NICE guidelines and changes in practice of guidelines you may encounter on the acute take. This is by no means a comprehensive list and guidelines can be accessed locally within your trust or on the NICE website.

www.nice.org.uk

We hope this serves as an aide-mémoire while on take and thank you to all those who have contributed.

Respiratory

Acute exacerbation of COPD

Dr Anna Moore, SpR in Respiratory Medicine

The NICE guidelines for diagnosis and management of COPD in over 16s were updated in December 2018.

Definition of COPD exacerbation according to NICE: “A sustained worsening of the patient’s symptoms from their usual stable state which is beyond normal day-to-day variations, and is acute in onset.”

Commonly reported symptoms:

- worsening breathlessness
- cough
- increased sputum production
- change in sputum colour

Assessment and investigations

All patients who come to hospital with a COPD exacerbation should have:

- CXR
- ABG with FiO_2 documented – and repeated according to response to treatment
- ECG (to exclude comorbidities)
- FBC, U&E
- Theophylline level – if on theophylline at home
- Sputum C&S if purulent sputum
- Blood cultures if patient is pyrexial

Hospital at home

Taking into account patient preference, and with multidisciplinary team input, consider hospital at home or assisted discharge scheme. These are safe and effective and should be used as an alternative way of caring for patients with exacerbations of COPD who would otherwise need to be admitted or stay in hospital.

Pharmacotherapy

Short acting bronchodilators

- Can be nebulised or inhaled
- Choice of delivery system should reflect the dose of drug required, the ability of the patient to use the device and the resources available to supervise the administration of the therapy.
- Change to hand-held inhalers as soon as the patient's condition has stabilised – this may permit earlier discharge from hospital.
- If hypercapnic or acidotic the nebuliser should be driven by compressed air, not oxygen (to avoid worsening hypercapnia). Ensure driving gas documented on the drug chart. If oxygen therapy is needed it should be administered simultaneously by nasal cannulae

Steroid therapy

- Oral corticosteroids should be used, in conjunction with other therapies, in all patients admitted to hospital with an exacerbation of COPD, unless contraindicated.
- Prescribe prednisolone 30mg orally for 7 to 14 days (no advantage in giving longer courses.)
- Consider osteoporosis prophylaxis should be considered in patients requiring frequent courses of oral corticosteroids.
- Give people, particularly those discharged from hospital, should be given clear instructions about why, when and how to stop their corticosteroid treatment.

Antibiotics: Check local guidelines for antibiotic choice

Consider antibiotics after taking into account:

- Severity of symptoms, particularly sputum changes
- Previous exacerbation and hospital admission history and risk of developing complications
- Previous sputum c&s results
- Risk of antimicrobial resistance with repeated courses of antibiotics

If a sputum sample has been sent for C&S and an antibiotics has been given:

- Review choice of antibiotic when results are available and only change the antibiotic according to susceptibility results if bacteria are resistant and symptoms are not already improving

If antibiotic is given, advise about

- Possible adverse effects eg diarrhoea
- Symptons that may not be fully resolved after course is complete
- Symptons that may not be fully resolved after course is complete

Seeking medical help if:

- Symptoms worsen rapidly/ significantly or
- Symptons do not start to improve within 2-3 days or
- Person becomes systemically very unwell

If no antibiotic is given, advise about

- Why antibiotic is not currently needed
- When to seek medical help (see above)

Theophylline and other methylxanthines

- Intravenous theophylline should only be used as an adjunct to the management of exacerbations of COPD if there is an inadequate response to nebulised bronchodilators.
- Use intravenous theophylline with caution because of interactions with

other drugs and potential toxicity if the patient has been on oral theophylline. Check levels within 24 hours of starting and monitor as frequently as indicated by the clinical circumstances.

Respiratory stimulants

- Only use doxapram when non- invasive ventilation is either unavailable or considered inappropriate.

Oxygen Therapy

- Measure arterial blood gases and note FiO2 in all people who arrive at hospital with an exacerbation of CORPD
- Prescribe oxygen to keep oxygen saturations within the individualised target range
- Clinicians should be aware that pulse oximetry gives no information about the pCO2 or pHrange

Non-invasive ventilation

- Treatment of choice for persistent hypercapnic ventilatory failure during exacerbations despite optimal medical therapy.
- NIV should be delivered in a dedicated setting with staff who have been trained in its application, who are experienced in its use and who are aware of its limitations.
- When starting NIV there should be a clear plan covering what to do in the event of deterioration and ceilings of therapy should be agreed.

Invasive ventilation and intensive care

- Patients with exacerbations of COPD should receive treatment on intensive care units, including invasive ventilation when this is thought to be necessary, taking into account:
- Functional status
- BMI
- Requirement for oxygen when stable
- Comorbidities
- Previous admissions to intensive care units
- Age and FEV^1. NB Neither age nor FEV^1 should be used in isolation when assessing suitability for NIV.
- NIV should be considered for patients who are slow to wean from invasive ventilation.

Respiratory physiotherapy

- Physiotherapy using positive expiratory pressure masks should be considered for selected patients with exacerbations of COPD, to help with clearing sputum

Monitoring recovery from an exacerbation

- Assess symptoms and observation of their functional capacity regularly
- Use pulse oximetry to monitor the recovery of patients with non-hypercapnic, non-acidotic respiratory failure.
- Use intermittent arterial blood gas measurements to monitor the recovery of patients with respiratory failure who are hypercapnic or acidotic, until they are stable
- Do not monitor peak expiratory flow or FEV^1 routinely to assess recovery because the magnitude of changes is small compared with the variability of the measurement

Discharge planning Before discharge:

- Measure spirometry in all patients.
- Re-establish patients on their optimal maintenance bronchodilator therapy.
- Ensure satisfactory oximetry or arterial blood gas results in all patients who have had an episode of respiratory failure.
- Assess all aspects of the routine care that patients receive, including appropriateness and risk of side effects
- Give appropriate information to enable patients to fully understand the correct use of medications, including oxygen.
- Make arrangements for follow-up and home care, such as visiting nurse, oxygen delivery, and referral for other support.
- The patient, their family and their physician should be confident that the patient can manage successfully. When there is remaining doubt a formal activities of daily living assessment may be helpful.

Management of acute asthma

Dr Anna Moore, SpR Respiratory Medicine

The SIGN/BTS Guidelines for management of asthma exacerbations were updated in 2016 and include lessons from the 2014 National Report into Asthma Deaths (NRAD). The NICE asthma guidelines were last updated and published in 2017 but contained some guidance that was contradictory to that from the SIGN/BTS guideline. Publication of a single co-badged national guideline is planned for 2019. From NRAD, most deaths occurred pre-hospital, and factors associated with mortality included:

- **chronic severe disease**, eg previous near fatal asthma requiring ventilation or associated with respiratory acidosis, previous admission with asthma, requiring ≥3 classes of asthma medication, heavy ß2 agonist use, repeated ED attendances especially in the last year
- **inadequate medical management or monitoring**, including inappropriate prescribing of beta blockers and NSAIDS and late referral for specialist advice. The report highlighted the increased risk of death within one month of discharge and that follow up in primary care is therefore essential
- **adverse psychosocial and behavioural factors**, including non-adherence, failure to attend appointments, self-discharge from hospital (for full list please see guideline)

seasonal factors: asthma

- deaths peak in July and August in young people (<44 years) and December and January in older people.

Recognition of acute asthma

Moderate acute asthma:

- increasing symptoms
- PEFR >50-70% best or predicted
- No features of acute severe asthma

Acute severe asthma:

Any one of:

- PEFR 33-50% best or predicted
- RR ≥25/min
- HR ≥110/min

Inability to complete sentences

- in one breath

Life threatening asthma:

Clinical signs:

- altered conscious level
- exhaustion
- arrhythmia
- hypotension
- cyanosis
- silent chest
- poor respiratory

effort Measurements:

- PEFR <33% best or predicted
- SpO2 <92%
- PaO2 <8kPa
- Normal PaCO2 (4.6-6.0 kPa)

Near fatal asthma:

- Raised PaCO2 and/or requiring mechanical ventilation with raised inflation pressures

Treatment of acute asthma in adults

Oxygen:

- If hypoxic give controlled oxygen, aiming sats 94-98%
- Avoid hyperoxygenation as this could be detrimental

ß2 agonist bronchodilators:

- salbutamol and terbutaline equally effective, use oxygen to drive nebulisers
- give continuously if not responding to bolus dose
- nebulised adrenaline does not have benefit over salbutamol/terbutaline
- IV ß2 agonist should be reserved for patients who cannot use inhaled therapy reliably (monitor lactate if using IV)

Steroids:

- PO steroids are as effective as IV unless patient unable to swallow/ absorb
- Give prednisolone 40-50mg daily or hydrocortisone 100mg QDS
- Continue prednisolone for 5 days or until recovery

Ipratropium bromide:

- adding ipratropium (0.5mg 4-6 hourly) to salbutamol has a greater bronchodilator effect than
  salbutamol alone in acute severe or life threatening asthma

- not necessary and may not be beneficial in milder attacks or after stabilisation

Magnesium:

- some evidence that magnesium has a bronchodilator effect
- do not give nebulised magnesium
- give a single dose of IV magnesium sulphate (1.2-2g over 20 minutes) in acute severe asthma or if not responding to nebulised bronchodilators

Aminophylline:

- in acute asthma, aminophylline unlikely result in additional bronchodilation effect
- if near-fatal or life threatening asthma with poor response to initial therapy may gain benefit from IV aminophylline (5mg/kg loading dose over 20 minutes unless on PO maintenance therapy, then infusion 0.5-0.7mg/kg/hr
- significant side effects of vomiting and arrhythmias
- check levels if on maintenance dose preadmission, and daily if on infusion

Not routinely indicated:

- Leukotriene receptor antagonists
- Antibiotics (infective exacerbations are most likely viral)
- Heliox
- IV fluids (unless requires rehydration or correction of electrolyte imbalance. Hypokalaemia common side effect of nebulised salbutamol/ steroid)
- Nebulised furosemide – no benefit

When to call ITU

- patient requiring ventilatory support
- acute severe or life threatening asthma failing to respond to therapy as evidenced by:
  - Deteriorating PEF
  - Persisting/worsening hypoxia
  - Hypercapnia
  - Falling pH or rising H+ on ABG
  - Exhaustion or feeble respiration
  - Drowsiness, confusion or altered mental state
  - Respiratory arrest
- may not need ventilation but ITU best setting for care

- intubation very difficult in acute severe asthma
- no evidence for ketamine or recombinant human deoxyribonuclease

Non-Invasive Ventilation:

- hypercapnic respiratory failure in asthma is indication for admission to ITU
- limited and inconclusive data about NIV in asthma
- may be safe but should only be considered on ITU

Monitoring

Measure and document:

- PEFR 15-30 minutes after starting treatment and continue according to response
- PEFR before and after nebulised therapy
- Oxygen saturations: keep 94-98%
- ABG within one hour of starting treatment if:
- Pa O2 <8kPa unless sats are >92%
- Initial PaCO2 is normal or raised
- Patient's condition deteriorates
- Repeat if condition has not improved in 4-6 hours
- Heart rate
- Blood glucose and K
- Theophylline levels if continuing amoinophylline for >24 hours (aim for 10-20mg/L or 55-110mmol/L)

Discharge and follow up

- No single parameter for defining timing of discharge
- Should be on reducing dose of salbutamol
- Patients discharged when PEF <75% predicted or best or variability of >25% are higher risk for early relapse and readmission
- Educate patients: inhaler technique, PEF monitoring and recording, personalised asthma action plan – role for specialist asthma nurse
- Inform primary care practice within 24 hours of discharge from hospital/ ED

Community acquired pneumonia

Dr Anna Moore, SpR in Respiratory Medicine

Published 2014 (NICE) and 2009 (BTS). BTS guidelines define community acquired pneumonia in patients admitted to hospital as "Symptoms and signs consistent with an acute lower respiratory tract infection associated with new radiographic shadowing for which there is no other explanation (eg. not pulmonary oedema or infarction)" – where those symptoms are the primary reason for admission.

Assessment

Mortality risk

- Use CURB 65 – one point for each of:
- Confusion (AMTS <8 or new disorientation in time, place or person)
- Raised blood urea nitrogen (>7mmol/L)
- Raised RR (>30/min)
- Low BP (<90mmHg systolic or <60mmHg diastolic)
- Age >65 years

Risk of death by score:

- 0-1: <3% (low)
- 2: 3-15% (intermediate)
- 3-5: >15% (high)

Decision about place of care- using CURB 65 score and clinical judgement:

- 0-1: consider home based care
- 2: consider hospital based care
- 3-5: consider intensive care assessment
- Review severity status regularly – at least 12 hourly if severe pneumonia

Investigations

- All patients:
- Oxygen saturations and ABG if necessary (see BTS oxygen guidelines)
- CXR
- U&Es
- CRP
- LFTs and FBC

For moderate to high severity pneumonia:

- Blood cultures (preferably before antibiotics)
- Sputum culture (before giving antibiotics)
- Consider sending pneumococcal and legionella urinary antigen
- if legionella positive, send sputum for legionella culture for epidemiological typing

For low severity pneumonia, decide on microbiological testing taking into account clinical factors: age, comorbidity, severity indicators, previous antibiotic therapy and epidemiological factors

- Do not routinely test for other pathogens (PCR for Mycoplasma, Chlamydophia species, viruses), unless no particular organism has been identified and patient is failing to respond, or there are epidemiological reasons

Management

General principles

- Appropriate oxygen therapy (with monitoring) to maintain (PaO_2) ≥ 8 kPa and oxygen saturation (SpO_2) 94–98%.
- High concentrations of oxygen can safely be given in patients who are not at risk of hypercapnic respiratory failure
- If at risk of hypercapnic respiratory failure and complicated by ventilatory failure guide oxygen therapy with repeated ABG
- IV fluid resuscitation as required
- VTE prophylaxis
- Monitor CRP and repeat CXR if no improvement after 3 days
- Do not offer glucocorticosteroid unless patient has a condition which requires steroids

Respiratory support

- Non-invasive ventilation (NIV) or continuous positive airway pressure (CPAP) should not be used routinely in patients with respiratory failure due to community acquired pneumonia

- If non-invasive ventilatory support is needed, it should be given in
  a critical area where expertise is available to facilitate rapid transition to invasive ventilation

Empirical antibiotics

Check local guidelines for agent of choice and guidance on penicillin allergy. The drugs below are specified in the guidelines.

- Confirm diagnosis of CAP before giving antibiotics, unless presumptive diagnosis in life- threatening disease
- Give antibiotics as soon as diagnosis confirmed and within 4 hours of presentation
- Low-moderate severity uncomplicated pneumonia: give 7 days of antibiotics
- High severity and microbiologically undefined: 7-10 days antibiotics or extended according to clinical circumstances
- Document indication for antibiotics clearly
- De-escalate antibiotics and switch IV to PO as soon as clinically possible and normal temperature for 24 hours
- Narrow spectrum when pathogen identified

Low severity

- oral amoxicillin or if PO contraindicated, IV amoxicillin, benzylpenicillin or clarithromycin

Moderate severity

- most patients can be adequately treated with oral antibiotics
- give amoxicillin and macrolide
  - consider macrolide alone if patient has failed to respond to an adequate course of amoxicillin pre-admission – but
    discuss this decision with senior clinician and give both until decided otherwise
- if PO contraindicated, IV amoxicillin or benzylpenicillin and clarithromycin
- in penicillin or macrolide intolerance, if giving PO
  - doxycycline, levofloxacin or moxifloxacin

- in penicillin intolerance if giving IV
  - second (cefuroxime) or third (cefotaxime/ceftriaxone) generation cephalosporin and IV clarithromycin

High severity

- treat immediately after diagnosis with parenteral antibiotics
- give broad spectrum ß-lactamase stable antibiotic (co-amoxiclav) with macrolide eg clarithromycin
- in penicillin allergy
  - second (cefuroxime) or third (cefotaxime/ceftriaxone) generation cephalosporin and IV clarithromycin

Common complications of CAP

- Empyema – perform thoracocentesis early in any patient with parapneumonic effusion and drain if pH <7.2 or found to have empyema

Follow up

- Patients should be reviewed at 6 weeks – either by GP or in hospital clinic, hospital team responsible for arranging this
- Repeat CXR at 6/52 or if signs or symptoms are persistent or high risk of underlying malignancy

Smoking

- All patients diagnosed with CAP who are smokers should be offered smoking cessation advice

Venous thromboembolism

Last updated November 2015, the guidelines recommend against giving systemic thrombolysis in haemodynamically stable PE, even if right heart dysfunction is present.

Definition of VTE according to NICE: “a condition in which a blood clot (a thrombus) forms in a vein, most commonly in the deep veins of the legs or pelvis. This is known as deep vein thrombosis, or DVT. The thrombus can dislodge and travel in the blood, particularly to the pulmonary arteries. This is known as pulmonary embolism, or PE. The term ‘VTE’ includes both DVT and PE.”

Guideline distinguishes between provoked and unprovoked VTE:

- Provoked: patient with a transient risk factor (eg surgery/immobility/ pregnancy/ OCP) within last 3 months
- Unprovoked: no known risk factors OR active cancer, thrombophilia or family history of VTE, because these are constant

Assessment and investigations DVT

- Thorough history and examination to exclude differential diagnoses
- If suspect DVT, use two-level Wells Score (below) to assess likelihood

Clinical feature	Points
Active cancer (treatment ongoing, within 6 months, or palliative)	1
Paralysis, paresis or recent plaster immobilisation of the lower extremities	1
Recently bedridden for 3 days or more or major surgery within 12 weeks requiring general or regional anaesthesia	1
Localised tenderness along the distribution of the deep venous system	1
Entire leg swollen	1
Calf swelling at least 3 cm larger than asymptomatic side	1

Clinical feature	Points
Pitting oedema confined to the symptomatic leg	1
Collateral superficial veins (non-varicose)	1
Previously documented DVT	1
An alternative diagnosis is at least as likely as DVT	−2
Clinical probability simplified score	
DVT *likely*	2 points or more
DVT *unlikely*	1 point or less

Adapted with permission from Wells PS et al. (2003) Evaluation of D-dimer in the diagnosis of suspected deep-vein thrombosis

If Wells Score "likely", either:

- Within 4 hours: proximal leg vein ultrasound, and if negative, D-dimer (repeat ultrasound in 6-8 days if D-dimer positive but US negative)
- Or, if 4 hour scan not available, D-dimer, parenteral anticoagulant and ultrasound within 24 hours

If DVT suspected and two-level Wells Score "unlikely", do D-dimer. If positive, either:

- Within 4 hours: proximal leg vein ultrasound scan
- Or, if 4 hour scan not available, give interim parenteral anticoagulant and ultrasound within 2 hours

Consider alternative diagnosis if:

- Two-level Wells Score "unlikely", and negative D-dimer, or positive D-dimer and negative ultrasound
- Two-level Wells Score "likely" and negative ultrasound and negative D-dimer
- Two negative

ultrasounds Or

- Two-level Wells Score "likely" and Negative ultrasound and negative D-dimer
- Two negative ultrasounds

PE

History, examination and CXR to exclude differential diagnoses

If suspect PE, use two-level Wells Score to assess likelihood:

Clinical feature	Points
Clinical signs and symptoms of DVT (minimum of leg swelling and pain with palpation of the deep veins)	3
An alternative diagnosis is less likely than PE	3
Heart rate >100 beats per minute	1.5
Immobilisation for more than 3 days or surgery in the previous 4 weeks	1.5
Previous DVT/PE	1.5
Haemoptysis	1
Malignancy (on treatment, treated in the last 6 months, or palliative)	1
Clinical probability simplified score	
PE *likely*	More than 4 points
PE *unlikely*	4 points or less

Adapted with permission from Wells PS et al. (2000) Derivation of a simple clinical model to categorize patents' probability of pulmonary embolism: increasing the model's utility with the SimpliRED D-dimer

If "likely" Wells Score, or "unlikely" Wells Score with positive D-dimer, either:

- Immediate CTPA
- Or, if CTPA not available immediately, immediate interim parenteral anticoagulant

Consider proximal leg vein ultrasound if CTPA negative but suspect DVT

If contrast allergy, renal impairment, or risk from irradiation too high (ie. pregnancy):

- Consider V/Q SPECT or, if not available, V/Q planar scan (need normal CXR)
- If not available immediately, give interim parenteral anticoagulant

Consider alternative diagnosis if

- "Unlikely" two-level Wells Score and negative D-dimer or positive D-dimer and negative CTPA or
- "Likely" two-level Wells Score and negative CTPA and no suspected DVT

If signs and symptoms of both DVT and PE, investigate for either, depending on clinical judgment

Treatment: for both DVT and PE

Acutely

- Treat as soon as possible
- Low molecular weight heparin (LMWH) or fondaparinux
- If renal impairment (eGFR <30) either:
  - Unfractionated heparin (UFH) – monitor APTT (better if increased risk bleeding)

  or
  - LMWH – monitor factor Xa
- Continue parenteral anticoagulant until INR is 2 or above for 24 hours
- If haemodynamically unstable PE, give UFH and consider thrombolysis
- Do not offer thrombolysis to patients with PE and haemodynamic stability with or without RV dysfunction
- Consider catheter directed thrombolysis if symptomatic ileofemoral DVT and symptoms for <14 days, good functional status, life expectancy >1 year and low risk of bleeding
- Offer inferior vena caval filter if:
  - Patient cannot be anticoagulated. Remove IVC filter and anticoagulate when possible.
  - Recurrent proximal DVT or PE despite adequate anticoagulation, having considered alternatives eg increasing target INR to 3-4 or switching to LMWH

Longer term

- If active cancer:
  - Treat both DVT and PE for 6 months
  - Then reassess risk/benefit of continuing
- If not, treat for 3 months, then reassess risk/benefit
- Having assessed bleeding vs recurrence risks,
  - Give >6 months treatment if unprovoked PE

- Consider >6 months if unprovoked DVT

Newer Oral Anticoagulants: Recommendation from NICE guidance on NOACs

- Rivaroxaban recommended as an option for:
  - treating DVT
  - preventing recurrent DVT and PE after a diagnosis of acute DVT.

Further investigations

Cancer

If unprovoked DVT or PE and not already known to have cancer perform:

- physical examination (guided by history)
- CXR
- full blood count, serum calcium and liver function tests
- urinalysis
- If over 40 and first unprovoked DVT or PE and no signs/symptoms of cancer consider abdomino-pelvic CT and mammogram for women.

Thrombophilia

Do not test for thrombophilia if:

- Anticoagulated
- “Provoked” DVT or PE
- Consider testing for antiphospholipid antibodies in patients who have had unprovoked DVT or PE if planning to stop anticoagulation.
- Consider testing for hereditary thrombophilia in patients if unprovoked DVT or PE and first- degree relative who has had DVT or PE if planning to stop anticoagulation.

Summary of Joint BTS/ICS Guidelines for the Ventilatory Management of Acute Hypercapnic Respiratory Failure, March 2016

This replaces the 2008 BTS guidelines for management of type 2 respiratory failure in COPD exacerbation, and advises on management of acute hypercapnic respiratory failure (AHRF) of any cause. It highlights importance of prevention, and advises keeping oxygen saturations 88-92% in patients at risk of AHRF.

Patient selection

When NOT to use NIV:

- Acute exacerbation of asthma or pneumonia
  - If respiratory support is needed (ie pH <7.35 and pCO2 >6.5), refer to ITU
- Other indications for referral to ITU instead of giving ward based NIV:
  - Impending respiratory arrest
  - NIV failing to reduce pCO2 or augment chest wall movement
  - Not maintaining saturations >85-88%
  - Needing IV sedation
  - Adverse features indicating need for close monitoring
  - Possible difficult intubation – eg obesity hypoventilation syndrome, Duchenne muscular dystrophy
- Absolute contraindications to NIV
  - Facial burns/trauma/deformity
  - Fixed upper airway obstruction
- Relative contraindications to NIV
  - pH <7.15 or <7.25 with adverse features
  - GCS <8
  - Confusion/agitation
  - Cognitive impairment – need enhanced supervision
  - Tachyarrhythmia with haemodynamic compromise – consider intubation

NB

- Pneumothorax is not a contraindication to NIV as long as chest drain is in place.
  - If too small to drain or chronic, can proceed with NIV with careful monitoring and reduced pressures, and stop immediately if any deterioration
- Vomiting is no longer considered a contraindication due to risk of aspiration – manage by inserting NG tube and ensure mask can be quickly removed
- Copious secretions may increase risk of treatment failure but NIV may also improve clearance and improve alveolar ventilation

When TO use NIV:

- COPD:
  - pH <7.35
  - PaCO2 >6.5
  - RR >23
  - Update 2017: consider NIV if PaCO2 is 6-6.5 (grade D evidence)
- Neuromuscular disease (NMD) or chest wall disease (CWD)
  - Respiratory illness with RR >20 if usual VC <1L even if pCO2 <6.5
  - Or pH <7.35 and PaCO2 >6.5
- Obesity hypoventilation syndrome (OHS)
  - pH <7.35 and PaCO2 >6.5
  - Or daytime CO2 >6 and somnolence

Before starting

NIV Investigate

- Arterial blood gas
- CXR (unless pH <7.25 to avoid delay in starting ventilation)
- Request FBC, U&E and ECG and think about reversible causes of AHRF and look for evidence of other organ dysfunction
- Consider echo if features of pulmonary oedema
- Ascertain other co-morbidities

Manage medically

- Keep saturations 88-92% in ANY CAUSE of acute hypercapnic respiratory failure
- Give bronchodilators, antibiotics and steroids as appropriate
- Get specialist help for obesity hypoventilation syndromes/ neuromuscular patients

- In OHS fluid overload a frequent problem

Make a plan in the event of NIV failure and decide DNAR status – discuss with patient or relatives as able

- Escalate to invasive mechanical ventilation?
- Admit to ITU for NIV?
- Ward based NIV only?
- Stop NIV?

Setting

up

Devices

- Pressure targeted ventilators are devices of choice
- Full face mask should be used initially, offer a range of other interfaces to suit individual

Initial pressure settings (in cm of H2O)

- EPAP: 3 (higher if OSA)
- IPAP:
  - If COPD/OHS/CWD, start at 15
    - » If pH is <7.25, start at 20
  - If neuromuscular (NM) cause, start at 10, or 5 above their usual setting

Up-titration

- Increase IPAP over 10-30 mins to 20-30cmH2O, aiming for adequate augmentation of chest wall/abdominal movement and reduction in RR
- Don't increase IPAP above 30 or EPAP above 8 without expert review

Back up rate

- Set at 15-20 breaths per minute
- Set inspiratory time at 0.8-1.2 seconds for COPD, 1.2-1.5 seconds for OHS, NMD or CWD

Inspiratory expiratory ratio (I:E)

- In COPD 1:2 to 1:3
- In OHS, NMD or CWD 1:1

Use NIV as much as possible in 1st 24 hours, then taper over next 48 hours according to blood gases and clinical condition

Monitoring

- Continuous oxygen saturation monitoring is required
- Check PaCO2 and H intermittently to assess response to treatment

- ECG monitoring if tachycardic >120 bpm, known cardiomyopathy or dysrhythmia

"Red flags"

- pH still <7.25 on optimal NIV
- RR persistently >25
- New onset confusion or distress
  - Check synchronisation
  - Check mask fit
  - Check exhalation port
  - Chest physiotherapy
  - Bronchodilators
  - Try anxiolytic
- If not successful, discuss with ITU for consideration of invasive mechanical ventilation

Supplementary Oxygen

- Keep saturations 88-92%
- Oxygen supply should be attached at or near the mask#
- Optimise NIV settings before increasing FiO2
- Giving >4L/minute may cause mask leak or delay in triggering and lead to patient/ventilator asynchrony

Humidification and bronchodilator therapy

- Humidification is not routinely required
- Give nebulised bronchodilators when having break from NIV – more effective than giving through NIV circuit. Can give through circuit if patient doesn't tolerate coming off NIV.

Sedation

- Only give with close monitoring
- If requiring IV sedation, should be given on ITU/HDU
- If not for invasive ventilation, sedation/anxiolysis indicated in distress/agitation
  - IV morphine 2.5-5mg (+/-benzodiazepine) while ON NIV, may improve tolerance to NIV and reduce symptoms

Complications

- Ulceration of nasal bridge most common – use barrier dressings, alternate type of masks, may require topical steroids +/- antibiotics
- Gastric distension – insert NG tube

- Pneumothorax – higher risk if had previous pneumothorax or in interstitial lung disease – use lower pressures. Difficult to detect – suspect if increasing agitation, distress or chest pain. Will need chest drain and consideration of risk: benefit of continuing NIV.

End of life care

- A proportion of patients on NIV will be at their ceiling of care, and symptom control in this group can be difficult
- Patients and relatives should be involved as far as possible in discussions about ceilings of care and withdrawing ventilation
- It is possible to achieve a dignified and comfortable death on NIV
  – removal of mask not always necessary
- Clinicians delivering NIV should have training in end of life care and access to specialist palliative care support

Cardiology

High sensitivity troponin and acute MI

Dr Anish Bhuva, SpR in Cardiology

There is a great deal of emphasis on the use of troponin as a biomarker for the diagnosis of acute myocardial infarction and it is a key component of the third universal definition of MI:

Third universal definition of myocardial infarction

Detection of rise and/or fall of cardiac biomarker values (preferably troponin) with at least one value above the 99th percentile of the upper reference limit and with at least one of the following:

- Symptioms of ischaemia;
- New or presumably new significant ST-T changes or new LBBB;
- Development of pathological Q waves in the ECG;
- Imaging evidence of new loss of viable myocardium, or new regional wall motion abnormality;
- Identification of an intracoronary thrombus by angiography or autopsy

Cardiac death with sympoms suggestive of myocardial ischaemia, and presumably new ECG changes or new LBBB, but death occurring before blood cardiac biomarkers values are released or before cardiac biomarker values would be increased.

Stent thromboses associated with MI when detected by coronary angiography or autopsy in the setting of myocardial ischaemia and with a rise and/or fall of cardiac biomarker values with at least one value above the 99th percentile URL.

ECG = electrocardiogram; LBBB-left bundle branch block.

[a]Excluding myocardial infarction associated with revascularisation procedures or criteria for prior myocardial infarction.

Figure 1: 2012 ESC guidelines "Third universal definition of myocardial infarction"

Universal classification of myocardial infarction:

Type of AMI	Definition	Description
Type 1	Spontaneous AMI	Plaque rupture
Type 2	Ischaemic imbalance	Coronary spasm, embolism, dissection, hypotension etc
Type 3	Cardiac death	Presumed AMI (death before biomarker values were obtained or could rise)
Type 4a	Related to PCI	Troponin values >5 times 99th percentile URL (with normal baseline values) or rise >20%, and additional evidence
Type 4b	Caused by stent thrombosis	Confirmed at angiography or autopsy
Type 5	Related to CABG	Troponin values >10 times 99 th percentile URL (with normal baseline values) and additional evidence

- Troponin is a highly specific and sensitive biomarker of cardiac necrosis, regardless of the underlying pathophysiology
- There is hererogeneity in Troponin assays and their reference values. Be familiar with the assay in use at your hospital
- 'High sensitivity' troponin assays are recommended in the current guidelines for the diagnosis of myocardial infarction (2015 ESC Guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation. European Heart Journal (2016) 37, 267-315 doi: 10.1093/eurheartj/ehv320)
- Point-of-care tests are usually less sensitive than lab tests
- Not all troponin elevation is due to ACS

- The introduction of 'high sensitivity' troponin assays have a 10 to 100 fold increase sensitivity in troponin release
- Detecting a dynamic rise therefore at 3 hours increases sensitivity up to 100% and has a negative predictive value of over 95%
- It is therefore recommended in current guidelines for the diagnosis of myocardial infarction (ESC guidelines 2011 Management of acute coronary syndromes in patients presenting without persisting ST segment elevation European Heart Journal (2011) 32, 2999–3054 doi:10.1093/eurheartj/ ehr236)
- It is important to remember that with increased sensitivity, is decreased specificity
- Not all troponin elevation– particularly when borderline levels are picked up–is related to ischaemia, and part of a careful history, examination and review of ECG is to pick up important mimics that include arrhythmia, heart failure, pulmonary embolus, aortic dissection amongst others)

Novel antiplatelet agents in NSTEACS (Non ST Elevation Acute coronary syndrome)

- Generally there will be NHS Trust specific guidelines on dual antiplatelet availability
- Newer ADP-receptor antagonists similar to clopidogrel (Prasugrel and Ticagrelor) reduce cardiovascular death after an acute coronary syndrome
- Prasugrel and Ticagrelor however are both associated with increased non-CABG related major bleeding and should be used in caution with patients with high bleeding risk. Prasugrel is contraindicated in those with history of TIA or stroke and is not recommended in patients aged over 75
- Ticagrelor is contraindicated in those with previous intracranial bleeding or moderate to severe hepatic dysfunction

References

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clopidogrel in patients with acute coronary syndromes. N Engl J Med 2007;357:2001 – 2015)

(Wallentin L, Becker RC, Budaj A, Cannon CP, Emanuelsson H, Held C, Horrow J, Husted S, James S, Katus H, Mahaffey KW, Scirica BM, Skene A, Steg PG, Storey RF, Harrington RA, for the PLATO Investigators. Ticagrelor versus clopidogrel in patients with acute coronary syndromes. N Engl J Med 2009;361:1045 – 1057)

Recommendations for oral antiplatelet agents

Recomendations	Class[a]	Level[b]
Aspirin should be given to all patients without contraindications at an initial loading dose of 150-300mg, and at a maintenance dose of 75-100mg daily long-term regardless of treatment strategy.	I	A
A P2Y12 inhibitor should be added to asaspiring as soon as possible and maintained over 12 months, unless there are contraindications such as excessive risk of bleeding.	I	A
A proton pump inhibitor (preferably not omeprazole) in combination with DAPT is recommended in patients with a history of gastrointestinal haemorrhage or peptic ulcer, and appropriate for patients with multiple other risk factors (H. elicobacter pylori infection, age >65 years, concurrent use of anticoagulants or steroids).	I	A
Prolonged or permanent withdrawal of P2Y12 inhibitors within 12 months after the index event is discouraged unless clinically indicated.	I	C
Ticagrelor (180mg loading dose, 90mg daily) is recommended for all patients at moderate-to-high risk of ischaemic events (eg. elevated troponins), regardless of initial treatment strategy and including those pre-treated with clopidogrel (which should be discontinued when ticagrelor is commenced).	I	B

Recomendations	Class[a]	Level[b]
Prasugrel (60m loading dose, 10mg daily dose) is recommended for P2Y12-inhibitor-naïve patients (especially diabetics) in whom coronary anatomy is known and who are proceeding to PCI unless there is a high risk of life-threatening bleeding or other contraindications.d	I	B
Clopidogrel (300mg loading dose, 75mg daily dose) is recommended for patients who cannot receive ticagrelor or prasugrel.	I	A
A 600mg loading dose of clopidogrel (or a supplementary 300mg dose at PCI following and following an initial 300mg loading dose) is recommended for patients scheduled for an invasive strategy when ticagrelor or prasugrel is not an option.	I	B
A higher maintenance dose of clopidogrel 150mg daily should be considered for the first 7 days in patients managed with PCI and without increased risk of bleeding.	IIa	B
Increasing the maintenance dose of clopidogrel based on platelet function testing is not advised as routing, but may be considreed in selected cases.	IIb	B
Genotyping and/or platelet function testing may be considered in selected cases when clopidogrel is used.	IIb	B
In patients pretreated with P2Y12 inhibitors who need to undergo non-emergent major surgery (including CABG), postponing surgery at least for 5 days after cessation of ticagrelor or clopidogrel, and 7 days for prasugrel, if clinically feasibly and unless the patient is at high risk of ischaemic events should be considered.	IIa	C
Ticagrelor or clopidogrel should be considered to be (re-)started after CABG surgery as soon as considered safe.	IIa	B
The combination of aspirin with an NSAID (selective COX-2 inhibitors and non-selective NSAID) is not recommended.	III	C

Figure 2: 2011 ESC guidelines for the management of acute coronary syndromes in patients presenting without persistent ST elevation.

Antiplatelet agents in NSTEACS (Non ST Elevation Acute coronary syndrome)

- Generally there will be NHS Trust specific guidelines on dual antiplatelet availability
- Prasugrel and ticagrelor are $P2Y_{12}$ receptor blockers and have a more potent

antiplatelet effect than clopidogrel, but increased bleeding risk is an important consdieration

Recommendations for platelet inhibition in non-STelevation acute coronary syndromes

Recommendations	Class[a]	Level[b]
Oral antiplatelet therapy		
Aspirin is recommended for all patients without contraindications at an initial oral loading dose[d] of 150–300 mg (in aspirin-naive patients) and a maintenance dose of 75–100 mg/day long-term regardless of treatment strategy.	I	A
A $P2Y_{12}$ inhibitor is recommended, in addition to aspirin, for 12 months unless there are contraindications such as excessive risk of bleeds.	I	A
• Ticagrelor (180 mg loading dose, 90 mg twice daily) is recommended, in the absence of contraindications,[e] for all patients at moderate-to-high risk of ischaemic events (e.g. elevated cardiac troponins), regardless of initial treatment strategy and including those pretreated with clopidogrel (which should be discontinued when ticagrelor is started).	I	B
• Prasugrel (60 mg loading dose, 10 mg daily dose) is recommended in patients who are proceeding to PCI if no contraindication.[e]	I	B
• Clopidogrel (300–600 mg loading dose, 75 mg daily dose) is recommended for patients who cannot receive ticagrelor or prasugrel or who require oral anticoagulation.	I	B
$P2Y_{12}$ inhibitor administration for a shorter duration of 3–6 months after DES implantation may be considered in patients deemed at high bleeding risk.	IIb	A
It is not recommended to administer prasugrel in patients in whom coronary anatomy is not known.	III	B

2015 ESC Guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation
European Heart Journal (2016) 37, 267–315
doi:10.1093/eurheartj/ehv320

Implantable devices in heart failure

- Heart failure due to ischaemic cardiomyopathy is common
- Implantable cardiac defibrillators (ICDs) are recommended as a possible treatment who are at high risk of sudden cardiac death
- Cardiac Resynchronisation Therapy ('CRT') with or without defibrillator function can also be used to improve symptoms in selected patients.

  NICE guidance published in 2014 have now recommended consideration of device therapy for more groups of patients
- It is worth considering a cardiology review for device implantation in any patient deemed suitable and with >1 year expected survival with a LV ejection fraction <35%
- In those with a narrow QRS complex (<120ms), an ICD can be considered; and those with a broad QRS complex (>120ms) a CRT can be considered

Treatment options with ICD or CRT for people with heart failure who have left ventricular dysfunciton with an LVEF of 35% or less (according to NYHA class, QRS duration and presence of LBBB).

	NYHA class			
QRS interval	I	II	III	IV
<120 milliseconds	ICD is there is a high risk of sudden cardiac death			ICD and CVRT not clinically indicated
120-149 milliseconds P without LBBB	ICD	ICD	ICD	CRT-
120-149 milliseconds with P LBBB	ICD	CRT-D	CRT-P or CRT-D	CRT-
>150 milliseconds with or P without LBBB	CRT-D	CRT-D	CRT-P or CRT-D	CRT-
LBBB, left bundle branch block; NYHA, New York Heart Association				

Figure 3: NICE Technology Appraisal TA134, published June 2014

Newer oral anticoagulant agents

NICE Guidance CG180 (2014) states that anticoagulation to prevent stroke in non valvular atrial fibrillation may be with apixiban, dabigatran etexilate, rivaroxaban or a vitamin K antagonist. Their characteristics are outlined below, as are options for reversal.

	Warfarin	Rivaroxaban	Apixaban	Dabigatran etexilate
Target	Vitamin K epoxide reductase (reducing the vitamin K-dependent coagulation factors)	Factor Xa	Factor Xa	Thrombin
T (max) Half-life	72-96h [3] 40h [3]	2.5-4h [4] 5-9h healthy, 9-13h elderly [4]	3h [5] 8-15h [5]	2h [6] 14-17h [6]
Monitoring Administration Metabolism	INR-adjusted Once daily Cytochrome P450	Not needed Once daily 66% fecal, 33% renal [4]	Not needed Twice daily 75 fecal, 25% _renal [4]	Not needed Once or twice daily 80% renal, 20% fecal [6]
Antidote or treatment of bleeding	Vitamin K + FFP, APCC, or recombinant FVIIa	Recombinant factor Xa derivativea, recombinant FVIIab, APPCCb	Recombinant factor Xa derivativea	No antidote
Assay Drug interactions	PT/INR CYP 2CP, 1A2, and 3A4	Antifactor Xa, PiCT, HepTest Potent CYP3A4 inhibitors	Antifactor Xa Potent CYP3A4 inhibitors	Ecarin clotting time Proton pump inhibitors decrease absorption

	Warfarin	Rivaroxaban	Apixaban	Dabigatran etexilate

APCC, activated prothrombin complex concentrate; CYP, cytochrome P450; FFP, fresh frozen plasma; FVIIa, factor VIIa; h, hours; hepTest, heparin test; INR, international normalized ratio; PiCT, one-step prothrombinase-induced clotting time; PT, prothrombin time; T (max), peak plasma levels.

[a]In-vitro human, and in-vivo animal studies [7].

[b]In-vivo animal studies [8].

Figure 4: Comparative properties of thrombin and Factor Xa inhibitors.

Curr Opin Hematol. 2009 Sep;16(5):347-56. Oral anticoagulation with factor Xa and thrombin inhibitors: on the threshold of change. Zikria JC1, Ansell J.W

Image from Van Rym et al Am J Med 2012;125:147

Atrial fibrillation

Dr Emily Gowland, SpR in Anaesthetics and Education Fellow

Rate and rhythm control

- Carry out emergency electrical cardioversion, without delaying to achieve anticoagulation, in people with life-threatening haemodynamic instability caused by new-onset atrial fibrillation.
- In people with atrial fibrillation presenting acutely without life-threatening haemodynamic instability, offer rate or rhythm control if the onset of the arrhythmia is less than 48 hours, and start rate control if it is more than 48 hours or is uncertain.
- Consider either pharmacological or electrical cardioversion depending on clinical circumstances and resources in people with new-onset atrial fibrillation who will be treated with a rhythm control strategy.
- If pharmacological cardioversion has been agreed on clinical and resource grounds for new-onset atrial fibrillation, offer:
  - flecainide or amiodarone if there is no evidence of structural or ischaemic heart disease or
  - amiodarone if there is evidence of structural heart disease.
- In people with atrial fibrillation in whom the duration of the arrhythmia is greater than 48 hours or uncertain and considered for long-term rhythm control, delay cardioversion until they have been maintained on therapeutic anticoagulation for a minimum of 3 weeks. During this period offer rate control as appropriate.
- Do not offer magnesium or a calcium-channel blocker for pharmacological cardioversion

Anticoagulation

- In people with new-onset atrial fibrillation who are receiving no, or subtherapeutic, anticoagulation therapy:
  - in the absence of contraindications, offer heparin at initial presentation continue heparin until a full assessment

has been made and appropriate antithrombotic therapy has been started, based on risk stratification (for stroke or bleeding risk)

- In people with a confirmed diagnosis of atrial fibrillation of recent onset (less than 48 hours since onset), offer oral anticoagulation if:
  - stable sinus rhythm is not successfully restored within the same 48-hour period following onset of atrial fibrillation or
  - there are factors indicating a high risk of atrial fibrillation recurrence or it is recommended after risk stratification
- In people with new-onset atrial fibrillation where there is uncertainty over the precise time since onset, offer oral anticoagulation as for persistent atrial

Central nervous system

Stroke

Anna Moore, SpR in Respiratory Medicine and Jonathan Birns, Consultant in Stroke Medicine, Geriatrics & General Medicine

A stroke and/or TIA is a focal neurological deficit of vascular origin. The history needs to confirm:

1. Neurological symptoms are **focal** rather than non-focal?
2. Symptoms are **negative** rather than positive?
3. **Onset** of symptoms is **sudden**?
4. Symptoms were **maximal at onset** rather than progressing over a period?

Recognition: use validated tool such as (FAST: Face Arm Speech Test)

Remember nil by mouth until swallow assessment done
Exclude hypoglycaemia as cause of symptoms

Everyone with suspected TIA should receive:

- Aspirin 300 mg immediately
- Specialist assessment and investigation within 24 hours of symptom onset
- Secondary prevention measures - start as soon as diagnosis is confirmed
- Perform urgent brain imaging if vascular territory is uncertain – preferably diffusion weighted MR, unless contraindicated, in which case CT

Specialist care for people with acute stroke:

- All people with suspected stroke should be admitted directly to a specialist hyperacute stroke unit and receive brain imaging urgently and at most within 1 hour of arrival at hospital

Imaging:

- CT brain in first instance
- Diffusion weighted MR has highest sensitivity for ischaemic damage
- Carotid imaging should be arranged after assessment by specialist stroke team

Treatment of acute ischaemic stroke

- Patients with acute ischaemic stroke should be considered for treatment with alteplase as soon as possible within 4.5 hours of onset of symptoms
    - Alteplase should only be administered within a well-organised stroke service with staff trained in the delivery of thrombolysis and monitoring for post-thrombolysis complications and immediate access to re-imaging
- Patients with acute ischaemic stroke should be considered for combination intravenous thrombolysis and intra-arterial clot extraction (using stent retriever

and/or aspiration techniques) if they have a proximal intracranial large vessel occlusion causing a disabling neurological deficit (National Institutes of Health Stroke Scale [NIHSS] score ≥6) and the procedure can begin (arterial puncture) within 5 hours of known onset.

- Patients with acute ischaemic stroke and a contraindication to intravenous thrombolysis but not to thrombectomy should be considered for intra-arterial clot extraction (using stent retriever and/or aspiration techniques) if they have a proximal intracranial large vessel occlusion causing a disabling neurological deficit (NIHSS score ≥6) and the procedure can begin (arterial puncture) within 5 hours of known onset.
- Patients with acute ischaemic stroke causing a disabling neurological deficit (NIHSS score ≥6) may be considered for intraarterial clot extraction (using stent retriever and/or aspiration techniques, with prior intravenous thrombolysis unless contraindicated) beyond an onset-to-arterial puncture time of 5 hours if the large artery occlusion is in the posterior circulation, in which case treatment up to 24 hours after onset may be appropriate, and/or a favourable profile on salvageable brain tissue imaging has been proven, in which case treatment up to 12 hours after onset may be appropriate.

Maintenance/restoration of homeostasis and management of vascular risk factors

- Supplemental oxygen therapy only if O_2 sats<95%. Do not use routinely.
- Blood sugar: keep blood glucose 4-11mmol/L. Use intravenous insulin and glucose to achieve optimum control in adults with type 1 diabetes
- Blood pressure: antihypertensive therapy only recommended acutely if there is a hypertensive emergency with one or more of:
  - Hypertensive encephalopathy
  - Hypertensive nephropathy
  - Hypertensive cardiac failure/MI
  - Aortic dissection
  - Pre-eclampsia/eclampsia
  - Intracerebral haemorrhage with SBP >200mmHg
  - Consider reducing BP to 185/110 or lower if candidate for thrombolysis
- Optimise blood pressure, glucose and cholesterol control long-term for vascular risk reduction

  - patients admitted on anti-hypertensive medication should resume oral treatment once they are medically stable and as soon as they can swallow medication safely

  - patients with acute ischaemic stroke should receive high intensity statin treatment with atorvastatin 20-80 mg daily as soon as they can swallow

medication safely

Nutrition and hydration

- Swallow assessment on admission by trained clinician
- If problem identified, should have specialist assessment as soon as possible
- NG feed within 24 hours if unable to take adequate nutrition orally
- Consider bridle/PEG if unable to tolerate NG
- Refer for specialist nutritional assessment

Early mobilization and optimum positioning

- Sitting up helps maintain oxygen saturation and prevent hypostatic pneumonia
- Mobilise and sit up as soon as possible

Surgery for people with acute stroke

- Primary intracranial haemorrhage with hydrocephalus
- Decompressive craniectomy for malignant ischemic stroke if:
  – Patient is referred to neurosurgery within 24 hours of stroke onset and treated within 48 hours of stroke onset
  – pre-stroke modified Rankin Scale score <2
  – clinical deficit suggestive of MCA territory with NIHSS>15
  – decrease in level of consciousness to give score or 1 or more on item 1a of the NIHSS
  – brain imaging consistent with infarction of at least 50% of MCA territory

Aspirin and anticoagulant treatment

Patients with acute ischemic stroke

- aspirin 300mg OD for 2 weeks after the onset of stroke symptoms, then start definitive long-term antithrombotic treatment
- give PO if not dysphagic, PR or NG if dysphagic
- if previous dyspepsia associated with aspirin, give PPI
- if allergic/genuinely intolerant, give alternative antiplatelet agent

Patients with acute venous stroke

- if diagnosed with cerebral venous sinus thrombosis (even if secondary cerebral haemorrhage), give full dose anticoagulation treatment – full dose heparin and then warfarin, unless contraindicated

Stroke associated with arterial dissection

- give either anticoagulants or antiplatelet agent

Reversal of anticoagulation treatment in people with haemorrhagic stroke

- return clotting levels to normal as soon as possible by giving prothrombin complex concentrate and IV vitamin K

Anticoagulation treatment for other co-morbidities

- people with disabling ischaemic stroke who are in atrial fibrillation are treated with aspirin 300 mg for the first 2 weeks before anticoagulation treatment is considered
- people with ischaemic stroke with small ischemic lesion(s) who are in atrial fibrillation may have anticoagulation started earlier than 2 weeks post-stroke under specialist supervision
- people with prosthetic valves who have disabling cerebral infarction and who are at significant risk of haemorrhagic transformation may have anticoagulation treatment stopped for 1 week with substitution with aspirin 300 mg (involving haematology advice)
- people with ischaemic stroke and symptomatic proximal DVT or PE should receive anticoagulation treatment in preference to treatment with aspirin unless there are other contraindications to anticoagulation
- people who have haemorrhagic stroke and symptomatic DVT or PE should be treated with either anticoagulation or a caval filter to prevent the development of further PE

Gastroenterology

Upper GI bleed

Dr Shuvra Ray, SpR in Gastroenterology

- Risk assessment scores: The Blatchford Score should be used routinely at first assessment to risk stratify all patients with an upper GI haemorrhage in addition to Rockall score post endoscopy
- Pre endoscopy there is no current evidence or recommendation for commencing IV omeprazole if endoscopy is done promptly
- There is a move towards restrictive transfusions protocols: base decisions on blood transfusion on the whole clinical picture, recognising that over-transfusion can be as damaging as under transfusion

Acute Upper Gastrointestinal Bleed Assessment and Investigations:

- Haemodynamic status: BP, HR (resting tachycardia), postural drop (orthostatic hypotension), cool peripheries/capillary refill, GCS
- Evidence of blood loss, haematemesis, melaena (rectal examination)
- Look for signs of underlying cause of bleeding: signs of chronic liver disease, portal hypertension, NSAID use and epigastric tenderness
- Calculate the Blatchford Score

Table 1. The Blatchford Score

Admission risk marker	Score
Blood Urea mmol/L	
≥6.5-7.9	2
8-9.9	3
10-24.9	4
≥25	6
Haemoglobin g/dL (men)	
≥12-13	1
10-11.9	3
<10	6
Haemoglobin g/dL (women)	
≥10-12	1
<10	6
Systolic blood pressure mmHg	
100-10	1
90-99	2
<90	3
Other markers	
Pulse ≥100	1
Presentation with malaena	1
Presentation with syncope	2
Hepatic disease	2
Cardiac failure	2

(Stanley AJ et al. Outpatient management of patients with low-risk upper-gastrointestinal haemorrhage: multicentre validation and prospective evaluation. Lancet. 2009 Jan 3;373(9657):42-7)

- Low-risk criteria of GBS
- Urea <6.5 mmol/L
- Haemoglobin >=130 g/L (men) or >=120 g/L (women)
- Systolic blood pressure >=110 mm Hg
- Pulse <100 beats per minute
- absence of melaena, syncope, cardiac failure, or liver disease

- absence of melaena, syncope, cardiac failure, or liver disease

The Glasgow-Blatchford bleeding score (GBS) is based on simple clinical and laboratory variables; a score of 0 identifies low-risk patients who might be suitable for outpatient management:

- Study evidence shows that GBS identifies many patients presenting to general hospitals with upper-gastrointestinal haemorrhage who can be managed safely as outpatients. This score reduces admissions for this condition, allowing more appropriate use of in-patient resources (1)
- In the validation study, scores ≥6 were associated with a greater than 50% risk of needing an intervention
- advantages of the GBS over the Rockall score, which assesses the risk of mortality in patients with upper GI bleeding, includes:
  - lack of subjective variables such as the severity of systemic disease
  - lack of a need for oesophagogastroduodenoscopy (OGD) to complete the score, a feature unique to the GBS

The factors used in the GBS include blood urea, haemoglobin value, systolic blood pressure and pulse rate.

Rockall Score

(Vreebrug et al. Validation of the Rockall risk scoring system in upper gastrointestinal bleeding. Gut. 1999 Mar;44(3):331-5.)

The various components of the Rockall Numerical Risk Scoring system are scored individually and then the sum of the component scores is the predictive score:

Age	
Age <60y	0 points
Age 60-79y	1 point
Age >= 80y	2 points
Shock	
No 'shock' (SBP <=100mmHg, HR <=100)	0 points
'Tachycardia' (SBP >= 100 mmHg, HR >=100)	1 point
'Hypotension' (SBP <100mmHg)	2 points
Comorbidity	
No major comorbidity	0 points
Cardiac failure, IHD or any major comorbidity	2 points
Renal failure, liver failure, or metastatic disease	3 points

Table 2. The Rockall Score (pre endoscopy)

Initial Rockall Score - out of 7:

0/7 = Predicted mortality 0.2%

1/7 = Predicted mortality 2.4%

2/7 = Predicted mortality 5.6%

3/7 = Predicted mortality 11%

4/7 = Predicted mortality

24.6%

5/7 = Predicted mortality 39.6%

6/7 = Predicted mortality 48.9%

7/7 = Predicted mortality 50%

Additional Criteria for Full Score (after gastroscopy)

This makes total score out of 11.

Diagnosis

Table 3. The Rockall Score (Additional criteria post endoscopy - full score out of 11)

Diagnosis	
Mallory-Weiss tear, no lesion seen nor SRH (stigmata of recent haemorrhage)	0 points
All other diagnoses apart from GI malignancy	1 point
GI malignancy	2 points
Major stigmata of recent haemorrhage (SRH)	

None or dark spot only	0 points
Blood, adherent clot, spurting vessel	2 points

Total score is calculated by simple addition. A score less than 3 carries good prognosis but total score more than 8 carries high risk of mortality

Initial Management Acute Upper GI bleed:

- IV access (large bore) and bloods (Group and save, cross match, FBC, clotting, LFT, U&E)
- Resuscitate with Crystalloid or colloid, monitor fluid balance, consider the need for CVP monitoring and urinary catheterisation to guide adequate resuscitation
- Stop anticoagulants and antiplatelets, Consider Vitamin K
- Confirmed or suspected Variceal bleed:
- Commence terlipressin 2mg qds IV (review ECG prior to administration of terlipression; history of ischaemic heart disease is a contraindication)
- Perform full septic screen Broad- spectrum antibiotics recommended for all patients with suspected or confirmed variceal bleed

Transfusion:

- Local transfusion protocols vary-be aware of local massive bleeding protocol to activate in the event of variceal haemorrhage
- Guidelines vary, but typically aim to transfuse packed red cells to a haemoglobin target of 70-90g/L
- Give platelets if actively bleeding and platelet count <50 x109/l
- Give FFP (12-15ml/kg) if Fibrinogen level <1g/l or PT more than 1.5 times normal
- If Fibrinogen level remains <1.5g/l despite FFP give cryoprecipitate as well
- Avoid overtransfusion in variceal bleeds: transfuse if Hb<70g/L aim for Hb>70g/L (Villeaneuva et al. NEJM 2013)
- Consider prothrombin complex concentrate (Beriplex) if on warfarin and actively bleeding

Endoscopy:

- Arrange endoscopy immediately after initial resuscitation if haemodynamically unstable or severe bleed.
- All other patients should be offered upper GI endoscopy within 24 hours
- Interventional radiology should be considered in all patients who rebleed after endoscopy. Surgery should be considered if interventional radiology is unavailable . Consider TIPSS in varices.

Post endoscopy care

- Use endoscopy findings to calculate Rockall score (evidence based post endoscopy mortality score)
- Rockall Score (see above)
- Consider repeat second look endoscopy at in all patients at high risk of re-bleeding, particularly if there is doubt about adequate haemostasis at the first endoscopy

Non-variceal bleeds post endoscopy care

- Commence high dose IV PPI therapy 80mg bolus omeprazole/ pantoprazole followed by 8mg/hr infusion for 72 hours if stigmata of recent haemorrhage at endoscopy
- Check H pylori screen (CLO test) and commence eradication therapy as requiredguided by local treatment protocol
- Continue low dose aspirin for secondary prevention of vascular events in patients with upper GI bleeding in whom haemostasis has been achieved. Discuss the risks/ benefits of continuing clopidogrel in patients with Upper GI bleed with appropriate specialist (cardiologist or stroke physician)
- Ensure follow up OGD arranged at 6-8 weeks for gastric ulcers >1cm diameter

Variceal bleeds post endoscopy care

- Stop terlipressin after definitive haemostasis has been achieved or after 5 days unless there is another indication for its use.
- PPI not recommended unless otherwise required for peptic ulcer disease.

- Anticipate and manage porto- systemic encephalopathy
- If varices noted at endoscopy discuss with Gastroenterologists need for endoscopic variceal banding programme (suggested 2-4 weekly until variceal eradication) or need for prophylaxis of variceal bleed with non selective beta blockade (Tripathi, Gut 2015):1-25)

References

1. *Acute upper gastrointestinal bleeding management (NICE 2016)*
2. *UK guidelines on the management of variceal haemorrhage in cirrhotic patients (Tripathi et al. Gut 2015)*
3. *Transfusion strategies for acute upper GI bleeding (Villaneuva et al. NEJM 2013)*

Decompensated chronic liver disease

Dr Sanju Mathew Hepatology SpR Kings College Hospital

Initial assessment

- Look for evidence of hepatic decompensation - ascites, encephalopathy, coagulopathy, jaundice, variceal bleeding

Blood tests and investigations

- All patients require FBC, U&Es, LFTs (aim AST + ALT), CRP, glucose, clotting screen (PT and INR)
- Complete a full Septic screen for all patients including an ascitic tap
- Send a full liver screen if this is a new diagnosis / index presentation

Liver screen

- Hepatitis B surface Ag, Hepatitis B core Ab (IgM and IgG) (If hep B serology is positive, send hepatitis D (delta) IgM, IgG) – remember that Hepatitis B Core antibody patients can re-activate if immunosuppressed
- Hepatitis C antibody (Anti-HCV)
- Liver auto-antibodies: Anti- mitochondrial antibodies, anti- smooth muscle antibodies, anti-nuclear antibodies, serum immunoglobulins
- Consider caeruloplasmin and serum free copper levels (if patient is <40 years)
- Serum ferritin and iron binding studies (transferrin saturations)
- Alpha - 1 antitrypsin phenotype
- Alphafetoprotein (not all HCCs will produce an AFP rise)

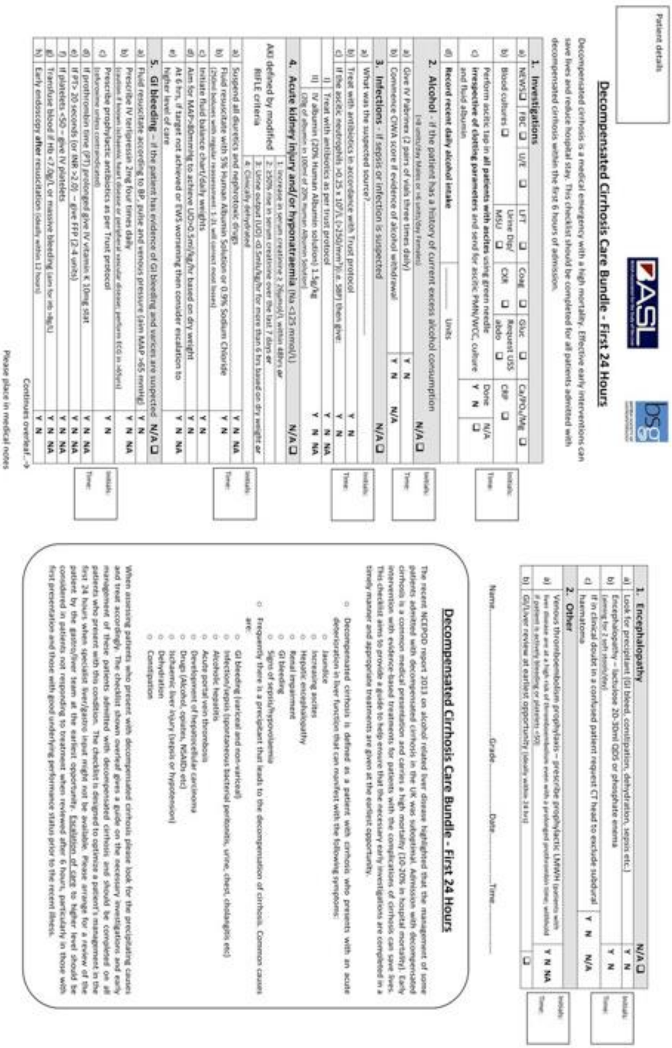
An Acute hepatitis screen requires in addition to the above (consideration of):

- Hepatitis A (IgM, IgG) + Hepatitis E (IgM, IgG) (rising rates of HEV in the UK)
- CMV, EBV, HSV
- Paracetamol and salicylate levels

Initial imaging:

- Ultrasound Liver, specifically requesting Portal Vein Doppler views

Initial Assessment and management goals (BSG/BASL flowsheet):



Patient details

Decompensated Cirrhosis Care Bundle - First 24 Hours

Decompensated cirrhosis is a medical emergency with a high mortality. Effective early interventions can save lives and reduce hospital stay. This checklist should be completed for all patients admitted with decompensated cirrhosis within the first 6 hours of admission.

1. Investigations				
a)	NEWS ❑ FBC ❑ U/E ❑ LFT ❑ Coag ❑ Gluc ❑ Ca/PO₄/Mg ❑			Initials: Time:
b)	Blood cultures ❑ Urine Dip/MSU ❑ CXR ❑ Request USS abdo ❑ CRP ❑			
c)	Perform ascitic tap in **all patients with ascites** using green needle **irrespective of clotting parameters** and send for ascitic PMN/WCC, culture and fluid albumin	Done Y N	N/A ❑	
d)	**Record recent daily alcohol intake** ______ Units			
2. Alcohol - if the patient has a history of current excess alcohol consumption (>8 units/day Males or >6 units/day Females)			N/A ❑	Initials: Time:
a)	Give IV Pabrinex (2 pairs of vials three times daily)	Y N		
b)	Commence CIWA score if evidence of alcohol withdrawal	Y N	N/A	
3. Infections - if sepsis or infection is suspected			N/A ❑	Initials: Time:
a)	What was the suspected source? ______			
b)	Treat with antibiotics in accordance with Trust protocol	Y N		
c)	If the ascitic neutrophils >0.25 x 10⁹/L (>250/mm³)(i.e. SBP) then give:	Y N		
i)	Treat with antibiotics as per trust protocol	Y N NA		
ii)	IV albumin (20% Human Albumin solution) 1.5g/kg (20g of albumin in 100ml of 20% Human Albumin Solution)	Y N NA		
4. Acute kidney injury and/or hyponatraemia (Na <125 mmol/L)			N/A ❑	Initials: Time:
AKI defined by modified RIFLE criteria	1: Increase in serum creatinine ≥ 26μmol/L within 48hrs **or** 2: ≥50% rise in serum creatinine over the last 7 days **or** 3: Urine output (UO) <0.5mls/kg/hr for more than 6 hrs based on dry weight **or** 4: Clinically dehydrated			
a)	Suspend all diuretics and nephrotoxic drugs	Y N NA		
b)	Fluid resuscitate with 5% Human Albumin Solution or 0.9% Sodium Chloride (250ml boluses with regular reassessment: 1-2L will correct most losses)	Y N		
c)	Initiate fluid balance chart/daily weights	Y N		
d)	Aim for MAP>80mmHg to achieve UO>0.5ml/kg/hr based on dry weight	Y N		
e)	At 6 hrs, if target not achieved or EWS worsening then consider escalation to higher level of care	Y N NA		
5. GI bleeding – if the patient has evidence of GI bleeding and varices are suspected			N/A ❑	Initials: Time:
a)	Fluid resuscitate according to BP, pulse and venous pressure (aim MAP >65 mmHg)	Y N		
b)	Prescribe IV terlipressin 2mg four times daily (caution if known ischaemic heart disease or peripheral vascular disease; perform ECG in >65yrs)	Y N NA		
c)	Prescribe prophylactic antibiotics as per Trust protocol (cefuroxime unless contraindicated)	Y N		
d)	If prothrombin time (PT) prolonged give IV vitamin K 10mg stat	Y N NA		
e)	If PT> 20 seconds (or INR >2.0) – give FFP (2-4 units)	Y N NA		
f)	If platelets <50 – give IV platelets	Y N NA		
g)	Transfuse blood if Hb <7.0g/L or massive bleeding (aim for Hb >8g/L)	Y N NA		
h)	Early endoscopy **after** resuscitation (ideally within 12 hours)	Y N		

Continues overleaf...→

Please place in medical notes

1. Encephalopathy		N/A ❑	Initials: Time:
a)	Look for precipitant (GI bleed, constipation, dehydration, sepsis etc.)	Y N	
b)	Encephalopathy – lactulose 20-30ml QDS or phosphate enema (aiming for 2 soft stools/day)	Y N	
c)	If in clinical doubt in a confused patient request CT head to exclude subdural haematoma	Y N N/A	
2. Other			Initials: Time:
a)	Venous thromboembolism prophylaxis – prescribe prophylactic LMWH (patients with liver disease are at a high risk of thromboembolism even with a prolonged prothrombin time; withhold if patient is actively bleeding or platelets <50)	Y N NA	
b)	GI/Liver review at earliest opportunity (ideally within 24 hrs)	❑	

Name........................ Grade............ Date............ Time...............

Decompensated Cirrhosis Care Bundle - First 24 Hours

The recent NCEPOD report 2013 on alcohol related liver disease highlighted that the management of some patients admitted with decompensated cirrhosis in the UK was suboptimal. Admission with decompensated cirrhosis is a common medical presentation and carries a high mortality (10-20% in hospital mortality). Early intervention with evidence-based treatments for patients with the complications of cirrhosis can save lives. This checklist aims to provide a guide to help ensure that the necessary early investigations are completed in a timely manner and appropriate treatments are given at the earliest opportunity.

- Decompensated cirrhosis is defined as a patient with cirrhosis who presents with an acute deterioration in liver function that can manifest with the following symptoms:
  - Jaundice
  - Increasing ascites
  - Hepatic encephalopathy
  - Renal impairment
  - GI bleeding
  - Signs of sepsis/hypovolaemia
- Frequently there is a precipitant that leads to the decompensation of cirrhosis. Common causes are:
  - GI bleeding (variceal and non-variceal)
  - Infection/sepsis (spontaneous bacterial peritonitis, urine, chest, cholangitis etc)
  - Alcoholic hepatitis
  - Acute portal vein thrombosis
  - Development of hepatocellular carcinoma
  - Drugs (Alcohol, opiates, NSAIDs etc)
  - Ischaemic liver injury (sepsis or hypotension)
  - Dehydration
  - Constipation

When assessing patients who present with decompensated cirrhosis please look for the precipitating causes and treat accordingly. The checklist shown overleaf gives a guide on the necessary investigations and early management of these patients admitted with decompensated cirrhosis and should be completed on all patients who present with this condition. The checklist is designed to optimize a patient's management in the first 24 hours when specialist liver/gastro input might not be available. Please arrange for a review of the patient by the gastro/liver team at the earliest opportunity. Escalation of care to higher level should be considered in patients not responding to treatment when reviewed after 6 hours, particularly in those with first presentation and those with good underlying performance status prior to the recent illness.

Specific situations

AKI / HRS (Hepatorenal syndrome)

- Ensure that the patient is fluid- replete and consider catheterisation for careful fluid balance monitoring
- Stop any nephrotoxic agents e.g. diuretics, NSAIDS
- Renal USS and UPCR (Urine protein, creatinine ratio)
- If renal impairment (usually Create> 133) persists despite filling/ stopping nephrotoxic drugs (over around 2 days) - consider commencing Terlipressin 0.5-1mg IV QDS following consultation with Gastroenterology/Hepatology service and Human Albumin Solution 4.5% 500ml BD or 20% 100 ml BD

Encephalopathy

- Give regular lactulose (10-20ml bd) and phosphate enemas aiming for at least three soft bowel motions a day
- Start a stool chart
- Have a low threshold for prophylactic broad spectrum antibiotics, and hunt for sepsis
- Avoid sedatives and check for electrolyte abnormalities (hyponatraemia or uraemia are often causative)
- Rifaximin should be added to lactulose if more than one episode of encephalopathy
- Hepatic encephalopathy is associated with significant morbidity and mortality, with needs for onward hepatology referral (if not already known)

Ascites

- A diagnostic ascitic tap should be performed in any cirrhotic patients acutely admitted – if moderate ascites is present (MC&S, Albumin, Cytology)
- SAAG (Serum Ascites Albumin Gradient) > 11g/l suggests a portal hypertensive (cirrhotic) cause with around a 97% accuracy (serum albumin – ascitic albumin)
- Management includes a low salt diet, diuretics, and paracentesis if required
- Ascites development heralds a poor outcome if cirrhotic – approximately 50% mortality at 2 years – and hepatology referral is important

- Spontaneous Bacterial Peritonitis (SBP) may be subtle clinically – and can present with complications of bleeding, shock, fever or other signs of systemic inflammation.

Spontaneous bacterial peritonitis (SBP)

- An ascitic fluid neutrophil count of > 250 cells/mm3 is diagnostic of SBP, and patients should be commenced on antibiotic therapy. The percentage of PMNs (polymorphonuclear cells) in the fluid is usually greater than 50%. Samples should be sent in Blood culture bottles, as well as a white top pot if suspicious. Antibiotics should be started after ascitic culture samples (ideally) - as even a single dose of an effective broad-spectrum drug causes the culture to produce no growth in up to 86% of cases.
- When the ascitic culture is positive (around 40% of cases), the most common pathogens includeGram-negative bacteria, usuallyE. coli and Gram-positive cocci (mainly Streptococcus species and enterococci).
- Antibiotics should be prescribed for SBP as per Trust protocol
- Antibiotic prophylaxis should continue on discharge if SBP is identified

Use of IV albumin in SBP

- Up to 30% of patients with SBP treated with antibiotics alone develop type 1 HRS. The administration of IV albumin at 1.5 g albumin/kg in the first 6 hours on day 1, followed by 1g/kg on day 3, reduces the frequency of HRS and improves survival.
- In practice HAS is usually prescribed daily for patients with confirmed or suspected SBP
- 100ml of 20% HAS contains approximately 20g of albumin. 500ml of 5% HAS contains approximately 25g of albumin.

Scoring systems (many, with many different applications for the same score!):

- Child Pugh score is the traditional model (measures bilirubin, albumin, INR, ascites, hepatic encephalopathy), scores can range 5-15, A (5-6); B (7-9); C (10-15) – and are associated approximately with 1-year survival rates of 100, 80 and 45% respectively.
- MELD Score (via Google): multiple applications, but can be used to estimate 3-month mortality in hospitalized patients: Scores: < 9 (1.9%), 10-19 (6%), 20-29 (19.6%), 30-39

(52.6%), >40 (71.3% 3 month mortality)

- Seek hepatology input here, particularly if considering any surgical interventions (often high-risk, and will need ITU considerations post-operatively if cirrhotic)

Alcoholic hepatitis

Dr Sanju Mathew Hepatology SpR Kings College Hospital

- Alcoholic hepatitis should be suspected in patients with jaundice and/or ascites on a background of ongoing alcohol misuse.
- Alcoholic hepatitis represents acute inflammation of the liver, often on a background of alcoholic steatosis. Patients may already have established cirrhosis or over time will develop cirrhosis.
- Liver biopsy may be considered in this group; this will be a Consultant lead decision.
- Severe alcoholic hepatitis has a high mortality, and there are several prognostic models available to determine patients at high risk of death who may benefit from steroids – discuss with ITU early and escalate early if concerned
- Importantly sepsis should be actively screened for and excluded prior to initiation of steroids - and treatment for alcoholic hepatitis should be discussed with a specialty team Gastroenterologist/ Hepatologist
- Consider discussing young, sick alcoholic hepatitis patients with your local transplant centre; in addition to clinical trials, young patients (around early 40s) may be eligible for transplant considerations on a case by case basis.
- Seek specialist input from Dietician and Alcohol Specialist nurses (nutrition can have positive impact here)

Clinical scores in Alcoholic Hepatitis *(all accessible via Google)*

- Maddrey's Discriminant Function (MDF) score MDF=(4.6 x PT prolongation) + total serum bilirubin in µmol/L
- An MDF score of > 32 identifies patients with severe alcoholic hepatitis who may benefit from steroid treatment (in the absence of sepsis). This score correlates with a mortality of greater than 50% at 1 month, compared with 17% mortality if the MDF is < 32.
- In patients receiving steroids for alcoholic hepatitis the Lille Model (calculation) can be used on day 7 to predict mortality. It is used to stratify those patients who will not improve and in whom steroid therapy offers no further

benefit and in whom alternative management / referral for transplant should be considered.

- Other scores include the Glasgow Alcoholic Hepatitis Score, and MELD

Acute severe colitis

Dr Charlotte Ford SpR in Gastroenterology

This is a gastroenterological emergency associated with up to 50% risk of colectomy, even with medical treatment. It has a significant mortality of between 2-3%. Ideally should be managed on a gastroenterology ward under the direct care of a gastroenterologist with expertise in managing IBD.

Initial assessment

- Full history and examination documenting:

1. The frequency and consistency of bowel movements, including
   - Onset of symptoms (acute, subacute, chronic)
   - Nocturnal symptoms
   - Presence of blood/mucous
   - Presence of urgency and/or incontinence
2. Presence of abdominal pain
3. Presence of recent illness (including recent episodes of gastroenteritis), fever or malaise
4. Details of weight loss
5. Travel history
6. Extra-intestinal symptoms, including joint, cutaneous and eye manifestations
7. Details and evidence of UC diagnosis including disease distribution and duration.
8. 8. Details of medical therapy to date, including:
   - Who usually manages the patient's IBD
   - Current pharmacological treatment
   - Details of what has previously been tried with reasons for discontinuation
9. Smoking history
10. Family history of IBD

Assessment of severity using the modified Truelove and Witt's criteria.

	Mild	Moderate	Severe
Bloody stools per day	< 4	4-6	> 6
Pulse	< 90 bpm	⩽ 90 bpm	> 90 bpm
Temperature	< 37.5 ℃	⩽ 37.8 ℃	> 37.8 ℃
Hemoglobin	> 11.5 gm/dL	⩾ 10.5 gm/dL	< 10.5 gm/dL
ESR	< 20 mm/h	⩽ 30 mm/h	> 30 mm/h
CRP	Normal	⩽ 30 mg/dL	> 30 mg/dL

- Send bloods for FBC, U&E, LFTS, CRP, ESR, Clotting, G&S
- 3 X Stool samples for MC&S and CDT – to exclude GI pathogens
- Baseline AXR – to assess for evidence of colonic dilatation
- Order unprepared flexible sigmoidoscopy for same or next day – to assess mucosal inflammation (phosphate enema can cause perforation in acute severe colitis)
- Alert luminal Gastroenterologist (SpR or Consultant) and IBD nurse

Initial management

- IV Hydrocortisone 100mg qds
- Supportive fluids if signs of dehydration – replace electrolytes including magnesium and phosphate
- Consider blood transfusion if Hb is less than 10
- VTE assessment and prophylaxis – IBD patients have twice the risk of VTE compared to healthy individuals and should always be given prophylactic LMWH unless rectal bleeding is torrential
- Stop opiates, anticholinergics and anti - diarrhoeal medications
- Initiate strict stool chart. This is the most important predictor of response to treatment and colectomy risk. The chart should if possible be completed by the patient for accuracy of documentation

Continuing management: time 0 to 72hrs (Day 0 - 3)

- Daily senior Gastroenterology review
- Daily FBC/U&E/LFTs/CRP
- If not previously done send the following bloods:
- Viral hepatitis (HBsAg, HCVIgG) VZV IgG and HIV screen (if considering immunosuppressants and/or biologics)
- TPMT (to assess safety of initiating thiopurines)
- Baseline serum cholesterol and magnesium (if considering initiating ciclosporin) – see useful prescribing regimes section
- TB screen (if considering biologics – patient needs CXR, relevant TB exposure history, previous BCG vaccination, and discussion with TB nurse regarding Quanteferon test ext. 1466)
- Daily AXR if initial AXR showed colonic dilatation OR any clinical deterioration in first three days (including worsening abdominal pain, distension, rising inflammatory markers)
- Inform ward dietician as patient likely to require nutritional support

Day 3 management – Patient should have received 12 doses of IV steroid

- Day 3 is the critical interval when a decision should be made regarding whether patient has responded adequately to IV steroids or whether 'rescue' therapy is required or if surgery should be conducted immediately.
- This is often a difficult decision and should be made by a Consultant
- Rescue therapy should be initiated if any of the following are present:
- Persistent colonic dilation on AXR
- CRP > 45
- Stool frequency > 8/day
- Rescue therapy is given in the form of either **infliximab or ciclosporin**
- Neither has been shown to be superior in head to head trials, but generally ciclosporin is favoured if the patient is thiopurine naïve (as a bridging agent), and infliximab is favoured if the patient is already receiving a thiopurine or has a contraindications to ciclosporin. Infliximab is not NHS funded for salvage therapy if the patient has no contraindications to ciclosporin therapy.
- Ciclosporin – 2mg/kg over a 24hr infusion (check Mg daily) – switch to oral after 3 - 4 days if clinically

improving. Trough levels will be required to ensure correct dosing. Oral ciclosporin is usually continued for 3 months whilst azathioprine is started and titrated. See your Trust's prescribing guidelines for more details.

- Infliximab – 5mg/kg over 2hours, infusion should be discussed with IBD CNS. Significant risk of infusion related reactions, prescribe PRN Hydrocortisone 100-200mg IV, Chlorpheniramine 10mg IV and Epinephrine 500 micrograms IM.
- Refer all patients undergoing rescue therapy for Surgical review by general or colorectal surgeons. If no clinical improvement seen with rescue therapy, colectomy is indicated and every opportunity should be taken to discuss and plan this with patient to obtain informed consent.

Endocrinology

Care of adults with Type 1 diabetes in Hospital

Dr Emily Gowland, Trainee in General Practice
NICE guidelines updated in July 2016

- Aim for target plasma glucose level of 5–8 mmol/litre for adults with type 1 diabetes during surgery or acute illness.
- Use intravenous in preference to subcutaneous insulin regimens for adults with type 1 diabetes if the person is unable to eat or is predicted to miss more than 1 meal or an acute situation is expected to result in unpredictable blood glucose levels – for example, major surgery, high-dose steroid treatment, inotrope treatment or sepsis or insulin absorption is expected to be unpredictable, for example because of circulatory compromise.
- Consider continuing the person's existing basal insulin regimen (including basal rate if they are using continuous subcutaneous insulin infusion [CSII or insulin pump] therapy) together with protocol-driven insulin delivery for controlling blood glucose levels in adults with type 1 diabetes during surgery or acute illness.
- Use subcutaneous insulin regimens (including rapid-acting insulin before meals) if an adult with type 1 diabetes and acute illness is eating.
- Enable inpatients to self-administer subcutaneous insulin if they are willing and it is safe to do so.

Management of DKA

Dr Emily Gowland

NICE Published in 2013, revised in July 2016 guidelines on DKA and sick day rules. The sick day rule can be accessed at: https://cks.nice.org.uk/diabetes-type-1#!scenarioclarification:2 Measure ketones at bedside

- Measure ketones at bedside
- Use venous not arterial blood to measure ketones, bicarbonate and pH and use as treatment markers
- Use blood gas analyser to measure electrolytes (with intermittent lab confirmation)
- Use fixed rate intravenous insulin infusion (FRIII), not sliding scale
- Maximum initial insulin infusion rate of 15 units per hour
- Continue long acting basal insulin analogues as normal
- Involve specialist diabetes team as soon as possible

Assessment

- One or more of the following may indicate severe DKA
- Blood ketones over 6mmol/L
- Bicarbonate level below 5mmol/L
- Venous/arterial pH below 7.0
- Hypokalaemia on admission (under 3.5mmol/L)
- GCS less than 12 or abnormal AVPU scale
- Oxygen saturation below 92% on air (assuming normal baseline respiratory function)
- Systolic BP below 90mmHg
- Pulse over 100 or below 60bpm
- Anion gap above 16 [Anion Gap = (Na+ + K+) – (Cl-+ HCO3-)]
- If any of the above signs present, patient should be reviewed by a consultant physician and admission to level 2 care considered
- Initial investigations:
- Blood ketones
- Capillary blood glucose
- Venous plasma glucose
- Urea and electrolytes
- Venous blood gases
- Full blood count
- Blood cultures
- ECG
- Chest radiograph if clinically indicated
- Urinalysis and culture
- Continuous cardiac monitoring and pulse oximetry
- Consider precipitating causes and treat appropriately
- Establish usual medication for diabetes
- Pregnancy test in women of child bearing age

Management

Fluid

- Fluid replacement more important initially than insulin – start fluids before insulin
- Aims:
- restore circulating volume
- clear ketones
- correct electrolyte imbalance
- Typical deficits in DKA:
- water 100ml/kg ie 7L in 70kg patient
- sodium 7-10mmol/kg
- potassium 3-5mmol/kg
- Use crystalloid, modify rate in renal/ heart failure, elderly or adolescents
- Give 500ml of 0.9% sodium chloride solution over 10-15 minutes
- If SBP remains below 90mmHg, call for senior help and give further bolus
- Most patients require between 500 to 1000ml given rapidly

- If no clinical improvement reconsider other causes of hypotension and seek an immediate senior assessment. Consider involving the ITU/
- Once SBP above 90mmHg follow fluid replacement as shown below

• If systolic BP >90mmHg, give fluids as below, and reassess cardiovascular status at 12 hours

Fluid	Volume
0.9% sodium chloride 1L (may need to add KCl if more than 1L has already been given to fluid resuscitate)	1000ml over 1st hour
0.9% sodium chloride with potassium chloride	1000ml over next 2 hours
0.9% sodium chloride with potassium chloride	1000ml over next 2 hours
0.9% sodium chloride with potassium chloride	1000ml over next 4 hours
0.9% sodium chloride with potassium chloride	1000ml over next 4 hours
0.9% sodium chloride with potassium chloride	1000ml over next 6 hours

Insulin

Role of insulin in DKA:

- suppression of ketogenesis
- reduction of blood glucose
- correction of electrolyte imbalance
- Role of insulin in D

- Use fixed rate intravenous insulin infusion (FRIII) at 0.1units/kg ie 6 units per hour in 60kg patient (estimate weight if not known)
- Give via an infusion pump: 50 units of human soluble insulin (Actrapid®, Humulin S®) made up to 50ml with 0.9% sodium chloride solution
- Only give bolus of IM insulin if there is a delay setting up the pump
- Can give insulin in the same line as intravenous replacement fluid provided that a Y connector with a one way, anti-siphon valve is used and a large-bore cannula has been placed
- Give 10% glucose infusion if blood glucose falls below 14mmol/L in order to keep insulin infusion running for suppression of ketogenesis, but continue 0.9% saline to correct circulating volume
- Continue glucose infusion as required until patient is eating and drinking normally
- Continue FRIII until ketones are less than 0.6mmol/L, venous pH >7.3 and/or venous bicarbonate >18mmol/L Urinary ketones will still be present after ketoacidosis has resolved – do not rely on urinary ketones for monitoring
- Give 0.25 units/kg/day subcutaneous Lantus® or Levemir® (or human NPH insulin, depending on local policy) to mitigate against rebound ketosis when FRIII stops

Monitoring
0-6 hours

- Measure blood glucose and ketones hourly, and serum pH, potassium and bicarbonate 2 hourly
- If meter reads “blood glucose over 20mmol/L” or “Hi” venous blood should be sent to the laboratory hourly or measured using venous blood in a blood gas analyser until the bedside meter is within its QA range
- Targets:
  - Reduce blood ketone concentration by 0.5mmol/L/hr
  - Increase venous bicarbonate by 3mmol/L/hr
  - Reduce capillary blood glucose by 3mmol/L/hr
  - Keep potassium between 4.0-5.5mmol/L
- If targets not achieved:
  - Check equipment functioning normally
  - Increase insulin infusion by 1 unit/hr increments hourly, until ketones target achieved

- If blood ketone measurement not available, use bicarbonate or glucose as markers.

- (If using glucose as marker, confirm acidosis also resolving by using blood gas analyser in case of euglycaemic ketoacidosis.)

- Identify and treat any precipitating factors
- Consider urinary catheterisation if patient incontinent or anuric
- Consider NG tube placement if patient obtunded – risk of aspiration
- If oxygen saturation falls, CXR and ABG
- Regular observations and early warning scores
- Maintain accurate fluid balance chart – minimum urine output 0.5ml/kg/hr
- Continuous cardiac monitoring if severe DKA
- Give LMWH as per NICE guidance

6-12 hours

- At 6 hours check venous pH, bicarbonate, potassium, blood ketones and glucose
- Resolution of DKA defined as above (ketones <0.6mmol/L and venous pH >7.3)
- Do not use bicarbonate as surrogate
- marker because hyperchloraemic acidosis caused by infusion of large volumes of 0.9% saline will lower bicarbonate levels. Hyperchloraemic acidosis may cause renal vasoconstriction and oliguria.
- If DKA resolved, convert to subcutaneous insulin – see below
- If not, continue FRIII and monitoring as above
- Continue to treat precipitating factors as necessary

12-24 hours

- At 12 hours check venous pH, bicarbonate, potassium, blood ketones and glucose
- Continue IV fluids if patient not eating and drinking
- If patient not eating and drinking convert to VRIII as per local guidelines
- Reassess for complications of treatment (cerebral oedema, fluid overload)
- Continue to treat precipitating factors as necessary
- At 24 hours ketonaemia and acidosis should have resolved – if not, specialist input should be sought urgently

Conversation to subcutaneous insulin

- When blood ketones less than 0.6mmol/L, pH over 7.3 and the patient is ready and able to eat
- Should be managed by specialist diabetes team if possible
- If not available manage as follows:

- restart previous regimen if HbA1c suggests reasonable control before admission

- If on basal bolus
  - continue insulin infusion for 30-60 minutes after fast acting S/C insulin given with a meal
  - if on long acting insulin Lantus, Levemir or Tresiba this should have been continued, only action needed is to give short acting insulin with a meal
  - do not stop insulin infusion until some form of background insulin has been given
  - if normal long acting insulin given in evening and FRIII stopped in morning, give half usual daily dose of basal insulin as isophane (Insulatard, Humulin, insuman basal)
- If on twice daily fix-mix insulin:
  - Re-introduce subcutaneous insulin before breakfast or before the evening meal. Do not change at any other time. Maintain the insulin infusion until 30 to 60 minutes after the subcutaneous insulin was given
  - If on CSII, recommence the CSII at the normal basal rate. Continue intravenous insulin infusion until the meal bolus has been given. Do not recommence CSII at bedtime
- If new diagnosis, must be seen by specialist team before discharge
  - See full guideline for calculating regimes and insulin dose in insulin naïve patient

Special patient groups

- Specialist input needed as soon as possible and special attention needs to be paid to fluid balance in:
- Elderly patients
- Pregnant patients
- 18 to 25 years – risk of cerebral oedema in rapid fluid replacement
- Heart or kidney failure
- Other serious comorbidities

Patient considerations

- Refer to diabetes specialist team within one day
- DKA is opportunity for patient education:
- Identify precipitating factor eg. infection or missed insulin injection
- Identify early warning symptoms
- Review of glycaemic control and self-management

Serious Complications of DKA
Hypokalaemia and hyperkalaemia

- Potassium almost always falls as DKA treated with insulin
- If serum K below 5.5mmol/L, give 0.9% saline with 40mmol potassium
- If potassium falls below

3.5mmol/L, increase rate of saline infusion if fluid balance allows

- May need more concentrated K infusion

Hypoglycaemia

- May result in rebound ketosis
- When serum glucose less than 14mmol/L, give 10% glucose alongside saline infusion

Cerebraloedema

- Symptomatic cerebral oedema relatively uncommon in adults
- More common in children, especially with more severe acidosis and faster fluid infusion
- Retrospective evidence suggests more common with bicarbonate infusion

Pulmonary oedema

- Rare
- May be associated with rapid infusion of fluids
- Elderly and patients with cardiac failure at particular risk
- Need appropriate monitoring**

Management of HHS

Dr Shazia Hussain, SpR in Diabetes and Endocrinology

Always refer to local guidelines.

Patient Characteristics:

- Complex
- Typically elderly with multiple comorbidities
- More common in T2DM/first presentation of T2DM
- Hyperglycaemia (typically 30mmol/L or more) in the absence of significant ketonaemia (<3mmol/L) or acidosis (pH >7.3/HCO3 >15)
- Hyperosmolar (typically >320mosmol/kg – calculated using formula [2Na + Ur + Gluc] – although some still use [2(Na+K) + Ur + Gluc])
- Hypovolaemia

BEWARE:

- Mixed DKA/HHS
- Acute Kidney Injury induced acidosis

Treatment approach:

- Rehydration
  - Fluid deficit in this group of patients is usually more than in patients with DKA (10-22L in a person weighing 100kg)
  - Rehydration alone will lower osmolality and hyperglycaemia
  - Use 0.9% NaCl as principle fluid
    - » Note – as osmolality falls water will shift into intracellular space which in turn will cause a rise in Na – this is not an indication for hypotonic fluids
  - Perform regular fluid balance assessments
  - K replacement (nil if K>5.5, 40mmol/L if between 3.5-5.5mmol/L, HDU review if <3.5mmol/L)
- Low dose IV Insulin should only be introduced once blood glucose is not falling at desired rate with fluids alone or if significant ketonaemia (3ß-hydroxybutyrate>1mmol/L ketonuria 2+ or more [ie. mixed DKA/HHS] at time zero

- Before initiating insulin therapy ensure adequate volume/rate of IV fluids
- If Insulin is initiated then should be at 0.05units/kg/hr to avoid rapid shifts in osmolality
- Calculate osmolality regularly – 1 hourly initially – to help guide management
- Treat underlying cause (ie. septic screen and antibiotics if sepsis is precipitant)
- Refer to specialist Diabetes team for ongoing management

Consider HDU/Level 2 care if:

- Osmolality >350mosmol/kg
- pH <7.1
- Sodium above 160mmol/L
- Hypokalaemia (<3.5mmol/L) or hyperkalaemia (>6mmol/L)
- GCS <12
- Hypoxia
- Oliguria
- Hr >100bpm, <60bpm
- Creatinine >200µmol/L
- Hypothermia
- Acute stroke/MI
- Major comorbidity

Targets:

- Replace fluid/electrolyte deficit (replace ~ 50% of fluid deficit in first 12hrs and the remainder in the following 12hrs – however, this is very much dependent upon the patients comorbidities and degree of renal failure)
- Normalise blood glucose and osmolality (gradually and safely- normalisation of electrolytes/ osmolality may take up to 72hrs)
- Aim fall in serum osmolality of no more than 3-8mosmol/kg/hr
- Fall in blood glucose of no more than 5mmol/L/hr
- Aim to keep the glucose between 10 and 15mmol/L in the first 24hours
- Treat precipitating cause (eg. stroke/ sepsis/myocardial infarction)
- Foot care to avoid ulceration (heel protection and daily foot checks)
- Avoid complications like cerebral oedema

- Thromboprophylaxis with prophylactic dose of LMWH unless contraindicated
- The rate of fall of plasma sodium should not exceed 10mmol/L in 24 hours
- Most patients will require SC insulin therapy upon discharge, however, in some cases this may be changed to oral therapy after a period of stability

0-60.1 minutes:

- IV 0.9% NaCl
- Aim to give 1st litre over 1 hour
- May need to be more rapid if hypotensive or slower if elderly with a history of heart failure
- Only start low dose (0.05units/kg/ hr) insulin if significant ketosis
- Assess mental state/fluid balance
- Try to identify precipitating cause and treat
- Initial investigations: Septic screen including cultures, VBG, CBG, blood ketones, FBC,U&E, LFT, CRP, calculated osmolality, CXR, ECG
- Foot assessment
- Aim to repeat osmolality, electrolytes, CBG 1 hourly initially
- Consider catheterisation
- IV Antibiotics if sepsis suspected
- Prophylactic LMWH

60 minutes-6 hours:

- Aim to reduce osmolality gradually (3-8mosmol/kg/hr)
- Continue IVF (cautiously if at risk of precipitating heart failure-target is to achieve positive fluid balance of 2-3L by 6 hours in those who aren't at risk of becoming overloaded)
- If plasma Na increasing but osmolality falling at desired rate continue 0.9% NaCl
- If plasma Na increasing and osmolality increasing (or falling at less than 3mosmol/kg/hr) reassess fluid balance and if appropriate speed up rate of IVF
- If osmolality increasing and fluid balance adequate consider initiating 0.45% saline
- If osmolality falling at rate more than 8mosmol/kg/hr consider reducing speed of IVF or insulin if already on insulin.

- If plasma glucose falling at less than 3-5mmol/L reassess fluid balance
- If fluid balance inadequate speed up fluids
- If fluid balance adequate consider starting insulin at 0.05units/kg/hr
- Maintain K in normal range
- Avoid hypoglycaemia
- Aim to keep glucose between 10 and 15mmol/L in the first 24hours
- If blood glucose <14mmol/L commence 5% or 10% Dextrose at 125ml/hr in addition to continuing saline

6-12 hours:

- Aim to achieve positive fluid balance of 3-6L by 12 hours (depending on age and comorbidities)
- Assess for complications (fluid overload, cerebral oedema)
- Strict fluid balance monitoring
- Avoid hypoglycaemia (as above)

12-24 hours:

- Continue to rehydrate and regularly check electrolytes, glucose and osmolality
- Osmolality is likely to still be elevated at 24hours
- Assess for complications
- Continue to treat underlying precipitating cause
- Ensure referral to Diabetes team

24 hours – Day 3:

Patient should have steadily recovered and biochemistry should be back to normal

- VRII if not eating and drinking
- Continue IVF if not E&D
- Convert to SC insulin when stable
- Daily foot checks
- Diabetes team review
- Mobilise as appropriate

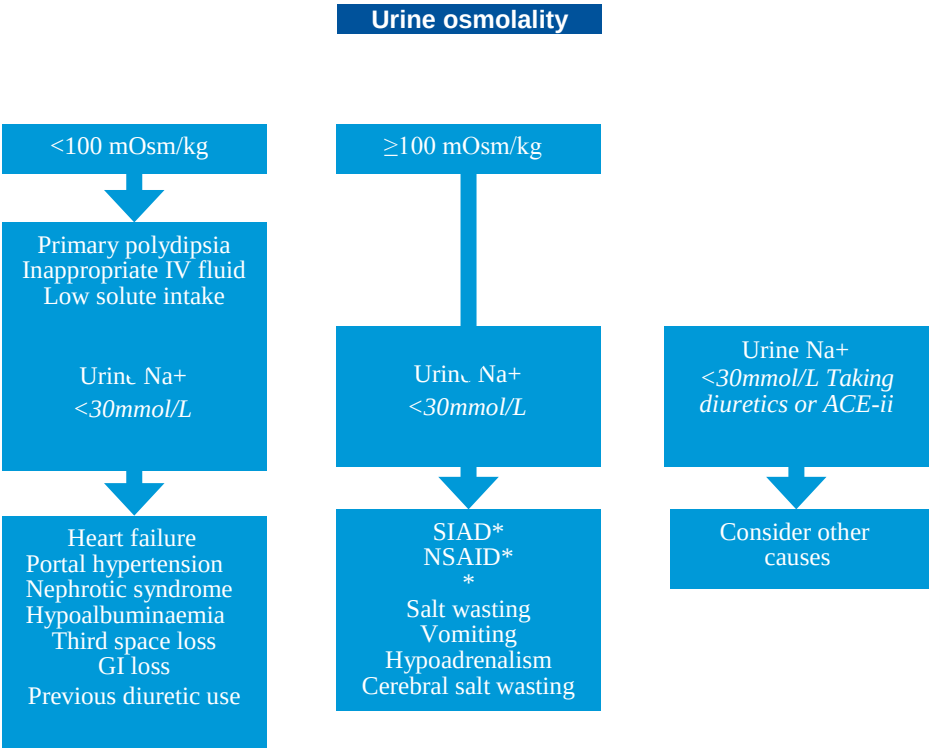
Hyponatraemia

Dr Brogan Salence, Core Medical Trainee

Assessment should include:

- The degree of hyponatraemia:
- Mild: 130-135mmol/L Moderate: 125-129mmol/L; Profound: <125mmol/L
- The rate of development of hyponatraemia
- Relevant co-morbidities of the patient
- The intrinsic ability of the central nervous system to adapt to changing osmolar stress
- Assessment of extracellular fluid volume status
- Symptoms and signs of hyponatraemia
- Measurement of urinary sodium to distinguish the aetiology

Diagnostic algorithm for patients with hyponatraemia



- *syndrome of inappropriate antidiuresis
- Management should be based on the clinical symptoms and signs rather than the degree of hyponatraemia
- Symptomatic hyponatraemia is associated with cerebral oedema and brain herniation and, as such, plasma sodium needs to be elevated acutely

Treatment of severe or moderately severe symptomatic hyponatraemia

0-1 hour

- IV infusion 150ml 3% hypertonic saline over 20 minutes
- Check Na+
- IV infusion 150ml 3% hypertonic saline over 20 minutes whilst awaiting result
- Repeat twice or until 5mmol/L increase in Na+

Follow up after 5mmol/L correction:

- Stop infusion
- Keep IV line open with minimum volume 0.9% saline
- Start diagnostic specific treatment
- Limit increase of Na+ to 10mmol/L in the first 24h

- Limit increase of Na+ to additional 8mmol/L every 24 h thereafter until Na+ 130mmol/L
- Check Na+ 6h, 12h and daily until stable

If there is no improvement in symptoms following 5mmol/L correction in the first hour:

- IV infusion 150ml 3% hypertonic saline
- Aim additional 1mmol/L increase in Na+

Indications for stopping infusion:

- Symptom improvement
- Na+ increases >10mmol/L in total or reaches 130mmol/L (whichever is first)
- Explore other causes
- During the treatment of hyponatraemia, regular monitoring of sodium is required in order to avoid rapid overcorrection with the risk of osmotic demyelination syndrome (ODS)
- Managing overcorrection of serum Na+If there is an increase in Na+ of 10mmol/L in first 24hr or 18mmol/L in first 48hr, hypertonic fluids should be stopped.
- Consult a clinician with experience in over-correction who may recommend hypotonic fluids

ODS

- Progressive quadriplegia
- Opthalmoplegia
- Extrapyramidal features such as ataxia
- Prognosis is variable but usually poor, with many patients developing persistent neurological deficit.
- Patients at high risk of developing ODS are those with Na+ concentration ≤105 mmol/L, hypokalaemia, alcoholism, malnutrition and advanced liver disease.

Drugs that frequently cause hyponatraemia include:

- Diuretics: Thiazides
- Selective serotonin reuptake inhibitors
- Antipsychotics: haloperidol; phenothiazides
- **Non-steroidal anti-inflammatory drugs
- Carbamazepine
- Less commonly: sulphonylureas; tricyclic antidepressants; dopamine agonists; opiates; theophylline; chlorpropamide, clofibrate, angiotensin-converting enzyme (ACE) inhibitors, angiotensin-II

receptor antagonists, melphalan, proton pump inhibitors, amiodarone, domperidone and MDMA

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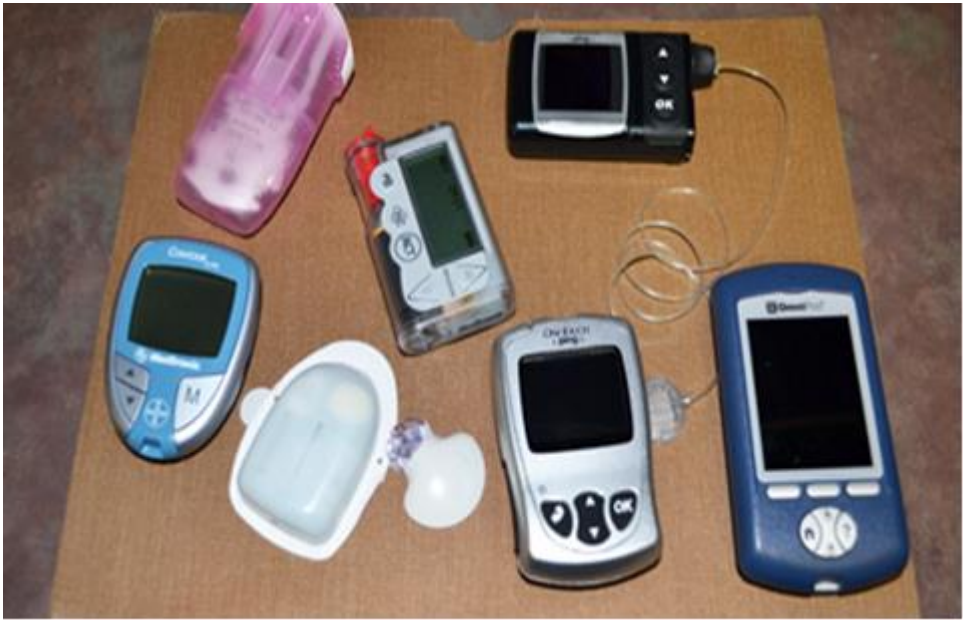
Diabetes Technology Update

Dr Marie McNulty, Registrar with Type 1 Diabetes, former Programme Manager at Diabetes UK.

There are a growing number of implantable devices being used in the management of Type 1 Diabetes. Below are a few examples of the large number of devices which are now available. Similar to other medical devices, it is important for medical staff to be able to recognise these items in the acute situation in order to ensure the safety of their patients.

Insulin Pumps



Sample selection of insulin pumps – Credit Diabetes Times

Worn continuously for the delivery of a constant basal rate of subcutaneous rapid-acting insulin e.g Novorapid, with bolus function for delivery of stat insulin prn for meals and snacks. Set changes usually occur approximately every 3 days.
Potential issues requiring medical attention may include site infection, air bubble in pump reservoir leading to under-delivery of insulin, pump malfunction (rare) or running out of insulin (all could result in DKA).

Advances in monitoring technology:

Relevance to acute medical work – spot diagnosis, to be able to recognise wearable medical technology and check sites for signs of infection if indicated.

Interstitial fluid monitoring, aka “Flash” monitoring

Wearer scanning “Freestyle Libre” sensor – Credit Bloomsburg

Subcutaneous sensors last 14 days and store 8 hours of data at a time. Usually worn on back of upper arm. Patients “swipe” the sensor with a reader or an Android phone. Readings must be taken minimum every 8 hours to capture all data over a 24-hour period. In addition to a simple reading, the wearer can see the trend of their blood glucose (e.g. whether rising or falling rapidly), allowing closer adjustment of insulin doses and potential earlier correction of impending hypoglycaemia. Limitations mean it may not completely replace finger prick testing (e.g. not approved for testing before driving).

Continuous glucose monitoring (CGM)

An example of a CGM sensor – Credit www.diabetes.co.uk

These sensors also sit subcutaneously. Usually worn on areas similar to traditional injection sites, e.g. abdomen, buttocks, thighs. There are combination systems for use with specific insulin pumps, along with standalone systems which can be used with any pump or injection regime. Sensor life varies, most last 1-2 weeks. Advantages over Flash technology include hypoglycaemia alarms (if linked with pump may be able to halt insulin delivery). Also allow transmission of data to remote devices e.g. smartwatches.

HIV

HIV testing

Updated January 2018 – Dr. Marie McNulty, GU Registrar.
Previous edition Dr Verity Sullivan, SpR in Infection disease and HIV & Joshana Lovage, Final Year Medical Student.

For full guidelines please see the 2008 British Association of Sexual Health and HIV (BHIVA) UK National Guidelines for HIV Testing. (http://www.bhiva.org/documents/guidelines/testing/glineshivtest08.pdf)

Key points to remember:

- HIV is a treatable medical condition and the majority of those living with the virus remain fit and well on treatment
    - In 2016, it was estimated that 89,400 people in England were living with HIV, of whom an estimated 12% were unaware of their infection (PHE 2016).
    - Late diagnosis is the most important factor associated with HIV-related morbidity and mortality in the UK, with a 10-fold increased risk of death in the year following diagnosis for these patients. 42% of people diagnosed with HIV in 2016 were diagnosed late.
    - Healthcare professionals can obtain informed consent for a HIV test in the same way that they do for any other medical investigation. Written consent is not required.
    - Patients should be offered and encouraged to accept HIV testing in any healthcare setting.
    - HIV testing should be normalised and stigma reduced, especially given that the outlook for HIV positive individuals is now better than for many other diseases for which clinicians routinely test. Pre-test counselling is not required unless the patient requests this. Explanation may be advisable if there is a high suspicion of HIV, however any pre-test discussion should cover the benefits of testing to the individual and include details of how the result will be communicated to the patient.

Who To Test?

- All patients presenting for healthcare where HIV, including HIV seroconversion, enters the differential diagnosis: this includes but is not limited to those displaying an indicator condition (Table 1 in 2008 guidelines, see http://www.bhiva.org/documents/guidelines/testing/glineshivtest08.pdf)
- All general medical admissions and new GP registrants in an area where HIV prevalence exceeds 2 in 1000 population. (Note – this qualifies many metropolitan areas including most of London for consideration of

universal testing – see fig 1.)

- All men who have sex with men (MSM) and female sexual contacts of MSM
- All patients from a country of high prevalence and any patient who reports sexual contact with someone from an area of high prevalence (Sub-Saharan Africa, Caribbean, South-East Asia and Russia)
- All those who report sexual contact with someone who is HIV positive
- All patients who report a history of injecting drug use (IVDU)
- Universal (opt-out) testing should occur in all of the following settings:
- Healthcare services for those diagnosed with TB, hepatitis B and C and Lymphoma, dialysis and organ transplant patients.
- Antenatal, genitourinary and TOP services.
- Drugs dependency programmes.

:

Which Test?

- 1st-line: Serum combined HIV antibody and p24 antigen test (4th generation assay). Ascertains HIV status 1 month prior to the test. Any risk that occurred within the 1 month prior to testing will not be covered (the “window period.”) Results should be available within 72 hours.
- Point of Care test (“POCT”, “Instant” or “Finger prick”):
- Antibody only test, using blood or saliva. Ascertains HIV status 3 months prior to the test (therefore, 3 months window period). A positive result must always be confirmed by serology. Useful where a rapid result is desirable or if venepuncture is refused.

What About Results?

- The result of a HIV test should be given directly to the patient by the testing team and not to any third party without explicit consent from the patient.
- The patient should be discussed with the HIV specialist team as soon as possible to ensure rapid integration into specialist care.
- An “equivocal” or “indeterminate” test should be discussed with the specialist team. This may represent HIV seroconversion and will require further specialist tests.

UK National Guidelines for HIV Testing 2008

Clinical indicator diseases for adult HIV infection		
	AIDS-defining conditions	**Other conditions where HIV testing should be offered**
Respiratory	Tuberculosis Pneumocystis	Bacterial pneumonia Aspergillosis
Neurology	Cerebral toxoplasmosis Primary cerebral lymphoma Cryptococcal meningitis Progressive multifocal leucoencephalopathy	Aseptic meningitis/encephalitis Cerebral abscess Space occupying lesion of unknown cause Guillain-Barré syndrome Transverse myelitis Peripheral neuropathy Dementia Leucoencephalopathy
Dermatology	Kaposi's sarcoma	Severe or recalcitrant seborrhoeic dermatitis Severe or recalcitrant psoriasis Multidermatomal or recurrent herpes zoster

Clinical indicator diseases for adult HIV infection		
	AIDS-defining conditions	**Other conditions where HIV testing should be offered**
Gastroenterology	Persistent cryptosporidiosis	Oral candidiasis Oral hairy leukoplakia Chronic diarrhoea of unknown cause Weight loss of unknown cause Salmonella, shigella or campylobacter Hepatitis B infection Hepatitis C infection
Oncology	Non-Hodkin's lymphoma	Anal cancer or anal intraepithelial dysplasia Lung cancer Seminoma Head and neck cancer Hodgkin's lymphoma Castleman's disease
Gynaecology	Cervical cancer	Vaginal intraepithelial neoplasia Cervical intraepithelial neoplasia Grade 2 or above
Haemotology		Any unexplained blood dyscrasia including: • thrombocytopenia • neutropenia • lymphopenia
Ophthalmology	Cytomegalovirus retinitis	Infective retinal diseases including herpesviruses and toxoplasma Any unexplained retinopathy
ENT		Lymphadenopathy of unknown cause Chronic parotitis Lymphoepithelial parotid cysts

Clinical indicator diseases for adult HIV infection		
	AIDS-defining conditions	**Other conditions where HIV testing should be offered**
Other		Mononucleosis-like syndrome (primary HIV infection) Pyrexia of unknown origin Any lymphadenopathy of unknown cause Any sexually transmitted infection

HIV General Knowledge Updates

- People living with diagnosed HIV infection are growing older due to low mortality rates. In 2016, more than a third of people accessing HIV care were aged 50 years and above, compared with 17% in 2007. More people with HIV are now living with multiple comorbidities.
- According to the latest BHIVA guidelines (2015/16), ALL HIV positive patients should be offered antiretroviral therapy regardless of CD4 count, including those with primary HIV infection (seroconversion illness) – make sure to liaise with your specialist team early if this is suspected.
- PEP (POST-exposure prophylaxis) must be prescribed within 72 hours of the risk exposure (whether occupational or sexual). First line regimen is Truvada OD + Raltegravir BD for 28 days, which is generally well tolerated, with few side effects or interactions. It is highly effective at preventing HIV when taken correctly. There is still a common misconception that PEP drugs are poorly tolerated and require co-prescription of anti-emetics and antidiarrhoeals. This is no longer the case.
- PreP (PRE-exposure prophylaxis) is now being used by some MSM at high risk of infection with HIV. You may see it as part of a medication history as Truvada or tenofovir-emtricitabine. Check renal function and ensure STI and virology screens are up to date along with liaising with specialist team.
- Useful quick links:
- For the full range of HIV-related guidelines, download the BHIVA app: http://www.bhiva.org/Apps.aspx
- Check for interactions before prescribing medications for patients taking antiretrovirals here: https://www.hiv-druginteractions.org/

- You can also check for interactions with Hepatitis C treatments here: https://www.hep-druginteractions.org/

Opportunistic Infections

- These are less common than in the past due to the success and earlier instigation of antiretroviral therapy but when they do occur, can represent a medical emergency.
- Thorough history and physical examination is vital to ascertain differentials, along with establishing HIV parameters i.e. CD4 count and early liaison with the specialist team.

Sample OIs per CD4 Count

CD4 Count	OI / Condition
> 500/mm3	Candidal vaginitis Persistent generalized lymphadenopathy
200-500/mm3	Pneumoccal pneumonia Pulmonary tuberculosis Herpes zoster Oropharyngeal candidiasis (Thrush)
< 200/mm3	Pneumocystis jiroveci pneumonia Miliary/extrapulmonary TB
< 100/mm3	Candida Esophagitis Penicilliosis Toxoplasmosis Cryptococcosis
< 50/mm3	Mycobacterium avium complex (MAC) Disseminated cytomegalovirus (CMV)

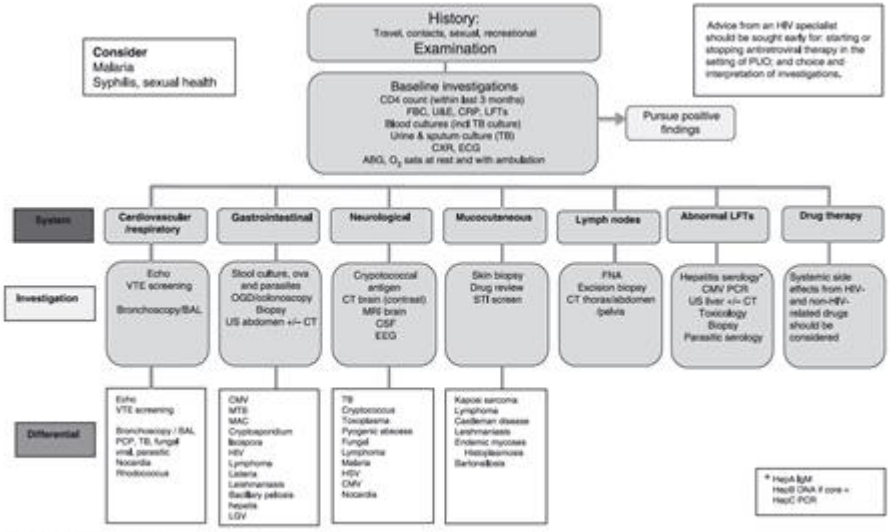


Fig. 9.1 PUO in an HIV-seropositive patient.

Reference:
http://www.bhiva.org/documents/Guidelines/OI/hiv_v12_is2_Iss2Press_Text.pdf

Respiratory disease in HIV positive individuals

(From the British HIV Association and British Infection Association Guidelines for the Treatment of Opportunistic Infection in HIV-seropositive Individuals 2011http://www.bhiva.org/documents/Guidelines/OI/hiv_v12_is2_Iss2Press_Text.pdf)Respiratory symptoms may arise from infection with a wide variety of organisms in HIV-positive patients.

- Alongside common bacterial pneumonias, atypical and opportunistic infections (OI) must be considered in these immunocompromised patients.
- Taking a focused history and performing appropriate investigations on the patient at presentation will enable a more rapid diagnosis and direct appropriate management.
- If TB is considered should be placed in respiratory isolation.

History

Specific things to consider in the HIV- positive patient:

- Most recent CD4 count and neutrophil count
- If the patient is taking/adhering to Highly-Active Antiretroviral Therapy (HAART)
- If the patient is taking/adhering to OI prophylaxis (eg. Septrin for PCP prophylaxis)
- Recent discharge from hospital (risk of nosocomial infection)
- Place of residence, or if homeless (risk of TB)
- Travel history (risk of TB, legionella)
- Recent injecting drug use (risk of bacterial pnemunonia, TB)
- Use of prolonged courses of immune modulators, eg. Corticosteroids

Investigations

In addition to acute medical management, all HIV-positive individuals presenting with respiratory symptoms should have:

- Chest X-ray
- Sputum for MC+S (bacterial infection) and AAFBs (TB)
- Blood cultures with consideration of TB blood cultures

- Respiratory virus PCR nasopharyngeal swab
- Legionella antigen (urinary/serology)
- Pneumococcal antigen (urinary/ serology)

Specific conditions to consider:

PCP (Pneumocystic jiroveccii)

- Over 90% of cases occur in patients with a CD4 count <200 (CD4 percentage <14%).
- Typically presents with exertional dyspnoea over several weeks, malaise and dry cough.
- Examination may show tachypnoea and fever. Breath sounds may be normal.
- CXR may be normal or can show interstitial infiltrate with apical sparing.
- Tissue/Body fluid containing the organism must be obtained to confirm diagnosis.

Additional Investigations

- Exercise Oximetry if safe to do so and if the patient has not had PCP in the past (as otherwise can give a false-positive result). An ambulatory oxygen saturation reading is deemed positive if the levels drop to 90% or below on exertion.
- Induced sputum if available.
- Arterial blood gas can guide appropriate treatment for PCP. A clinically stable patient with a PaO_2 >10 kPa may be considered for outpatient treatment. Patients with a PaO_2 of <8 require treatment with IV methylprednisolone to encourage stabilisation.

Management

- First-line treatment is with Co- Trimoxazole +/- steroids.
- Treatment should not be delayed in a presumed case by having to wait for microbiological confirmation: adequate lung samples can be obtained up to 10-days after starting PCP therapy.
- Discuss with the specialist team: they will advise on appropriate treatment and whether or not HAART should be prescribed.

Infectious diseases

Tuberculosis

Katherine Gaskell, SpR in Infectious Diseases

Wide range of symptoms:

- Classic B symptoms: Fever/weight loss/night sweats. Cough/sputum production/Vague abdominal distension, discomfort/altered bowel habit/back pain/bone pain/swelling/ testicular Sx/headache.
- Diagnosis: A tissue sample for microbiological diagnosis is required.

Respiratory + LN TB

- X3 sputum or Induced sputum sent for AAFB/TB culture/TB PCR. If pulmonary TB is expected and no sputum can be induced then a bronchoalevolar lavage (BAL) is needed. CXR plus CT as needed.
- For LN or Pleural TB: Aspirates/core biopsy/Pleural biopsy.

6 months treatment:

- First 2 months Rifampicin, Isoniazid, Ethambutol + Pyrazinamide.
- Then 4 months Rifampicin + Isoniazid
- Side effects: Hepatitis, liver failure, peripheral neuropathy, optic neuritis, colour blindness, rash, vomiting, diarrhoea, thrombocytopenia.

Pericardial TB:

- As per Respiratory TB plus steroids equivalent to 60mg prednisolone.

TB meningitis

- Lumbar Puncture and CT Brain for diagnosis.

12 months treatment:

- 2 months Rifampicin, Isoniazid, Pyrazinamide, Ethambutol (I+ P penetrate CSF best)

- 10 months Rifampicin, Isoniazid
- Steroid: Prednisolone 20-40mg if on R (or 10-20mg if not). Gradual tapering of Steroid after 4 weeks

Bone + Joint TB:

- Diagnosis requires either CT or MRI imaging and tissue diagnosis. Treatment is as per TB meningitis only use steroids if spinal cord involvement.

Latent TB Infection:

- Positive interferon gamma test (IGT)
- Asymptomatic
- Known exposure/likely high risk exposure
- Foreign nationals from an endemic country
- Immunosuppression (eg. pre TNF alpha treatment)
- Three months' treatment with Isoniazid and Rifampicin. Monitor LFTs + FBC.

Clostridium difficile

Dr Katherine Gaskell, SpR in Infectious Diseases

Diagnosis

- Diarrhoea (>3 or 3 type 6/7 stool in 4 hrs) + abdominal symptoms
- Positive test for C. difficiles toxin/ toxigenic C. Difficlile +/-antigen on diarrhoeal stool
- Pseudomembranous colitis on colonscopy
- Possible antimicrobial use in previous 8 weeks
- Patients often have Fever/Abdominal cramping/distended abdomen.

Markers of Severity

- Rising Lactate/ rising WCC/falling albumin/Acute Kidney Injury/ hypokalaemia/ Toxic megacolon/ abdominal perforation/SIRS/Sepsis.

Treatment

- Hand hygiene/gowns/gloves/side rooms/isolated commodes
- Stop causative agents: antimicrobials/ PPI/antiperistalsic agents
- Suspected severe/complicated CDI: initiate treatment whilst waiting for results
- Mild-Mod: Metronidazole orally 500mg x3/day 14 days.
- Severe: Vancomycin orally 125mg x4/ day 14 days.
- Severe, complicated: (Vancomycin orally 500mgx4/day or 500mg rectally in 100ml N Saline x4/day) + Metronidazole iv 500mgx3/day 14 days.
- Consider proceeding to colectomy in severely unwell patients.

Recurrent CDI

- 1st: Treat as per the initial episode (Mild/Mod/Sev)
- 2nd: Tapered Vancomycin course
- 3rd: Fidaxomicin 200mg x2/day 10 days (reduced recurrence but £££)
- Or faecal microbiota transplant (FMT)

Prevention

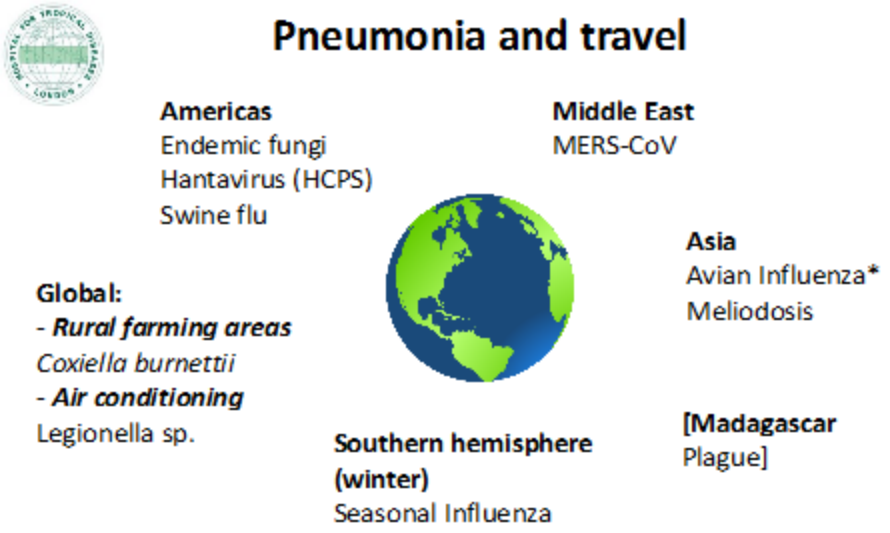
- Focused short courses of antibiotic prescribing, always document an end

date for antibiotics,
stop PPI unless clear
clinical indication.

Emerging respiratory infections

Clinical content courtesy of Victoria Johnston, with thanks to Sarah Logan, Hospital for Tropical Diseases London.
Editing by Marie McNulty, Medical Education Fellow.

- Emerging infections can be a brand new infection not previously recognised (e.g. SARS, MERS) or a known infection which rapidly increases in incidence or geographical range (e.g. Ebola, Zika)
- Of 335 emerging infections between 1940 and 2004, 60% werer zoonoses (72% from wildlife). Organism - 55% bacteria or rickettsia, 25% viruses.
- H1 N1 was the last flu virus to evolve the ability to spread from human to human after originating in swine
- Careful history taking is essential to enable accurate and timely diagnosis treatment. Patients don't always volunteer travel history so ask specifically. Make sure to also inquire about: sick contacts, exposure to air conditioning, travel to rural areas and animals (livestock or wild).



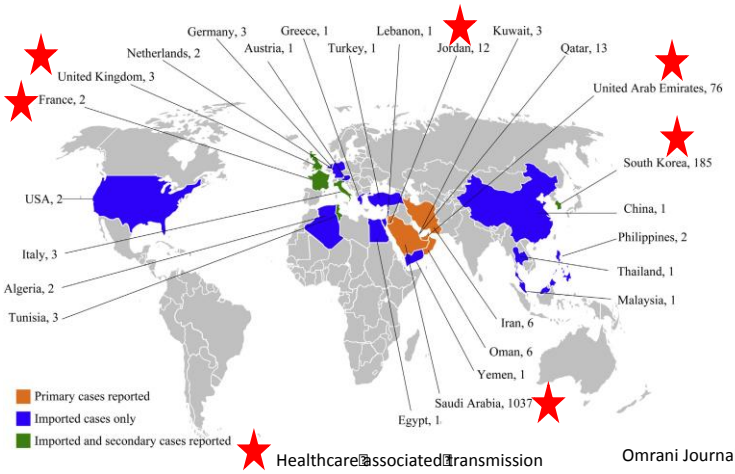
Emerging viral infections: Mers

- Coronaviruses are RNA viruses which cause diseases from the common cold to SARS and now MERS.

- MERS is seen as a major threat due to:
    - High mortality
    - Respiratory droplet transmission
    - Millions of people travelling annually to SA for Hajj and Umrah pilgrimages.

- However, sustained human to human transmission is not being observed and as such an epidemic resulting from this method of spread is unlikely.
- Even though few patients with MERS-CoV infection give a history of camel exposure, it is likely that camels are the major reservoir host.
- Seasonal peak in Spring (April-June) may reflect transmission from newly infected young camels.

MERS cases, July 2015



Healthcare associated transmission

Omrani Journal Hosp Inf 2015

- Common symptoms include fever (+/- rigors), cough which may be dry or productive, and shortness of breath.
- Other symptoms can include myalgia, diarrhoea, nausea and vomiting, sore throat, and less commonly haemoptysis, chest or abdominal pain or headache.

Public Health England

UK guidance: who to test?

Acute respiratory infection requiring hospital admission:

- Fever (>38 or history)
- Cough
- Lung parenchymal disease (clinical or radiological)
- Not explained by other infection

PLUS one of

- Travel to MERS-endemic country* within 14 days of symptom onset
- Contact with symptomatic confirmed case within 14 days
- ICU HCW caring for patient with severe acute respiratory infection
- Cluster (2+) of epidemiologically-linked cases within a 2/52 period requiring ICU admission

*Bahrain, Jordan, Iraq, Iran, Kingdom of Saudi Arabia, Kuwait, Oman, Qatar, United Arab Emirates, Yemen

Public Health England

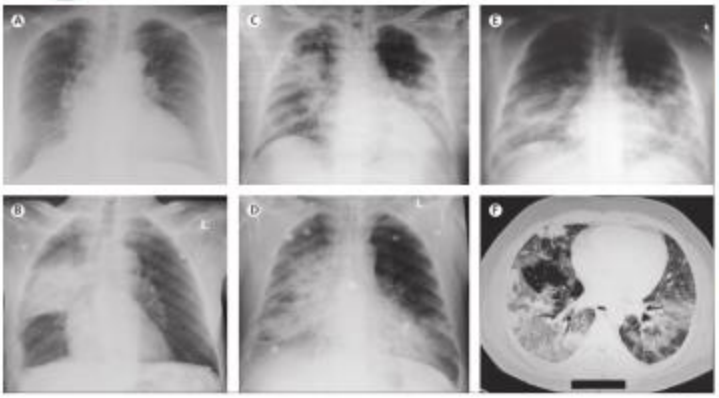
UK guidance: testing

- **What samples?**
  - Sputum (or BAL)
  - Throat & nose swab in viral transport medium x 2
  - Acute serum sample
- **Handling of samples**
  - Double bag + biohazard sticker
  - Containment level 3
  - Category B transport
- **How do I request?**
  - Call local ID/micro → call local PHE → arrange transport to MERS-testing labs

Results of routine investigations

- Bloods: most commonly raised LDH, thrombocytopenia and lymphopenia, but increased ALT and AST has been observed also. Renal dysfunction is also common (unclear mechanism).
- CXR has demonstrated abnormalities in all cases

Radiology



Fine reticulonodular air-space opacities

↓

Focal consolidation

Assiri Lancet 2013

Public Health England

UK guidance: infection control

- **Isolation:**
  - Triage: single room
  - Admission: negative pressure single room
- **PPE:**
  - long sleeved fluid repellent gown, surgical gloves, FFP3 mask, eye protection
- **Staff:**
  - Inform infection control
  - Restricted entry / log book
  - Self-monitor for 14 days and report if fever

Be aware

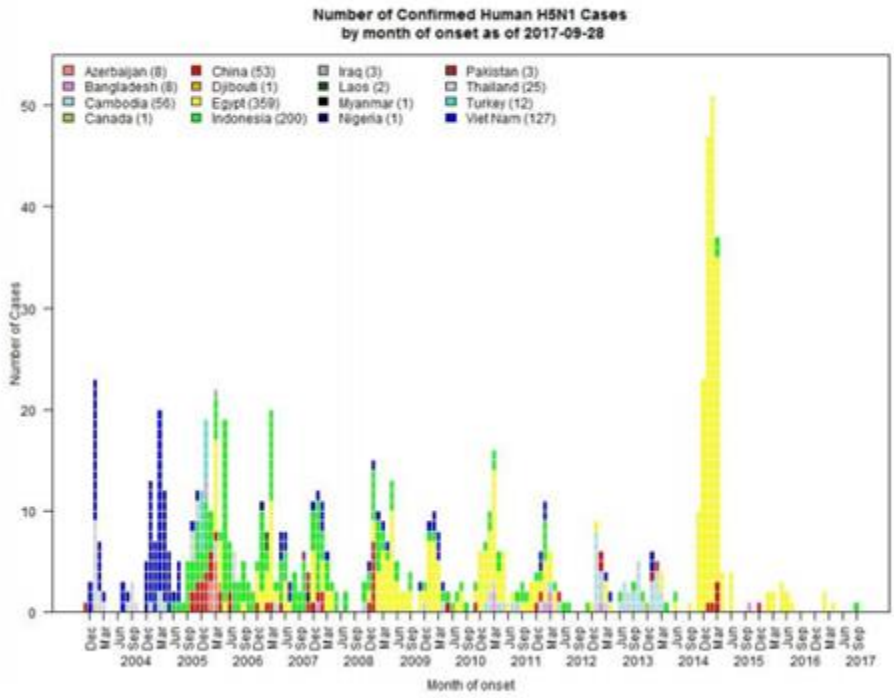
- Case mortality rises with age (up to 75% in >60); however skewed data since case definition for those being tested is skewed to severe end of spectrum
- No effective treatment as yet – some potentials may include interferon, ribavirin.
- Steroids have shown no survival benefit. Also caution as may have worsened outcomes with SARS

Risk factors for severe infection

- Immunocompromised
- Co-morbidities
- Smoking
- Concomitant infection
- Low albumin
- Age >65 (mortality)

Emerging Viral Infections: Avian Flu

Figure 1: Epidemiological curve of avian influenza A(H5N1) cases in humans by week of onset, 2003-2017



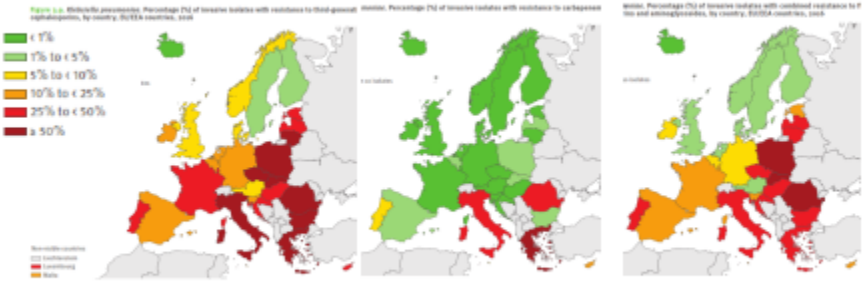
- H7N9 Current outbreak in China
  - 1564 lab-confirmed cases, 612 deaths as of September 2017
  - Ongoing geographical spread
  - Small clusters of human cases
- H5 subtypes Ongoing outbreaks in birds in Africa, Europe and Asia
  - Humans (2003- Sep 2017)
  - H5N1: 860 lab-confirmed cases, 454 deaths
  - H5N6: 10 cases
- 2009 H1N1 was the last flu virus to evolve the ability to spread from human to human. Human cases of H1N1 first identified in HK in 1997.
- H7N9 first identified in humans in 2013 in China

Emerging Bacterial Infections

Main issue = RESISTANCE

- Take micro samples EARLY (pre-abx if possible)
- Follow local guidelines BUT if the patient has been admitted to hospital overseas OR is not responding to standard antibiotics, maintain a low threshold for EARLY discussion with ID/Micro.
- Transfers from any overseas hospital (or those who have recent admission) should be isolated on admission and screened for carbapenem resistant organisms by rectal swab or stool sample.

Klebsiella pneumoniae



Third generation cephalosporins | Carbapenems | Third gen cephalosporins, fluroquinolones and aminoglycosides

Pseudomonas aeruginosa

Tazocin | Fluroquinolones | Ceftazadine | Aminoglycosides

The same pattern for carbapenems AND resistance to at least **three** of these antibiotics

University College London Hospitals NHS
NHS Foundation Trust

Clinical advice

Fever service
08447788990

HTD national advice line
02034567890
(ask for HTD on-call)

Emerging infections: summary

- Appears to be an increase in emerging infections over time
- Major public health concern and potential threat to global security
- Health care workers are on the front-line
  - Awareness
  - Travel history
  - Infection control

Renal

Acute kidney injury

Dr Emily Gowland, SpR in Anaesthetics and Education Fellow

The following is adapted from the 2013 NICE guidelines on Acute Kidney Injury.

Identifying acute kidney injury in patients with acute illness

- Investigate for acute kidney injury (AKI), by measuring serum creatinine and comparing with baseline,

Suspect in adults with acute illness + any of the following:

- Chronic kidney disease (adults with an estimated glomerular filtration rate [eGFR] less than 60 ml/min/1.73 m^2 are at particular risk)
- Heart failure
- Liver disease
- Diabetes
- History of acute kidney injury
- Oliguria (urine output less than 0.5 ml/kg/hour)
- Neurological or cognitive impairment or disability
- Hypovolaemia
- Drugs with nephrotoxic potential eg NSAIDs, aminoglycosides, ACE inhibitors, angiotensin II receptor antagonists and diuretics use of iodinated contrast agents within the past week
- Symptoms or history of urological obstruction, or conditions that may lead to obstruction
- Sepsis
- Deteriorating early warning scores
- 65 years or over.

Preventing acute kidney injury

- Ongoing assessment of the condition of patients in hospital
- Review/monitor early warning score and respond to oliguria (urine output <0.5ml/kg/hr)

- Increase frequency of observations if abnormal physiology is detected.
- If at risk or suspected AKI
- measure urine output regularly
- measure urea, creatinine and electrolytes regularly
- Consider measuring lactate, blood glucose and blood gases

Assessment and Prevention of AKI in adults having iodinated contrast agents

- Iodinated contrast agents are often used for imaging
- Non-emergency imaging, investigate for CKD by measuring eGFR or by checking an eGFR result obtained within the past 3 months.
- There is an increased risk of AKI associated with contrast agents with the following:
- CKD with an eGFR less than 40 ml/ min/1.73 m^2
- Diabetes
- Heart failure
- Renal transplant
- 75 years or over
- Hypovolaemia
- Increasing volume of contrast agent
- Intra-arterial administration of contrast agent.
- In an emergency setting ensure that risk assessment does not delay emergency imaging.

Prevention of AKI

- If at risk of AKI from risk factors described offer IV fluid volume expansion prior to contrast
- Offer either isotonic sodium bicarbonate or 0.9% sodium chloride.
- Consider temporarily stopping ACE inhibitors and ARBs in adults having iodinated contrast agents if they have chronic kidney disease with an eGFR less than 40 ml/min/1.73 m^2.
- Discuss with nephrology team before offering iodinated contrast agent to adults with contraindications to IV fluids if:
- Increased risk of contrast induced acute kidney injury
- Acute illness
- On renal replacement therapy

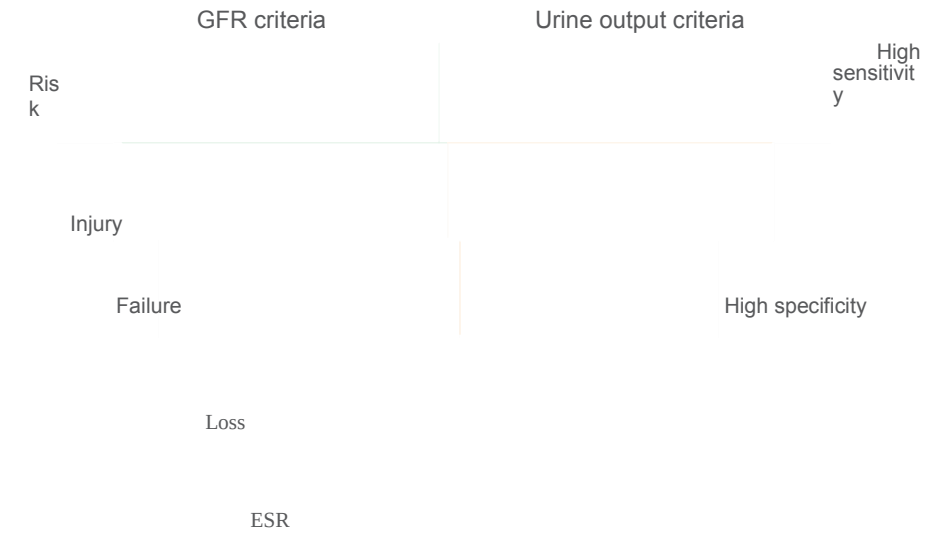
Detecting acute kidney injury

Follow the scoring system used at your trust: (p)RIFLE, AKIN or KDIGO

By using any of the following criteria:

- Rise in serum creatinine of 26 micromol/litre or greater within 48 hours
- 50% or greater rise in serum creatinine known or presumed to have occurred within the past 7 days
- Fall in urine output to less than 0.5 ml/kg/hour for more than 6 hours

Figure 1: RIFLE scoring system



(Acutemed.co.uk)

Investigating causes of AKI

- Acute nephritis – suspect when no obvious cause of acute kidney injury with dipstick results showing haematuria and proteinuria, without urinary tract infection or trauma due to catheterisation.
- Do not routinely offer ultrasound of the urinary tract when the cause of the acute kidney injury has been identified.
- If pyonephrosis is suspected ultrasound urinary tract -to be performed within 6 hours of assessment.
- If no identified cause of their acute kidney injury or at risk of urinary tract obstruction- urgent ultrasound of the urinary tract within 24 hours of assessment

Management

- Treat the cause, and monitor progress.

Obstruction

- Refer to urologist immediately when one or more of the following is present:
- pyonephrosis
- an obstructed solitary kidney
- bilateral upper urinary tract obstruction
- AKI caused by urological obstruction.
- nephrostomy or stenting should be undertaken within 12 hours of diagnosis

Pharmacological

- Do not routinely offer loop diuretics to treat acute kidney injury.
- Consider loop diuretics for treating fluid overload or oedema while: awaiting renal replacement therapy,
- Do not use low-dose dopamine to treat acute kidney injury.

Referring for renal replacement therapy

- Immediate referral if any of the following are not responding to medical management:
- Hyperkalaemia
- Metabolic acidosis

- Symptoms or complications of uraemia (for example, pericarditis or encephalopathy)
- Fluid overload
- Pulmonary oedema

Referring to nephrology

- Immediately if they meet criteria for renal replacement therapy
- Do not when there is a clear cause for acute kidney injury and the condition is responding promptly to medical management, unless they have a renal transplant.
- Consider discussion if concurrent severe illness might benefit from treatment, but there is uncertainty as to whether they are nearing the end of their life.
- Discuss within 24 hours if:
- The diagnosis that may need specialist treatment eg vasculitis, glomerulonephritis, tubulointerstitial nephritis or myeloma
- AKI with no clear cause
- Lack of response to treatment
- Complications associated with acute kidney injury
- Stage 3 AKI (according to RIFLE)
- a renal transplant
- CKD stage 4 or 5.
- When eGFR is 30 ml/min/1.73 m^2 or less in adults
- Consider referral if AKI resolved but has hypertension, impaired renal function or 1+ or greater proteinuria on dipstick testing of an early morning urine sample

Psychiatry

Acute psychosis on the medical ward

Dr C. Louise Murphy, SpR in General Adult Psychiatry, South London and Maudsley NHS Foundation Trust

On a busy medical ward, managing a patient with acute psychosis can be very challenging. Medical wards are not conducive to managing patients who may be agitated, chaotic, perplexed or behaviourally disturbed in other ways. The priority for the Medical Registrar will be to ensure the immediate safety of the patient, other patients on the ward and staff, to ensure the patient is reviewed urgently by liaison psychiatry service and to treat any concomitant physical illness.

There will be three main reasons for a patient with acute psychosis to be on a medical ward:

- The patient has a known mental illness, is known to mental health services and is admitted to the general hospital because of co-morbid physical illness and while an inpatient has a relapse and becomes acutely psychotic.
- The patient has a known mental illness and is admitted to a psychiatric inpatient unit, either detained under the Mental Health Act or admitted informally (voluntarily agreed to the psychiatric admission). During their psychiatric admission, they become physical unwell and are transferred to a medical ward for investigation and treatment. In this case, the patient should be transferred with staff from the psychiatric unit who can support the medical team in managing the severity of the patients' psychotic symptoms and behavioural disturbance.
- A patient has a new onset of psychotic illness (first episode psychosis) while an inpatient on a medical ward. This may be due to physical illness, prescribed drugs or illicit substances or represents a first psychotic episode de novo.

Assessment

- As medical registrar, if you suspect a patient may be acutely psychotic or developing a psychotic illness briefly assess the patient's mental state:

Symptoms of acute psychosis:

- Paranoid ideas/ delusions (commonly on a medical ward that the ward is fake, the staff are actors and the food is poisoned etc)
- Suspiciousness/fear
- Other bizarre delusions
- Hallucinations
- Irritability or agitation
- Thought disorder/thought block- disorganised speech or inability to communicate
- Loss of insight (complete break from reality)

These symptoms may occur when a person has a greatly elevated mood and increased energy (manic psychosis) or when the person is very low in mood (severe depression with psychotic symptoms)

- Do exclude any underlying physical illnesses such as:
- Delirium (including delirium tremens),
- Use of illicit substances/acute intoxication
- Steroid or Isoniazid-induced psychosis
- Systemic Lupus Erythematosus or any other systemic rheumatological disorder
- Hyper or hypo-thryoidism or any other endocrine disorder
- Any neurological disorder: commonly epilepsy, encephalitis, AIDS, Cerebral neoplasm, stroke, Parkinson's disease and Huntington's disease

Management

Immediate

- Do request an urgent assessment by the psychiatric liaison team/on-call psychiatric doctor.
- If the patient is attempting to leave the ward and appears acutely psychotic do assess them for detention under Section $5^{(2)}$ of the Mental Health Act. Section $5^{(2)}$ is a temporary hold of a person who is an inpatient in order for an assessment to be arrange under the Mental

Health Act 1983. This ensures their immediate safety whilst the assessment is arranged. It can be signed by the ward consultant or any nominated deputy (such as the On-Call Medical Registrar) who is a medically registered doctor

- If the patient is detained under Section 5.2 of the Mental Health Act, this is a legal framework which detains the patient in hospital for 72 hours. If the patient attempts to leave the ward you may need support from a Registered Mental Health Nurse, an on-call team, security or the police as a last resort to keep that person in hospital.
- If a person is deemed to lack capacity to make a decision to self discharge and is not under a Section $5^{(2)}$ of the Mental Health Act and it is the patient's best interests to remain on the ward- consider applying for an urgent Deprivation of Liberty Safeguard (DoLS). In the patient's best interests you may consider using a Registered Mental Health Nurse carrying out 1:1 nursing observations or security or the police as a last resort to assist you in maintaining the safety of the patient, other patients and staff on the ward.
- If the patient presents as behaviourally disturbed try reduce the level of arousal by verbal de-escalation techniques, time out and nursing in a side room with 1: 1 nursing observations (preferably with a Registered Mental Health Nurse).
- If this fails to reduce the level of disturbance consider Rapid Tranquillisation.
- The aims of Rapid Tranquillisation are:
    a. To reduce the suffering of the patient (psychological or physical)
    b. To reduce risk of harm to other by maintaining a safe environment
    c. To do no harm

The recommended interventions are (The Maudsley Prescribing Guidelines in Psychiatry 12th Edition, 2015)

- Step 1: Verbal de-escalation and time out
- Step 2: Offer oral treatment
    a. Choose one of:

- Lorazepam 1-2mg
- Buccal Midazolam 10mg
- Quetiapine 50-100mg
- Olanzapine 10mg
- Haloperidol 5mg (best with Promethiazine 25mg) – requires pre-treatment ECG

- Step 3: Consider IM treatment (choose one agent and repeat after 30-60 mins if effect insufficient)
  - Lorazepam 2mg
  - Promethiazine 25mg
  - Olanzapine 10mg
  - Haloperidol 5mg (should be the last drug considered, requires pre-treatment ECG)
- Step 4: Consider IV treatment
  - Diazepam 10mg over at least 5 minutes

If considering the use of Rapid Tranquilisation, it will be very likely you are doing this under the framework of the Mental Capacity Act as the patient is unlikely to be able to give informed consent for this treatment. You are considering the use of Rapid Tranquilisation in an incapacitious patient in their best interests.

Short term

- Urgent review by liaison psychiatry services with consideration of use of the Mental Health Act or Deprivation of Liberty Safeguards (DOLS) depending on the patient's capacity, severity of symptoms and cause of the acute psychosis.
- Exclusion of any medical cause for their current presentation. This is particularly important if the onset of the symptom is abrupt and the patient is not known to have a psychotic illness.
- Treatment of any medical cause for their presentation or treatment of any concurrent physical illness.
- Behavioural management plan over next 24-48 hours which includes PRN medication for acute agitation or disturbed behaviour and close observation by nursing staff (ideally with 1:1 nursing observations with Registered Mental Health Nurse).

Long term

- If the patient remains acutely psychotic consider the use of a regular antipsychotic medication and other psychiatric medication depending on cause of the

psychosis (liaison psychiatry service should advise).

- If the patient remains acutely disturbed or agitated consider the use of a regular benzodiazepine such as Clonazepam or Lorazepam (liaison psychiatry service should advise).
- Ideally, the patient should have a daily review by the liaison psychiatry service to review mental state and review acute risks.
- Once medically fit for discharge, the patient should be assessed by a psychiatrist to determine if the patient needs an admission to a psychiatric inpatient bed and if this will require a Mental Health Act assessment for detention under Section 2 or Section 3 of the Mental Health Act.

References

Taylor, David, Carol Paton, and Shitij Kapur. The Maudsley prescribing guidelines in psychiatry. John Wiley & Sons, 2015.

Self harm on the medical ward

Dr C. Louise Murphy, SpR in General Adult Psychiatry, South London and Maudsley NHS Foundation Trust

Introduction

Self-harm is defined as 'self-poisoning or injury, irrespective of the apparent purpose of the act'. Self-harm is an expression of personal distress and the reason why a person self-harms are complex. They can include a person wanting to end their life (suicidal intent), a person who self-harms in response to command auditory hallucinations, a person who self-harms to manage difficult emotions/relieve tension or a person who self-harms in order to affect change in others.

There are two situations in which a medical registrar will manage patients who harm themselves:

- The patient has been admitted to a medical ward due to the physical consequences of a self-harm act. The most common reason for this is a paracetamol self-poisoning.
- The patient has been admitted to a medical ward and while on the ward attempts to harm him or herself. This situation is a psychiatric emergency and the on-call psychiatric doctor/ liaison psychiatry service should be called to urgently assess this patient.

General principles of the management of a person who has self-harmed

- Any person who has self-harmed should be treated with the same respect and compassion as any other patient on the medical ward. The care they receive should be compassionate and non-judgemental.
- All people who self-harm should be offered treatment for the physical consequence of the self-harm act.
- If a patient refuses medical treatment, issues of mental capacity and of consent should be addressed. The person's mental capacity to refuse treatment or self-discharge should be assessed and documented in the notes
- If a person is assessed to lack capacity, staff have to act in the person's best interests and this may

include detaining the person in hospital to receive treatment for the physical consequences of the self- harm act.

- In certain circumstances a person may be treated for the physical consequences of a self-harm act if detained under the Mental Health Act and if the self-harm act is seen to result as a direct consequence of mental illness. This is a complex issue and the liaison psychiatry services/ the on-call psychiatry doctor should provide support and guidance with this.
- In a particularly complicated case, you may need to seek legal advice regarding a person's capacity to consent or refuse treatment following a self-harm act.

Involvement of mental health services

- Liaison psychiatry services/the on- call psychiatric doctor should be involved at the earliest opportunity in the care of a person who is admitted to a medical ward as a consequence of a self-harm act.
- Liaison psychiatry services/the on-call psychiatric doctor should conduct a risk assessment for a person who has self-harmed.

This should occur initially in the emergency department and a clear plan should be documented in the medical notes with regards to keeping the person safe on the ward. This may involve the use of 1:1 nursing observations by a Registered Mental Health Nurse.

- Liaison psychiatry services should regularly review the person who has been admitted to the medical ward following an act of self-harm and provide the medical team with updates regarding risk assessment.
- Liaison psychiatry services/on-call psychiatric doctor assessment should NOT be delayed until medical treatment is complete. Liaison psychiatry services should be involved throughout the admission and advise on risk management while the patient is admitted.
- Any person who has self-harmed should NOT be discharged from a medical ward without a mental health/psychiatric assessment.
- A person who has self-harmed and wishes to leave a medical ward before a mental health/psychiatric assessment has been undertaken, and who is deemed to lack

capacity, should have an urgent mental health assessment. Appropriate measures should also be taken to prevent the person leaving the hospital.

Discharge planning

- Prior to discharge, a person who has self-harmed should have a comprehensive assessment of needs by a mental health professional. This should include evaluation of the social, psychological and motivational factors specific to the act of self-harm, current suicidal intent and hopelessness, as well as a full mental health and social needs assessment.
- This should form the basis of a management plan when the person is medically fit for discharge. This may include:
- An admission to a psychiatric inpatient unit; under detention of the the Mental Health Act or an informal admission (the person voluntarily agreed to the psychiatric admission)
- Discharge with the Crisis Resolution and Home Treatment Team who can offer daily review at the person's home
- Follow up with the community mental health team or with the person's GP, ideally within 7 days of discharge.
- This discharge plan will depend on the assessment of needs and risk assessment by the mental health professional (Liaison psychiatry service/on call psychiatric doctor) in discussion with the medical team.

References

NICE Guidelines July 2004 (accessed 6th August 2015)

www.nice.org.uk/guidance/cg16 / chapter/1-recommendations

Deprivation of liberty safeguards (DOLS)

Dr Natasha Malik, GP registrar

- Part of the Mental Capacity Act (MCA) 2005. 'The person is under continuous supervision and control and is not free to leave, and the person lacks capacity to consent to these arrangements.
- Aims to make sure people in hospitals are looked after in a way that does not inappropriately restrict their freedom. Freedom should only be restricted in a safe and correct way in the best interests of the person, if all possible options have been explored and there is still a need to care for them safely. Applies to people aged 18 and over AND who lack capacity (as per the MCA definition). It cannot be used on someone who is already detained under the Mental Health Act 1983.

Strict process:

- Provide the patient with a representative – appointed by the Local Authority. Usually a relative (or an independent mental capacity advocate or IMCA if no relatives).
- Give the patient/representative the right to challenge a DOLS through the Court of Protection
- Mechanisms in place to review and monitor the DOLS regularly
- Applied for through the registered manager of the NHS Trust to the Local Authority (in England) who must make an assessment within 21 days.
- Can apply for emergency authorisation whilst awaiting standard authorisation.
- Authorisation should last for the shortest possible period up to a maximum of 12 months.

Useful Links: www.alzheimers.org.uk

Mental Capacity Act (MCA) 2005

5 key principles:

- Adults over 18 are presumed to have capacity unless proven otherwise

Lack capacity if they are unable to:

- Understand what decision they need to make OR
- Understand the likely consequences of making, or not making, the decision OR
- Retain and weight up the information relevant to the decision OR
- Communicate their decision (even via a translator/Speech therapist/ writing etc)

- Clinicians must maximise decision making capacity. A patient must be offered all resources (interpreter, writing material, sign language, pictures), time (repeating the assessment if capacity fluctuates) and support.
- Freedom to make seemingly unwise decisions. Proof of incapacity depends on the process above, not the decision itself.
- Any decision or action taken must be in the Best Interests of the patient who lacks capacity taking in to account their wishes, any Lasting Power of Attorney or Advanced Directive. If a decision can be delayed until they regain capacity it should be.
- The least restrictive alternative must be chosen by the healthcare professional in order to still meet the interests of the patient.

Lasting Power of Attorney (LPA)

- MCA provides the legal framework to enable someone to give a named person the authority to make decisions on their behalf but only in the person's best interests.
- The LPA agreement can specify the limits of the powers granted eg to make decisions regarding personal welfare, healthcare, social care, life sustaining treatments etc

Advance Decisions/Living wills

- Valid if a person is over 18 years of age & no LPA has subsequently been put in to place.
- Allows the patient to specify (before capacity is lost) what treatments they would and would not consent to.
- Cannot demand treatments
- Can be withdrawn if the patient regains capacity
- Can be made verbally (except refusal of life sustaining treatments

which must be written, signed and witnessed. eg. artificial ventilation)

- Clinicians are responsible for finding out if an advance directive exists and respect it

Mental Health Act 2007

Table of Sections

Section	Who can apply for it?	Who can enforce it?	What is it for?	How long does it last?	Other Information
2	Relative or Approved Mental Health Professional (AMHP)	Two separate doctors (One must be trained in this role)	Assessment	Up to 28 days. Cannot be renewed after this. Can move on to section 3.	Patient has right to appeal. Patient cannot refuse treatment but certain treatments cannot be given without consent (eg ECT) Patient can be discharged by Responsible Clinician (responsible for their care in hospital)

Section	Who can apply for it?	Who can enforce it?	What is it for?	How long does it last?	Other Information
3	Relative or AMHP	Two doctors (one must be trained in this role)	Treatment	Up to 6 months. Can then be renewed for 6 months. Can then be renewed yearly thereafter.	Right to appeal. Can be treated against patient's will for up to 3 months. Then need second opinion approval. Cannot give certain treatments (eg. ECT) without consent. Discharge by Responsible Clinician.
4	Relative or AMHP	One doctor	Emergency assessment and treatment	Up to 72 hours	Discharged by Responsible clinician OR Assessed by second doctor and put on to Section 2 or 3.
5(2)	Doctor in charge of care at the time	Doctor in charge of care at the time	Stop patient from leaving hospital voluntarily.	Up to 72 hours	Only used when not possible or safe to use sections 2, 3 or 4.
5(4)	Nurse (registered in mental or LD health)	Nurse (registered in mental or LD health)	Stop patient from leaving hospital voluntarily.	Up to 6 hours	Only used when not possible or safe to use sections 2, 3 or 4.

Critical Care

Assessment of fluid requirements and resuscitation

Dr Rachael Owen, SpR in Anaesthetics & Intensive Care

Fluid balance assessment:

History:

- Input - oral intake/IV fluid/ NG feed / TPN / IV medications
- Output-UOP/ diarrhoea/ vomiting/ insensible losses from sweat if febrile / drains
- Clinical condition associated with fluid loss or shifts – sepsis / pancreatitis / liver disease etc

Examination:

The following are signs of hypovolaemia

- Fall in blood pressure from baseline
- Increased heart rate compared to baseline – check if beta blocked
- Increased capillary refill time - central and peripheral
- Reduced skin turgor
- Dry mucous membranes
- Fall in urine output – should be >0.5ml/ kg/hr
- Review fluid balance charts

Investigations:

- FBC – Anaemia?
- U&E – Elevation in urea and creatinine compared to baseline / Hyperkalaemia
- LFTs – Low albumin
- Lactate
- Venous blood gas / Arterial blood gas – pH, negative base deficit

Types of Fluid:

Crystalloids:

- Hartmann's solution (compound sodium lactate). Closely resembles physiological body fluid in terms of electrolyte content and osmolality. Lactate added to allow a reduced chloride concentration, consider avoiding in patients with high lactate, or reduced ability to metabolise lactate (eg. liver dysfunction) or diabetic patients (lactate can be converted to glucose).
- 0.9% Normal saline. Contains significantly higher chloride content than that found in plasma can cause hyperchloraemic acidosis, therefore monitor chloride level and pH if using large volumes.
- 5% glucose. The glucose is metabolised leaving water, very little remains in intravascular compartment (84mls of a 1000ml infusion). Therefore not

suitable for fluid resuscitation.

Colloids:

- Hydroxyethyl starches (HES) – highly branched starch compound, derivative of amylopectin. Potential side effects include impaired coagulation; renal tubular ischaemia and renal failure; accumulation in reticuloendothelial system (can cause itching); anaphylaxis, incidence ~ 1:20,000 administrations.
- Gelatins – high molecular weight proteins (manufactured from bovine gelatin) suspended in solution. Risk of anaphylaxis, incidence ~ 1 in 10,000 administrations.
- Albumin – used for fluid resuscitation in patients with significant hypoalbuminaemia or to replace albumin loss following ascitic or pleural drainage

Controversy:

- Long-standing in the debate for crystalloids vs. colloids for fluid resuscitation in critically ill patients
- Crystalloids now first-line for fluid resuscitation due to lack of clear survival benefit using colloids (some trials report increased mortality) and higher incidence of side effects, especially renal with use of HES.

Fluid resuscitation:

- Following assessment if a patient is exhibiting signs of shock i.e. hypotension / tachycardia / delayed capillary refill / poor urine output / new onset renal dysfunction / raised lactate then commence fluid resuscitation.
- Initial trial of fluid bolus given over <15mins - 250ml crystalloid if frail / elderly / or history of heart failure or 500ml if otherwise well.
- Following this re-assess patient – look specifically for haemodynamic response – e.g. reduction in heart rate, increase in BP, improved perfusion, fall in lactate on VBG.
- Repeat fluid boluses as required up to 2L.
- If the patient is showing no signs of response to fluid boluses, remains shocked or has ongoing signs of end organ dysfunction despite fluid challenges (i.e. Agitation / poor urine output) consider referring to ICU as inotropes and invasive monitoring may be required.
- Always consider the need for blood as part of fluid resuscitation if Hb <80 or evidence of bleeding as cause of shock.

Maintenance fluids:

- As a basic rule 1-2ml/kg/hr of crystalloid based on ideal body

weight

- The choice of fluid should be considered based on the need for potassium supplementation, chloride levels and other electrolyte levels – Hartmann's solution is usually 1st line
- Additional fluid may be needed to compensate for losses over and above maintenance e.g. if the patient has large volume diarrhoea aim to match losses by increasing rate or giving additional boluses.
- Consider need for glucose if patient nil by mouth.
- Consider reducing the amount of fluids prescribed for patients who are old or frail, have renal impairment, cardiac failure or are receiving large volumes of IV drugs.
- Patients receiving continuous fluid replacement / maintenance should have their U&E and electrolytes checked daily. Consider supplementation of potassium and phosphate orally if possible.

Acute pain and opioids

Dr Rachael Owen, SpR in Anaesthetics & Intensive Care

Assessment of pain

Assessment of pain is important for patient comfort but also if treated appropriately can aid mobilisation, rehabilitation and reduce the risk of developing DVT's, PE's and hospital-acquired pneumonia.

Pain is commonly assessed on a 0-10 scale with 0 being no pain and 10 being very severe pain. Some patients may not be able to rate their pain in this way and it is important to consider this particularly in patients with cognitive impairment, hearing or visual impairment. In these patients consider using a simplified scale, qualifying it as mild, moderate or severe, or other aids such as Wong-Baker FACES scale, physiological signs and examination findings.

The WHO analgesic ladder

Was developed for the management of adult cancer patients, but the principles can be applied to a much broader range of patients.

Pain is categorised as mild, moderate or severe. Treatment is started according to the level of pain the patient is experiencing, if the pain becomes more severe or the analgesia is ineffective, move up one step of the ladder.

Step 1: For mild pain: Non- opioid
E.g. paracetamol, NSAIDs) +/- adjuvant

Step 2: For mild to moderate pain: Weak opioid
e.g. codeine, tramadol) +/-non-opioid +/-adjuvant

Step 3: For moderate to severe pain: Strong opioid
e.g. Morphine, oxycodone +/-non-opioid +/-adjuvant

Consider prescribing analgesia regularly with PRN analgesia to manage breakthrough pain. Analgesic requirements should be assessed every 24hours and consider increasing regular dosing if multiple PRN doses or reducing if pain improving.

Commonly used opioids

Weak opioids:

Codeine:

- 5 – 15% metabolised by cytochrome P450 to morphine – exerts analgesic effects.
- Cytochrome P450 exerts genetic polymorphism. Poor metabolisers (9% of UK population, 30% of Hong Kong population) experience little analgesic effect. Ultra rapid metabolisers convert codeine faster and more completely to morphine resulting in higher morphine levels in the blood.
- Do not use codeine in children under 12 years, as it is associated with a risk of respiratory side effects. Do not use in breastfeeding mothers.
- Dose: 30–60 mg every 4 hours if required; maximum

240 mg per day.

Tramadol:

- Acts at opioid receptors to provide analgesia. Also inhibits noradrenaline and 5-HT re-uptake, and stimulates pre-synaptic 5-HT release, providing analgesia through descending inhibitory pathways.
- Side effects can be unpleasant in some patients (nausea, dizziness, sedation). Avoid in patients with epilepsy (lowers seizure threshold), and those taking tricyclic antidepressants or SSRIs. Caution in the elderly as can precipitate delirium.
- Dose: Initially 100mg, then 50-100mg every 4-6 hours. Usually maximum 400mg/24hrs – reduce in the elderly.

Strong opioids:

Morphine:

- Oral: Oramorph: Useful for breakthrough pain. Initial dose 5-10mg every 4 hours reduce to 2.5-5mg in renal impairment and the elderly.
- IV Morphine: Initially 5 mg every 4 hours, adjusted according to response, dose can be adjusted more frequently during titration, reduced dose recommended in frail and elderly patients.
- Patient Controlled Analgesia – can be arranged usually via the pain team or anaesthetic department. Usually started at a dose of 1mg bolus with a 5 minute lockout. Patients require close monitoring – hourly PCA observations including respiratory rate, oxygen saturation, and sedation scores.

Oxycodone:

- Oral: Oxynorm: Useful for breakthrough pain. Initial dose 5mg every 4 hours reduce to 2.5mg in renal impairment and the elderly. Generally safer in renal impairment but still requires caution.
- IV: Oxycodone: Titrated to effect 1-10mg every 4hrs.

Fentanyl:

- More rapid onset of action and shorter duration of action than morphine, greater potential for respiratory depression. For this reason not generally used as a bolus for analgesia on the ward.
- Fentanyl PCA can be used as an alternative to morphine in patients who are intolerant to morphine, or who have renal impairment (morphine metabolites are predominantly renally excreted)

Adjuvants:

Most commonly used to treat chronic pain conditions, especially neuropathic pain – agents include tricyclic antidepressants (e.g. amitryptiline), anticonvulsants (e.g. carbamazepine, gabapentin), membrane stabilisers (e.g. lignocaine) or NMDA receptor antagonist (Ketamine).

Other options include regional nerve blocks, lignocaine patches, and epidurals – contact acute pain team.

Consider prescribing regular laxatives along side Codeine due to constipation as common side effect.

Sepsis

Dr Rachael Owen
Guidelines taken from NICE guideline [NG51] Published date: July 2016 Last updated: September 2017

The key to successful identification and management of sepsis is early recognition, identification of risk factors and prompt institution of mamagement. The sepsis six tool has created a bundle of care which should be delivered within the first hour of recognition of sepsis. The below details when to suspect sepsis, risk factors and common sources of sepsis. Following this please refer to the NICE algorithm for sepsis risk stratification and initial management tool. For antimicrobial selection please consult your local guidelines.

When to suspect sepsis?

- Think 'could this be sepsis?' if a person presents with signs or symptoms that indicate possible infection.
- Take into account that people with sepsis may have non-specific, non-localised presentations, for example feeling very unwell, and may not have a high temperature.
- Pay particular attention to concerns expressed by the person and their family or carers, for example changes from usual behaviour.
- Assess people who might have sepsis with extra care if they cannot give a good history (for example, people with English as a second language or people with communication problems).

Assess people with any suspected infection to identify:

- Possible source of infection
- Factors that increase risk of sepsis
- Any indications of clinical concern, such as new onset abnormalities of behaviour, circulation or respiration.
- Consider using an early warning score to assess people with suspected sepsis in acute hospital settings.Suspect neutropenic sepsis in patients having anticancer treatment who become unwell.

Risk Factors

- The very young (under one year) and older people (over 75 years) or people who are very frail
- Also people who have impaired immune systems because of illness or drugs, including:
- People being treated for cancer with chemotherapy
- People who have impaired immune function (for example, people with

diabetes, people who have had a splenectomy, or people with sickle cell disease)

- People taking long-term steroids
- People taking immunosuppressant drugs to treat non-malignant disorders such as rheumatoid arthritis -- People who have had surgery, or other invasive procedures, in the past 6 weeks
- People with any breach of skin integrity (for example, cuts, burns, blisters or skin infections)
- People who misuse drugs intravenously
- People with indwelling lines or catheters

Common sources of sepsis (% of cases approx):

Pneumonia 50%

Urinary tract 20%

Abdominal 15%

Soft tissue, bone & joint 10%

Endocarditis 10%

Device related 1%

Meningitis 1%

Others 1%

NICE Algorithm.pdf

Maternal Medicine

Hypertensive Disease in Pregnancy

Dr Blossom Cooke, ST1 Obstetrics and Gynaecology

The following is a summary of guidance CG107. This guidance was first published in 2010 and last updated 2011. NICE guidelines are currently planning review in 2017.

Chronic hypertension

- Definition of gestational hypertension according to NICE: Hypertension that is present at the booking visit or before 20 weeks or if the woman is already taking antihypertensive medication when referred to maternity services.

Gestational Hypertension

- Definition of gestational hypertension according to NICE: “new hypertension presenting after 20 weeks without significant proteinuria full assessment should be carried out in a secondary care setting by a healthcare professional who is trained in the management of hypertensive disorders“.

Pre-eclampsia

- A hypertensive syndrome that occurs in pregnant women after 20 weeks' gestation, consisting of new-onset, persistent hypertension (defined as a BP of ≥140 mmHg systolic and/or ≥90 mmHg diastolic, based on at least 2 measurements taken at least 4 hours apart) with either proteinuria (defined as urinary excretion of ≥0.3 g protein/24 hours) or evidence of systemic involvement. The severity of the condition is based on the BP measurement and the extent of systemic involvement if present.

Eclampsia

- Seizures occur in a pregnant women with pre-eclampsia

Pre-pregnancy advice for women with pre-existing treated hypertension:

Tell women who take ACE inhibitors or ARBs:

- that there is an increased risk of congenital abnormalities if these drugs are taken during pregnancy
- to discuss other antihypertensive treatments with the healthcare

professional responsible for managing their hypertension, if they are planning pregnancy.

- Stop antihypertensive treatment in women taking ACE inhibitors or ARBs if they become pregnant (preferably within 2 working days of notification of pregnancy) and offer alternatives.

Tell women who take chlorothiazide:

- that there may be an increased risk of congenital abnormality and neonatal complications if these drugs are taken during pregnancy
- to discuss other antihypertensive treatment with the healthcare professional responsible for managing their hypertension, if they are planning pregnancy
- Tell women who take antihypertensive treatments other than ACE inhibitors, ARBs or chlorothiazide that the limited evidence available has not shown an increased risk of congenital malformation with such treatments.

Diet

- Encourage women with chronic hypertension to keep their dietary sodium intake low, either by reducing or substituting sodium salt, because this can reduce blood pressure.

Advice during pregnancy for women with chronic hypertension:

- In pregnant women with uncomplicated chronic hypertension aim to keep blood pressure lower than 150/100 mmHg.
- Do not offer pregnant women with uncomplicated chronic hypertension treatment to lower diastolic blood pressure below 80 mmHg.
- Offer pregnant women with target-organ damage secondary to chronic hypertension (for example, kidney disease) treatment with the aim of keeping blood pressure lower than 140/90 mmHg.
- Offer pregnant women with secondary chronic hypertension referral to a specialist in hypertensive disorders
- Offer women with chronic hypertension antihypertensive treatment dependent on pre-existing treatment, side-effect profiles and teratogenicity.
- Encourage women with chronic hypertension to keep their dietary sodium intake low, either by reducing or substituting sodium salt, because this can reduce blood pressure.

Gestational hypertension

Assessment and Investigations of gestational hypertension:

- 140/90 to 149-99 mmHg

- Admission and treatment not required
- Test for proteinuria +/- protein: creatinine ratio
- Follow up once weekly BP monitoring

Moderate Hypertension

- 150/100 to 159/109 mmHg
- Treat with oral labetalol* as first-line treatment
- Aim to keep diastolic BP between 80-100 mmHg
- Aim to keep systolic BP less than 150 mmHg
- Test for proteinuria +/- protein: creatinine ratio
- Test kidney function, electrolytes, full blood count, transaminases, bilirubin. Do not carry out further blood tests if no proteinuria at subsequent visits
- Twice weekly BP monitoring
- Second line treatment options may be implemented *if not contraindicated

Sever Hypertension

- >160/110 mmHg
- Requires admission
- Four times daily BP monitoring
- Same treatment required for moderate hypertension

Proteinuria

- If >+1 protein is obtained from urine analysis send urine specimen for protein: creatinine ratio.
- Proteinuria is significant if the urinary protein: creatinine ratio is greater than 30mg/mmol.

Reducing the risk of pre-eclampsia

Anti-platelets

- Advise women at high risk of pre-eclampsia to take 75 mg of aspirin1 daily from 12 weeks until the birth of the baby. Women at high risk are those with any of the following:
- hypertensive disease during a previous pregnancy
- chronic kidney disease
- autoimmune disease such as systemic lupus erythematosis or antiphospholipid syndrome
- type 1 or type 2 diabetes
- chronic hypertension
- Advise women with more than one moderate risk factor for pre-eclampsia to take 75 mg of aspirin1 daily from 12 weeks until the birth of the baby. Factors indicating moderate risk are:
- first pregnancy
- age 40 years or older
- pregnancy interval of more than 10 years
- BMI of 35 kg/m2 or more at first visit
- family history of pre-eclampsia
- multiple pregnancy

Pre-Eclampsia

- Definition of gestational

hypertension according to NICE: “new hypertension presenting after 20 weeks with significant proteinuria”.

- Symptoms include:
  - severe headache
  - problems with vision, such as blurring or flashing before the eyes
  - severe pain just below the ribs
  - vomiting
  - sudden swelling of the face, hands or feet

Women with suspected pre-eclampsia

- The Triage PlGF test and the Elecsys immunoassay sFlt-1/PlGF ratio, used with standard clinical assessment and subsequent clinical follow-up, are recommended to help rule-out pre-eclampsia in women presenting with suspected pre-eclampsia between 20 weeks and 34 weeks plus 6 days of gestation.
- When pre-eclampsia is not ruled-out using a PlGF based test result, the result should not be used to diagnose (rule-in) pre-eclampsia, as there is insufficient evidence currently to recommend routine adoption of these tests for diagnosing pre-eclampsia in the NHS.

Assessment and Investigation

- For women diagnosed with pre-eclampsia the treatment guidelines are the same as for gestational hypertension with the addition of the following:
  - All women require admission to hospital.
  - BP monitoring at least four times per day (severe hypertension requires >4 depending on clinical circumstances).
  - Monitoring of blood results 2- 3 times weekly to exclude HELLP syndrome.
  - Repeat quantification of proteinuria is not required.

- Offer women with severe hypertension or severe pre-eclampsia referral to the appropriate critical care setting using the following criteria:

Please see NICE guidelines for patients

Level 3 care	Severe pre-eclampsia and needing ventilation.
Level 2 care	Step-down from level 3 or severe pre-eclampsia with any of the following complications: -eclampsia -HELLP syndrome - haemorrhage - hyperkalaemia - severe oliguria - coagulation support - intravenous antihypertensive treatment - initial stabilisation of severe hypertension - evidence of cardiac failure - abnormal neurology
Level 1 care	-Pre-eclampsia with mild or moderate hypertension. - Ongoing conservative antenatal management of severe preterm hypertension. - Step-down treatment after the birth.

with severe hypertension or pre-eclampsia requiring critical care.

Management of severe hypertension or pre-eclampsia in the critical care setting

Anticonvulsants

- If a woman in a critical care setting who has severe hypertension or severe pre-eclampsia has or previously had an eclamptic fit, give intravenous magnesium sulphate:
- Consider giving intravenous magnesium sulphate1 to women with severe pre-eclampsia who are in a critical care setting if birth is planned within 24 hours.
- If considering magnesium sulphate1 treatment, use the following as features of severe pre-eclampsia:
  - severe hypertension and proteinuria or
  - mild or moderate hypertension and proteinuria with one or more of the following:
  - symptoms of severe headache
  - problems with vision, such as blurring or flashing before the eyes
  - severe pain just below the ribs or vomiting
  - papilloedema
  - signs of clonus (≥3 beats)
  - liver tenderness
  - HELLP syndrome
  - platelet count falling to below 100 x 109 per litre
  - abnormal liver enzymes (ALT or AST rising to above 70 IU/litre).
- Use the Collaborative Eclampsia Trial2 regimen for administration of magnesium sulphate1:
  - loading dose of 4 g should be given intravenously over 5 minutes, followed by an infusion of 1 g/hour maintained for 24 hours
  - recurrent seizures should be treated with a further dose of 2–4 g given over 5 minutes.
- **Do not** use diazepam, phenytoin or lytic cocktail as an alternative to magnesium sulphate1 in women with eclampsia.

Antihypertensives

- Treat women with severe hypertension who are in critical care during pregnancy or after birth immediately with one of the following:
  - labetalol (oral or intravenous)
  - hydralazine (intravenous)
  - nifedipine (oral).
  - In women with severe hypertension who are in critical care, monitor their response to treatment:
  - to ensure that their blood pressure falls
  - to identify adverse effects for both the woman and the

fetus

- to modify treatment according to response

- Consider using up to 500 ml crystalloid fluid before or at the same time as the first dose of intravenous hydralazine in the antenatal period. In women with severe hypertension who are in critical care, aim to keep systolic blood pressure below 150 mmHg and diastolic blood pressure between 80 and 100 mmHg.

Corticosteroids

- For fetal lung maturation in women with pre-eclampsia if birth is considered likely within 7 days:
- give two doses of betamethasone1 12 mg intramuscularly 24 hours apart in women between 24 and 34 weeks
- consider giving two doses of betamethasone 12 mg intramuscularly 24 hours apart in women between 35 and 36 weeks.

Venous Thromboembolism in Pregnancy

- This is a summary of VTE guidance taken from RCOG Greentop Guideline No.37b. Minor amendments have been made in December 2016. As VTE has been covered in respiratory content, guidance specific to pregnancy will be outlined.

Diagnosis

- Pregnant women with symptoms and signs of VTE must have as assessment
  - history and examination
  - objective testing of VTE
  - commence low molecular weight heparin (LMWH) until the diagnosis can be safely excluded.

Assessment

?Acute DVT:

- Compression duplex ultrasound should be undertaken.
- Women with negative USS and are low risk, LMWH can be discontinued.
- Women with negative USS and remain high risk should have LMWH discontinued but should have a repeat USS on days 3 and 7. [New 2015]
- D-dimer testing should not be performed in the investigation of acute VTE in pregnancy.
- Clinicians should be aware that, at present, there is no evidence to support the use of pretest probability assessment in the management of acute VTE in pregnancy. [New 2015]

?Acute PE:

- Women who present with a high suspicion of PE must have ECG and CXR. If abnormal CXR, CTPA should be performed in preference to V/Q scan.
- In women who present with symptoms of PE as well as DVT,

if USS is positive, no further investigation is required and treatment for VTE should be started.

- "Women should be advised that compared with CTPA, VQ scanning may carry an increased risk of childhood cancer but is associated with a lower risk of maternal breast cancer; in both situations, the absolute risk is small."
- Women should receive informed consent regarding undergoing either CTPA or V/Q scanning.

Maintenance and Treatment

- Therapeutic doses should be continued antenatally and for 6 weeks postnatally and until least 3 months of treatment has been given in total.
- LMWH should be titrated against a women's booking or early pregnancy weight.
- Early mobilisation and compression stockings should be encouraged.
- Vitamin K antagonist such as warfarin should not be used as VTE treatment due to the adverse effects on fetus.
- Postnatal anticoagulation
- Women should be offered a choice of LMWH or anticoagulation after discussion for need of further blood tests, particularly during the first 10 days of treatment.
- Postpartum warfarin should be avoided until at least 5th days and for longer in women at risk of postpartum haemorrhage.

CPR decision making documentation

Natasha Malik, GP Registrar

It is recommended that:

- Paper forms on which CPR decisions are recorded should travel with the patient whenever possible.
- When a person is at home and has a current CPR decision (in particular a DNACPR decision) they understand and accept they should have with them a CPR decision form recording that situation.
- If healthcare organisations require copies of CPR decision forms for audit or records purposes it is recommended that each form is available in duplicate or triplicate with non-carbon copies that are a different colour and that have different printed wording to reflect their purpose. Only the original (top) copy can then be identified as a CPR decision record for clinical use, avoiding the potential danger of a copy being used to guide clinical decisions when the original may have been cancelled.
- If CPR decision forms are completed and/or stored electronically:

a. they should contain all the required elements defined in this quality standard; they should be accessible immediately by all the organisations and individuals who may be involved in the person's care;

b. there should be robust arrangements in place to ensure that they remain current and appropriate.

References

www.resus.org.uk/dnacpr

Janet Tracey v Cambridge University Hospital

Emily Gowland, Registrar in Anaesthetics

- A Court of Appeal judgment in June 2014 confirmed that doctors have a legal duty to involve patients when considering 'do not attempt cardiopulmonary resuscitation'
- A DNAR notice was made without the patient's knowledge but was subsequently cancelled following discussion with her family about her wishes. It was reinstated when her condition deteriorated. The family felt they should have been informed of the DNAR order and that it was in breach of Article 8 of the Human Rights Act, which provides that: "Everyone has the right to respect for their private and family life".The Department of Health policy states 'no decision about me without me'.

1.b.1. Key rulings by the court:

- Patients that have capacity should be involved in DNAR decision making and those that lack capacity should still be involved as much as possible while considering their beliefs, values and wishes.
- Discussion with the patient and family should be commenced at the earliest opportunity in the clinical relationship and reviewed as circumstances change.
- Failure to consult a patient constitutes a breach of common law and a violation of the right to private and family life under Article 8 of the Human Rights Act
- This duty to consult does not mean that a doctor is compelled to provide treatment which is considered "futile" or inappropriate, which would represent an "unacceptable intrusion into the realm of clinical judgment."

1.b.2. In Practice…

- Discussion: Adequate consultation with patients and their families on decisions regarding life sustaining treatment, and revisit if circumstances change.Specifically discuss DNAR decisions with patients (and their relatives if they wish)

Record Keeping: Ensure that a comprehensive record is made in the notes of all relevant discussions with patients, relatives and colleagues and all decisions taken.

- Policy: Healthcare providers must ensure that clinical staff receives adequate training and that there is a consistent policy with clear advice, including the reassurance that they are not required to give treatment which is not clinically indicated.

References

http://www.bbc.co.uk/news/health-278862

Interventions in the final days and hours of life

Dr. Marie McNulty (Medical Education Fellow, Health Education England)
Dr. Natalie Webber (Palliative Care Registrar)

See https://www.nice.org.uk/guidance/ng31 for the full guideline "Care of dying adults in the last days of life", published December 2015.

A brief summary of the principles of the guideline are outlined below, taken from the guideline's baseline assessment tool available on the NICE website. The sections regarding prescription of medications are reproduced in fuller detail and with input from clinical practice:

- **Recognition of the dying** person – This can often be a challenge in the acute setting. Assessment of signs and symptoms can help, along with collateral information about functional state from family/carers.
- **Communication** – The communication needs and expectations of the dying person, along with those close to them, will need to be considered.
- **Shared decision making** – Establishing the level of involvement that a dying person wishes to have in decisions about their care is important along with knowledge of any advanced directives or other legal documents (e.g. lasting power of attorney) is important.
- **Providing individualised care** – With the input of a multiprofessional team and in discussion with the dying person, any care plan should include their personal goals and wishes, preferred care setting, current and anticipated care needs (including preferences for symptom management and any specific needs after death), and resource requirements. All plans, discussions and discussions should be recorded in case notes and shared with relevant people.
- **Maintaining hydration** – The dying person should be supported to drink if they wish to and if they are able to, with assessment of any potential difficulties e.g. aspiration. Risks and benefits of drinking should be discussed. Frequent mouth and lipcare should be offered.

Clinically assisted hydration

- Assess, preferably daily, the dying person's hydration status, and review the possible need for starting clinically assisted hydration, respecting the person's wishes and preferences.
- Discuss the risks and benefits of clinically assisted hydration with the dying person and those important to them. Advise them that, for someone who is in the last days of life
    - clinically assisted hydration may relieve distressing symptoms or signs related to dehydration, but may cause other problems
    - it is uncertain if giving clinically assisted hydration will prolong life or extend the dying process
    - it is uncertain if not giving clinically assisted hydration will hasten death.
- Address any concerns raised by the dying person or those important to them before starting clinically assisted hydration.
- When considering clinically assisted hydration for a dying person, use an individualised approach and take into account:
    - whether they have expressed a preference for or against clinically assisted hydration, or have any cultural, spiritual or religious beliefs that might affect this documented in an advance statement or an advance decision to refuse treatment
    - their level of consciousness
    - any swallowing difficulties
    - their level of thirst
    - the risk of pulmonary oedema
    - whether even temporary recovery is possible.
- Consider a therapeutic trial of clinically assisted hydration if the person has distressing symptoms or signs that could be associated with dehydration, such as thirst or delirium, and oral hydration is inadequate.

For people being started on clinically assisted hydration:

- Monitor at least every 12 hours for changes in the symptoms or signs of dehydration, and for any evidence of benefit or harm.

- Continue with clinically assisted hydration if there are signs of clinical benefit.
- Reduce or stop clinically assisted hydration if there are signs of possible harm to the dying person, such as fluid overload, or if they no longer want it.

For people already dependent on clinically assisted hydration (enteral or parenteral) before the last days of life:

- Review the risks and benefits of continuing clinically assisted hydration with the person and those important to them.
- Consider whether to continue, reduce or stop clinically assisted hydration as the person nears death.

Pharmacological interventions

- Review their current medicines and, after discussion and agreement with the dying person and those important to them (as appropriate), stop any previously prescribed medicines that are not providing symptomatic benefit or that may cause harm.

When considering medicines for symptom control, take into account:

- the likely cause of the symptom
- the dying person's preferences alongside the benefits and harms of the medicine
- any individual or cultural views that might affect their choice
- any other medicines being taken to manage symptoms
- any risks of the medicine that could affect prescribing decisions, for example prescribing cyclizine to manage nausea and vomiting may exacerbate heart failure.
- Decide on the most effective route for administering medicines tailored to the dying person's condition, their ability to swallow safely and their preferences.
- Consider prescribing different routes of administering medicine if the dying person is unable to take or tolerate oral medicines. Avoid giving intramuscular injections and give either subcutaneous or intravenous injections.
- Consider using a syringe pump to deliver medicines for continuous symptom control if more than 2 or 3 doses of any PRN medicines have been given within 24 hours.
- For people starting treatment who have not previously been given medicines for symptom management, start with the lowest effective dose and

titrate as clinically indicated.

- Regularly reassess, at least daily, the dying person's symptoms during treatment to inform appropriate titration of medicine.
- *Seek specialist palliative care advice if the dying person's symptoms do not improve promptly with treatment or if there are undesirable side effects, such as unwanted sedation.*

Managing pain:

- Consider non-pharmacological management.
- Not all people in the last days of life experience pain. If pain is identified, manage it promptly and effectively, and treat any reversible causes of pain, such as urinary retention.
- Assess the level of pain and for all possible causes when making prescribing decisions for managing pain.
- Follow the principles of pain management used at other times when caring for people in the last days of life.
- For a person who is unable to effectively explain that they are in pain, e.g. dementia or learning disabilities, use a validated behavioural pain assessment to inform their pain management.

Managing breathlessness

- Identify and treat reversible causes, for example pulmonary oedema or pleural effusion.
- Consider non-pharmacological management. Do not routinely start oxygen to manage breathlessness. Only offer oxygen therapy to people known or clinically suspected to have symptomatic hypoxaemia.
- Consider managing breathlessness with:
  - an opioid or a benzodiazepine or a combination of an opioid and benzodiazepine.

Managing nausea and vomiting

- Assess for likely causes. These may include:
  - certain medications
  - recent chemotherapy or radiotherapy
  - psychological causes
  - biochemical causes, e.g. hypercalcaemia
  - raised intracranial pressure
  - gastrointestinal motility disorder

- ileus or bowel obstruction.

- Discuss treatment options with the dying person and those important to them.
- Consider non-pharmacological methods.
- When choosing medicines for treatment, take into account:
  - the likely cause of the nausea/vomiting and if it is reversible
  - the side effects, including sedative effects, of the medicine
  - other symptoms the person has
  - the desired balancing of effects when managing other symptoms
  - compatibility and drug interactions with other medicines
- Haloperidol and cyclizine tend to be used first line.
- For people with large volume vomiting, consider:
  - hyoscine butylbromide
  - octreotide if the symptoms do not improve within 24 hours of starting hyoscine butylbromide.

Managing anxiety, delirium and agitation

- Explore the possible causes of anxiety or delirium, with or without agitation, with the dying person and those important to them. Be aware that agitation in isolation is sometimes associated with other unrelieved symptoms or bodily needs for example, unrelieved pain or a full bladder or rectum.
- Consider non-pharmacological management.
- Treat any reversible causes of e.g. psychological causes or metabolic disorders (like renal failure or hyponatraemia).
- Consider a trial of a benzodiazepine to manage anxiety or agitation.
- Consider a trial of an antipsychotic medicine to manage delirium or agitation.
- *Seek specialist advice if the diagnosis of agitation or delirium is uncertain, if the agitation or delirium does not respond to antipsychotic treatment or if treatment causes unwanted sedation.*

Managing noisy respiratory secretions

- Assess for the likely causes and establish whether the noise has an impact on the dying person or those

important to them. Reassure them that, although the noise can be distressing, it is unlikely to cause discomfort. Be prepared to talk about any fears or concerns they may have.

- Consider non-pharmacological measures to manage noisy respiratory or pharyngeal secretions, to reduce any distress in people at the end of life.
- Consider a trial of medicine if they are causing distress to the dying person. Options include:
  - glycopyrronium bromide
  - hyoscine butylbromide
  - hyoscine hydrobromide
- When giving medicine for noisy respiratory secretions:
  - Monitor for improvements, preferably every 4 hours, but at least every 12 hours.
  - Monitor regularly for side effects, particularly delirium, agitation or excessive sedation when using hyoscine hydrobromide.
  - Treat side effects, such as dry mouth, delirium or sedation.
  - Consider changing or stopping medicines if noisy secretions continue and are still causing distress after 12 hours (medicines may take up to 12 hours to become effective).
  - Consider changing or stopping medicines if unacceptable side effects, e.g. dry mouth, urinary retention, delirium, agitation and unwanted levels of sedation, persist.

Anticipatory prescribing

- Use an individualised approach for people who are likely to need symptom control. Specify the indications for use (e.g. agitation, anxiety, breathlessness, nausea and vomiting, noisy respiratory secretions and pain) and the dosage of any medicines prescribed.
- Discuss any prescribing needs with the dying person, those important to them and the multiprofessional team.
- Ensure that suitable anticipatory medicines and routes are prescribed as early as possible. Review these medicines as the dying person's needs change

When deciding which anticipatory

medicines to offer take into account:

- the likelihood of specific symptoms occurring
- the benefits and harms of prescribing or administering medicines
- the benefits and harms of not prescribing or administering medicines
- the possible risk of the person suddenly deteriorating (for example, catastrophic haemorrhage or seizures) for which urgent symptom control may be needed
- the place of care and the time it would take to obtain medicines.
- **Before anticipatory medicines are administered,** review the dying person's individual symptoms and adjust the individualised care plan and prescriptions as necessary.
- If anticipatory medicines are administered:
    - Monitor for benefits and any side effects at least daily, and give feedback to the lead healthcare professional.
    - Adjust the individualised care plan and prescription as necessary.

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