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Bleep and phone numbers back cover
INTRODUCTION

“Guidelines for the Management of Common Medical Emergencies” have been used in many of the local hospitals. Most notably, St. George’s Hospital Medical School produced the guidelines and has been using them since 1979. The Kingston Hospital guidelines follow a similar format with articles written by specialists, edited to ensure clarity, approved by colleagues, and designed to advise junior staff what to do when confronted with some of the more common medical emergencies. The guidelines are regularly reviewed every six months to ensure that they are kept up-to-date. Three months prior to publication, each section is sent to the link consultant for review, with the request that changes should be discussed amongst colleagues and returned as a consensus position.

In each edition of this book, every attempt is made to ensure that statements are fully compatible with the advice given by the British National Formulary, the Drug and Therapeutics Bulletin, the various professional bodies (such as the British Thoracic Society), the Royal Colleges (particularly the Royal College of Physicians), NICE guidelines, and data from clinical trials, meta-analyses and national consensus statements.

The Blue Book is a dynamic document and if there are any concerns, questions or comments to be made about relevant sections, please direct these to the link consultant at the beginning of each section concerned; he or she can use those comments to modify subsequent editions. Alternatively, please send your comments to myself, Dr. Lee, at Kingston Hospital.

The Blue book is also available on the hospital intranet PIMS (Policies Information Management System).

Dr. Chooi Lee
Co-Editor
Consultant Physician
General Medicine and Geriatric Medicine

Catrin Thomas
Co-Editor
Principal Pharmacist
Medicines Management
GENERAL POINTS

• The aim of these guidelines is to advise staff on how to deal with some common medical emergencies and problems of medical management in adults >18 years.

• The doses given in these guidelines are for adults unless otherwise stated.

• If the patient is pregnant, discuss her management with the duty obstetric registrar as soon as time permits.

• When medical problems arise, the arrangements for seeking advice are as follows: during the working day, always refer upwards through your own medical firm. If on “cover” at night and you need advice about a patient on another firm and there is no policy written in the notes, first turn to the in-taking registrar and then to the in-taking consultant. The in-taking consultant may choose to contact the patient’s own consultant or another consultant for specialist advice.

• ‘Repatriations’ - Procedure for patients who are transferred from other hospitals: the ward nurse will contact the junior doctor on duty to inform him/her of the admission. Please clerk the patient. For patients who arrive at Kingston hospital out of normal hours, clerk and add the patient’s details to the on call list, as with a new admission; ensure that they are seen on the next Consultant post-take ward round. If you have clinical concerns and want an urgent senior clinical review, call the on call registrar and/or Consultant, as in the point above.

• If not using CRS, ensure that entries in patient’s notes are written, dated, timed, and countersigned legibly in black ink and that the results of investigations, including blood tests, are documented promptly and correctly. Ensure that the patient’s name and hospital number are documented on every document pertaining to the patient’s care. Ensure that discussions with the patient and his/her relatives are documented clearly in the patient’s notes.

• When writing the discharge summary, include the principal diagnosis (the main reason for the patient being in hospital), all subsidiary diagnoses, and/or any surgical operations or procedures. This will improve the reliability of the hospital’s diagnostic coding data and provide succinct information for the General Practitioner taking over the patient’s care. Ensure that the rationale for all medication changes is clearly stated.

• Point of Care Testing (POCT): the use of any analytical testing undertaken outside the central laboratory and carried out by non-laboratory staff, including: urinalysis, pregnancy testing, blood glucose meters, glycated haemoglobin analysers, drugs of abuse testing, blood gas analysers. The objective of POCT is to generate an accurate result quickly so that appropriate treatment can be implemented safely, leading to an improved clinical outcome for the patient. The blood gas analysers sited in NNU, Maternity, ITU, AAU and A&E are password protected. To obtain a password, you will need to attend a training session and prove your competency to use the machines. Using another person’s password is regarded as a disciplinary offence. This is because you are held personally responsible for all the POCT results you obtain; lack of training could lead to the wrong results, with potentially fatal outcome(s). Training will be arranged during Induction. If you miss this, contact the biochemistry department (ext 3299) to arrange a training session on blood gas analysers, and the Diabetic Day Unit (ext 6370) or Education centre (ext 2666) to arrange training for blood glucose meters.
HOW TO ACCESS THE BLUE BOOK ELECTRONICALLY:

1. Click ‘Clinical Guidelines and Trust policies’ on the intranet home page
2. Put ‘Blue Book’ into the Patient Information Management Service (PIMS) search engine
3. Download the pdf version

For NON iphone or android Smart phones:

1. Email the pdf copy of the bluebook from PIMS to your personal email address
2. Open the blue book pdf on your phone from your email and save

For iphones and android devices:

1. Purchase iBook app from the app store (free)/ abode reader from google play store (free)
2. Email the pdf to yourself
3. Open the pdf in iBooks /abode reader

HOW TO DECIDE WHICH BLOOD BOTTLE TO USE FOR WHICH TEST?

https://geekymedics.com/blood-bottles-guide/
CORONER’S REFERRALS
HM Senior Coroner, West London: Mr. Chinyere Inyama

There is a duty to report a death when:
- The deceased has not been attended to during his/her last illness
- There is no duly completed death certificate or a certificate in which the deceased was not seen by the certifying doctor either after death or within 14 days before death
- The cause of death is unknown
- Death is unnatural or caused by violence, linked to an accident (e.g. a fall), or neglect (self-neglect or neglect by others) or abortion or suspicious
- Death occurred during an operation or before recovery from the effects of an anaesthetic
- Death may be related to a medical procedure or treatment – invasive or not
- Death related to lack of medical care
- Death is due to industrial disease, poisoning or related to employment
- Death in police or prison custody
- Death whilst detained under the Mental Health Act
- Death of those on a Deprivation of Liberty Safeguard authorisation (DoLS)
- Death contributed to by the actions of the deceased, e.g. ‘suicide’, alcohol abuse

Referral of ‘routine’ and unexpected deaths to the Coroner (via a Coroner’s Officer) should be made by a doctor who has good knowledge of the patient and a good understanding of the case. All referrals must be typed on the Coroner’s referral form (available on the Intranet under ‘forms’) and faxed to 0207 384 2762 or emailed to Coroner.Reerrals@lbhf.gcsx.gov.uk (secure link), before 12 noon each day, for advice from a Coroner’s Officer that same day. Referrals received later than 12 noon will be dealt with on the next working day.

Suspicious deaths or deaths where there is police involvement must be referred to the coroner by telephone without delay. Telephone 0208 753 6804 for instructions on how to contact the On-call Coroner’s Officer.

Please note that it is the duty of the reporting doctor to inform each patient’s relatives of the referral to the Coroner.

ACUTE & CRITICAL CARE OUTREACH TEAM (ACCOT)
Link nurse manager: Matron Belinda Brophy
Outreach Practitioners: bleeps 868 and 869

The Outreach Team offers advice or direct assistance about any adult patient with potential or actual acute or critical illness, including problems: airway or tracheostomy management, respiratory assessment and support, cardiovascular assessment, fluid management, acute renal failure, and sepsis. The team also advises on use of equipment including CVP monitoring devices, drains, non-invasive ventilators and CPAP, and about potentially hazardous patient transfers (e.g. for CT scanning). The team always works in partnership with the parent team (i.e. the medical team directly in charge of the care of the patient). It liaises with the critical
care department as required, and also routinely follows up discharges to wards from critical care.

### Escalation of the deteriorating patient at all times

<table>
<thead>
<tr>
<th>The National Early Warning Score (NEWS) thresholds and triggers</th>
<th>Clinical risk</th>
</tr>
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<tbody>
<tr>
<td>NEW scores</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Low (Green)</td>
</tr>
<tr>
<td>Aggregate 1 – 4</td>
<td></td>
</tr>
<tr>
<td><strong>RED score</strong>* (any individual parameter scoring 3)</td>
<td>Medium (Amber)</td>
</tr>
<tr>
<td>Aggregate 5 – 6</td>
<td></td>
</tr>
<tr>
<td>Aggregate 7 or more</td>
<td>High (Red)</td>
</tr>
</tbody>
</table>

Further guidance on the National Early Warning Score (NEWS) is available: [Royal College of Physicians National-early-warning-score-standardising-assessment-acute-illness-severity-nhs.pdf](https://example.com)

<table>
<thead>
<tr>
<th>Respiration rate</th>
<th>3 RED</th>
<th>2 AMBER</th>
<th>1 GREEN</th>
<th>0</th>
<th>1 GREEN</th>
<th>2 AMBER</th>
<th>3 RED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen saturations</td>
<td>≤ 91</td>
<td>92 - 93</td>
<td>94 - 95</td>
<td>≥ 96</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supplemental oxygen</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart rate</td>
<td>≤ 40</td>
<td>41 - 50</td>
<td>51-90</td>
<td>91-110</td>
<td>111-130</td>
<td>≥ 120</td>
<td></td>
</tr>
<tr>
<td>Systolic BP</td>
<td>≤ 90</td>
<td>91 - 100</td>
<td>101-110</td>
<td>111-219</td>
<td>≥ 220</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level of consciousness</td>
<td>≤ 35.0</td>
<td>35.1-36.0</td>
<td>36.1-38.0</td>
<td>38.1-39.0</td>
<td>≥ 39.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Level of consciousness – responsive to: V – Voice; P – Pain; U - Unresponsive
<table>
<thead>
<tr>
<th>NEWS Score</th>
<th>FREQUENCY OF OBSERVATIONS</th>
<th>CLINICAL RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Minimum 12 hourly</td>
<td>Continue NEWS monitoring with every set of observations</td>
</tr>
<tr>
<td>TOTAL 1-4</td>
<td>Minimum 4-6 hourly</td>
<td>• Inform Registered Nurse who MUST assess the patient</td>
</tr>
<tr>
<td>LOW RISK</td>
<td></td>
<td>• RN to decide if increased monitoring or escalation to ANP/ASP/Outreach is required.</td>
</tr>
<tr>
<td>TOTAL ≥ 5</td>
<td>Minimum 1 hourly</td>
<td>REFER USING SBAR*</td>
</tr>
<tr>
<td>or Score 3 in one parameter</td>
<td>Measure urine output and start fluid balance chart</td>
<td>Registered nurse to urgently inform:</td>
</tr>
<tr>
<td>MEDIUM RISK</td>
<td></td>
<td>• Medical/surgical team caring for the patient or ‘on-call’ team at FY1/SHO level.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Outreach or ANP/ASP (out of hrs)</td>
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<tr>
<td>TOTAL 7 or more</td>
<td>CONTINUOUS</td>
<td>IMMEDIATE RESPONSE</td>
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<td>Registered nurse to immediately inform:</td>
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<td></td>
<td></td>
<td>• Medical / Surgical team caring for the patients or ‘oncall team’ at SpR Level.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Outreach or ANP/ASP (out of hours).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Consider peri-arrest call</td>
</tr>
<tr>
<td>Cardiac Arrest or Peri-arrest</td>
<td></td>
<td>CALL 2222</td>
</tr>
<tr>
<td>Collapsed Or Unconscious person anywhere on site</td>
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</table>

*SBAR:*

S = Situation  
B = Background  
A = Assessment  
R = Response
**Contacts Out of hours**
- ASP – Advanced Site Practitioner (bleep 504) – AAU and A&E
- ANP – Advanced Nurse Practitioner (bleep 654) – Surgery, Esher wing (Medicine and Orthopaedics)
- Outreach team – bleep 868/869
- Medical SPR bleep 174
- Medical consultant on call (via switchboard)

If no response within 10 minutes, escalate to the next level of seniority.

Call the Outreach Team on bleep 869/868 for help with the patient who has a NEWS of 3 in any individual parameter or a total score of 5 or more. Parameters include:
- Not fully alert and orientated
- Respiratory rate ≥ 25 or < 8 min⁻¹
- O₂ saturations < 91%
- Systolic BP < 90 mmHg
- Pulse ≥ 131 or < 55 min⁻¹

*And/or* when you are seriously worried about the patient.

**PERI-ARREST CALLING CRITERIA**
(Call the Cardiac arrest team on 2222)

Two or more criteria
- Threatened airway
- Respiratory rate < 8 or ≥ 25, (O₂ saturations < 91%)
- Pulse < 40 or ≥ 131, Systolic BP < 90 mmHg
- GCS lowered by more than 2 and / or AVPU = P/U

*And* when you are seriously worried about the patient.

Follow the escalation pathway (previous page and following page) for guidelines on the management of acutely ill adult patients.
**ESCALATION PATHWAY:**

**MANAGEMENT OF ACUTELY ILL ADULT INPATIENTS**

**Adult In-Patient**
Vital Sign Monitoring

*Adult Observations Recording and Escalation Policy*

Full set of Observations taken
Minimum 12 hourly if NEWS = 0, 4 hourly if NEWS = 1-4

**LOW NEWS 1-4**
Minimum Obs 4-6 hourly

If clinical concern, inform nurse in charge and increase frequency of observations as appropriate
Consider referral to F1/F2/SHO and/or Outreach/ASP/ANP

**MEDIUM NEWS**
5-6 or 3 in one parameter
Minimum Obs 1 hourly

If patient has a NEWS of 3 in one parameter/total score ≥ 5
- Not fully alert and orientated
- Respirations ≥ 25 or < 8 min⁻¹
- O₂ saturations < 91%
- Systolic BP < 90 mmHg
- Pulse ≥ 131 or < 40 min⁻¹
- Clinical concern about the patient

**HIGH NEWS**
7 or more or peri-arrest

If the patient has a NEWS ≥ 7
- Inform the Registrar/Consultant and Outreach Team/ASP immediately
- Consider peri-arrest call
- Consider ITU referral

Call both F1/F2/SHO and/or Outreach/ASP to review urgently (see out of hours contacts, previous page)
The doctor should inform the appropriate SPR or consultant
Increase observations to hourly
Consider clinical care in an environment with monitoring facilities
(Audit standard: within maximum 1 hour)

**Ongoing Monitoring & Patient Reassessment after One Hour of Treatment Initiation**

**Normal vital signs**
Alert
Respirations 10-20 min⁻¹, O₂ saturations on air ≥ 95%, Systolic BP 111-219 mmHg
Pulse 51-90 min⁻¹
& no clinical concern

Monitor according to **Trust Policy**

**SpR &/or Outreach/ASP/ANP review**

*Call Cardiac Arrest Team for peri-arrests*

**Improvement or Unchanged**

Within maximum of 1 hour
(within 2 hours of treatment initiation)

**Deterioration**

Within maximum of 20 minutes

Organ impairment?
- Hypoxaemia: O₂ saturations ≤ 90% on ≥ 60% oxygen
- Systolic BP ≤ 90 mmHg despite treatment
- Oliguria: ≤ 100mls/6 hrs or ≤ 400mls/24 hrs
- Lactate ≥ 4 mmol/l
- GCS < 9 or reduced by ≥ 2 points

**YES**
Consultant involvement
Decide: **HDU/ICU referral guidelines** on PIMS or Ward care
- reversibility of disease
- severity of disease
- co-morbidities
- patient’s wishes

**NO**
ANAPHYLAXIS
Link consultant: Dr Amolak Bansal

Anaphylaxis is life threatening but rapidly reversible if treated properly. The symptoms, which include bronchospasm, hypotension, laryngeal and facial oedema and urticaria, can develop within minutes of challenge. Common precipitants include food (e.g. shellfish, peanut); wasp/beet sting; drugs such as penicillins, antisera, contrast media, vaccines, antigens given for “desensitisisation”, or allergy to latex. Treatment principles are similar for adults and children but the doses of the drugs given differ; the doses quoted below are for adults. (For children or small individuals the adrenaline should be given at 1 microgram/kg.)

Management
• The success of treatment is highly dependent on early identification of anaphylaxis as a cause of dyspnoea or hypotension and rapid use of adrenaline. Adrenaline administered inappropriately will not harm the vast majority of patients; delaying its use can lead to anaphylaxis that can be difficult to reverse.
• As a first step remove allergen (e.g. stop drug infusion) if this is possible.
• Give adrenaline (epinephrine) 0.5ml of a 1 in 1000 solution (i.e. 500 micrograms) IM if there is dyspnoea from either upper airway constriction (stridor), severe bronchospasm or marked hypotension with or without impaired consciousness. Repeat after 5 minutes if there is no improvement. Several doses may be needed especially if improvement is transient or the patient deteriorates. Consider intubation by a skilled anaesthetist early if there is upper airway swelling and asphyxiation that is not immediately responding to the adrenaline.
• Giving adrenaline IV is potentially hazardous and should be reserved for patients with immediately life-threatening profound shock in whom IV access can be obtained without delay. Never give the 1 in 1000 adrenaline by the IV route. The IV dose is 50 micrograms (0.5 ml of 1 in 10,000), given slowly over 30 seconds, with ECG and BP monitoring. It can be repeated according to the response. Use a much reduced dose of adrenaline if patient is on a tricylic antidepressant (risk of hypertension and arrhythmia).
• Once the adrenaline has been administered then offer high-flow oxygen
• Give chlorphemamine by slow IV injection in a dose of 10-20mg.
• For patients with a severe or recurrent reaction, and in all patients with asthma, give hydrocortisone 200 mg by slow IV injection. If IV access is a problem, IM injection can be used in a dose of 200 mg (max 300 mg).
• For severe hypotension not responding to adrenaline and elevation of the legs give 1-2 litres of sodium chloride 0.9% (at least10-15 ml/kg)
• An inhaled β2 agonist (nebulised salbutamol 2.5-5 mg) is a useful adjunct if bronchospasm is a major feature which has not responded rapidly to other treatment. Repeated treatments may be required but consider early if the treatment is not working and ventilation is required.

NB
• Beware the possibility of early recurrence of symptoms and all patients suffering significant anaphylaxis should be admitted for overnight observation. Please take blood for serum tryptase estimation as this will help in considering the possible causes of the reaction subsequently.
• Write the name of the agent that caused the reaction prominently in the patient’s notes and on the front of the patient’s drug chart in the ‘allergy’ section.
• Co-existing asthma increases the risk of severe airways involvement and be prepared to give a course of prednisolone.
**Anaphylaxis algorithm**

**Anaphylactic reaction?**

**A, B, C, D, E**

**Diagnosis** - look for:
- Acute onset of illness
- Life-threatening A.F.E.D.
- And usually skin changes

- Call for help
- Lie patient flat
- Raise patient's legs

**Adrenaline**

When skills and equipment available:
- Establish airway
- High flow oxygen
- IV fluid challenge
- Chlorphenamine
- Hydrocortisone
- Monitor:
  - Pulse oximetry
  - ECG
  - Blood pressure

1. If life-threatening problems:
   - Airway: stridor
   - Breathing: rapid breathing, wheeze, fatigue, cyanosis
   - Circulation: pale, clammy, coldness, drowsiness, coma

2. Adrenaline (give more experienced with IV adrenaline)
   - M: doses of 1:1000 adrenaline (repeat after 5 min if no relief)
     - Adult: 500 micrograms IM (0.5 ml)
     - Child: more than 12 years, 500 micrograms IM (0.5 ml)
     - Child: 6-12 years: 300 micrograms IM (0 ml)
     - Child: less than 6 years: 150 micrograms IM (0.15 ml)
   - Adrenaline IV to be given only by experienced specialists

3. IV fluid challenge:
   - Ad: 500-1000 ml
   - Chl: crystalloid 20 ml/kg
   - Stop IV colloid

4. Chlorphenamine
   - Adult or child more than 12 years: 10 mg
   - Child: 6-12 years: 5 mg
   - Child: 6 months to 6 years: 25 mg
   - Child: less than 6 months: 250 micrograms/kg

5. Hydrocortisone
   - Adult or child: 200 mg
   - Child: 100 mg
   - Child: 50 mg
   - Child: 25 mg
Basic and advanced life support training is provided for all clinical staff. Training sessions are arranged as part of your induction and in relation to your clinical need. Current 2015 UK Resuscitation Council guidelines are followed at Kingston Hospital. The Hospital cardiac arrest and emergency call number is **2222**.

If you have any questions or would like to check on training sessions or arrange any further training, please bleep the Resuscitation Officers on bleeps 888/826 or contact them via switchboard.
Adult Bradycardia Algorithm 2015

Anesi using the ABCOE approach
- Monitor SpO2 and give oxygen if hypoxic
- Monitor ECG and BP, and record 12-lead ECG
- Obtain IV access
- Identify and treat reversible causes (e.g., electrolyte abnormalities)

Adverse features?
- Shock
- Syncope
- Myocardial ischaemia
- Heart failure

Yes

Atropine 500 mcg IV

Satisfactory response?

No

Consider interim measures:
- Atropine 500 mcg IV repeat to maximum of 3 mg
- Transcutaneous pacing
- Isoprenaline 5 mcg min⁻¹ IV
- Adrenaline 2-10 mcg min⁻¹ IV
- Alternative drugs

Risk of asystole?
- Recent asystole
- Mobitz II AV block
- Complete heart block with broad ORS
- Ventricular pause > 3 s

No

Continue observation

Seek expert help
Arrange transvenous pacing

Alternatives include:
- Aminophylline
- Dopamine
- Glucagon (if bradycardia is caused by beta-blocker or calcium channel blocker)
- Glycopyrrolate (may be used instead of atropine)
Adult Tachycardia Algorithm 2015

Assess using the ABCDE approach
- Monitor SpO2 and give oxygen if hypoxic
- Monitor ECG and BP, and record 12-lead ECG
- Obtain IV access
- Identify and treat reversible causes (e.g. electrolyte abnormalities)

Synchronised DC Shock*
Up to 3 attempts

Yes - Unstable
Seek expert help

- Amiodarone 300 mg IV over 10-20 min
- Repeat shock
- Then give amiodarone 900 mg over 24 h

No - Stable

Adverse features?
- Shock
- Syncope
- Myocardial ischaemia
- Heart failure

Is QRS narrow (< 0.12 s)?
Broad
- Narrow

Narrow QRS
Is rhythm regular?
Regular
- Irregular

Probable AF:
- Control rate with beta-blocker or diltiazem
- If in heart failure consider digoxin or amiodarone
- Assess thromboembolic risk and consider anticoagulation

Sinus rhythm achieved?
Yes
- No

If VT (or uncertain rhythm):
- Amiodarone 300 mg IV over 20-60 min then 900 mg over 24 h
If known to be SVT with bundle branch block:
- Treat as for regular narrow-complex tachycardia

Possibilities include:
- AF with bundle branch block treat as for narrow complex
- Pre-excited AF consider amiodarone

Regular

Irregular

Vagal manoeuvres
- Adenosine 6 mg rapid IV bolus if no effect give 12 mg if no effect give further 12 mg
- Monitor/record ECG continuously

Seek expert help

Sinus rhythm achieved?
Yes
- No

Probable re-entrant paroxysmal SVT:
- Record 12-lead ECG in sinus rhythm
- If SVT recurs treat again and consider anti-arrhythmic prophylaxis

Possible atrial flutter:
- Control rate (e.g. with beta-blocker)

*Conscious patients require sedation or general anaesthesia for cardioversion
CRITICAL CARE: GUIDELINES FOR REFERRAL AND DISCHARGE
Link consultant: Dr. Jim Zwaal

Note: Consultant involvement is mandatory before referring a patient for HDU/ITU support

Refer to the full policy on PIMS: Guidelines for the referral to the ITU

Factors to be taken into consideration in judging appropriateness of admission to critical care
- Patient’s wishes
- Severity of illness and prognosis
- Co-existing disease/physiological reserve
- Availability of treatment
- Response to treatment to date
- Recent cardio-pulmonary arrest
- Age (biological)
- Anticipated quality of life

Specific Patient categories for whom critical care would normally be deemed inappropriate
- Patients who competently decline admission to intensive care
- Patients with terminal irreversible illness
- Very elderly patients with irreversible chronic illness
- Patients with severe irreversible brain damage
- Patients in a persistent vegetative state or permanently unconscious
- Patients with metastatic cancer with poor prognosis and unresponsive to chemo- and/or radiotherapy
- Patients with irreversible multi-organ failure

Specific Patient categories for whom critical care may be appropriate
- Patients requiring invasive mechanical ventilatory support
- Patients who may experience a sudden precipitous deterioration in respiratory function requiring immediate endotracheal intubation and mechanical ventilation
- Patients requiring more than 50% oxygen via fixed performance mask
- Patients at risk of progressive deterioration to the point of needing advanced respiratory support
- Patients needing physiotherapy at least 2 hourly to clear secretions
- Patients recently extubated after a prolonged period of intubation and mechanical ventilation
- Patients in need of non-invasive modes of ventilation
- Patients requiring intubation for airway protection but not otherwise in need of ventilatory support
- Patients requiring vasoactive drugs to support arterial pressure or cardiac output
- Patients requiring support for circulatory instability due to hypovolaemia from any cause which is unresponsive to modest fluid replacement
- Patients resuscitated following cardiac arrest where critical care is deemed to be appropriate
- Patients with central nervous system depression sufficient to prejudice the airway and protective reflexes
- Patients requiring invasive neurological monitoring
- Patients requiring acute renal replacement therapy
Post-operative patients in need of prolonged postoperative recovery and monitoring

The following categories of patients may be appropriately discharged from critical care:

- Patients in whom (in the judgement of the intensive care consultant) the condition which led to referral for critical care has been adequately treated and reversed
- Patients who (in the judgement of the intensive care consultant) no longer benefit from the treatment available
- Patients requiring palliative care that can be provided on the ward
- Patients needing specialist treatment that cannot be provided in the admitting unit, for whom transfer to a specialist unit should be arranged
- Patients who have entered a persistent or permanent vegetative state

Patients can be transferred to another critical care unit to facilitate admission of another critically ill patient only if, in the judgement of the intensive care consultant, the risk of not admitting the new patient is significant and the risks of transfer of the existing patient are deemed to be insignificant and small. Under those circumstances the non-clinical transfer protocol should be followed.

FALLS: PREVENTION AND MANAGEMENT

Link consultant: Dr. Chooi Lee

Inpatient falls are the commonest type of adverse event. There are approximately 1000 inpatient falls in Kingston hospital each year, several resulting in significant harm, including hip fracture, serious brain injury and death. All falls are reported electronically as adverse incidents: those resulting in significant harm require investigation.

Patients over the age of 80 years who have fallen at least once in the last year are the most likely to suffer another fall. Other major risk factors related to falls include:

- Gait impairment
- Muscle weakness
- Balance impairment
- Delirium
- Dementia
- Visual impairment
- Acute illness
- Old age
- Frailty
- Medication
- Hearing impairment
- Neurological disease
- Orthostatic hypotension
- Environmental factors
- Inappropriate footwear
- Incontinence
- Fear of falling
- Polypharmacy

Predicting the risk of falling in hospital (NICE 2013)

Regard the following groups of inpatients as being at risk of falling in hospital and manage their care accordingly (see below)

- All patients aged 65 or older
- Patients aged 50-64 years who are judged by a clinician to be at higher risk of falling because of an underlying condition

The use of a falls prediction tool is unnecessary
**Actions for Medical Staff in Falls prevention**

Doctors are expected to complete the following for each patient, on admission to hospital, after transfer to the ward, and after an inpatient falls:

- After an inpatient fall, use the CRS pre-configured template ‘Post-Fall Medical Assessment’ to document full physical examination, in particular for significant neurological defect, head injury, neck, hip or other fractures.
- Follow emergency CT brain scan protocol for patients on warfarin and other anticoagulants
- If there is ongoing concern that there could be a fracture which is not visible on plain x-ray, consider requesting a CT scan of the hip/pelvis/other affected part.
- Review medications and stop high risk drugs, if possible
- Document lying and standing blood pressure and adjust medications accordingly
- Decide if each patient is at high (or extremely high) risk of falling
- Escalate concerns to senior nursing staff if intensive supervision is needed e.g. in confused patients
- Refer high risk patients to the team physiotherapist for strength and balance assessment, and referral to community falls prevention programmes
- Refer high risk patients to the team occupational therapist for assessment of fear of falling and environmental modifications

Additionally, you should be aware and be involved in the assessments and interventions (see below):

**Assessment and Interventions**

1. Ensure that the inpatient environment is safe, including flooring, lighting, furniture and fittings (e.g. toilet rails)
2. Multifactorial assessment to identify each patient’s risks of falling – treat, improve or manage any factors
3. Multifactorial intervention- promptly address each patient’s risk factors for falling in hospital
   - Cognitive impairment (including delirium assessment)
   - Continence problems (i.e. toileting/continence assessment and care plan)
   - Falls history, including causes and consequences (injury, fear of falling)
   - Footwear that is unsuitable or missing
   - Conditions increase their risk of falling (including postural hypotension)
   - Medication (e.g. avoid new night sedation, review high risk drugs)
   - Postural instability, mobility problems and/or balance problems
   - Syncope syndrome
   - Visual impairment

**Information for patients and relatives**

Provide relevant oral and written information and support for patients, and their family members and carers if the patient agrees. Information should include:

- Explaining about the patient’s individual riskfactors for falling in hospital
- Showing the patient how to use the nurse call bell system, making sure the call bell is in reach, and encouraging/reminding them to use it when they need help
- Providing consistent messages about when a patient should ask for help before getting up or moving about
- Helping the patient to engage in any multifactorial intervention aimed at addressing their individual risk factors
PLEASE DISCUSS ALL PATIENTS WHO HAVE BEEN ADMITTED WITH ACCIDENTAL FALLS WITH THE TEAM PHYSIOTHERAPIST
He/she will assess and refer each patient, if appropriate, to the relevant community falls prevention team for further evidence-based assessment and intervention after discharge from hospital

RADIOLOGY: EMERGENCY CT HEAD SCANNING
Link consultants: Dr. Anita Rhodes

This section specifically refers to referral guidelines for emergency CT head scans.

The full guidance for the emergency management of head injury can be found on the NICE website; emergency CT scanning guidance can be found using the link:
NICE guidance/CG176/Head Injury: assessment and early management

EMERGENCY CT HEAD SCANS OUT OF HOURS

The referring team is reminded that a doctor should be present during the CT examination out of hours.

These guidelines cover the following clinical scenarios:
1. Head injuries
2. Suspected subarachnoid haemorrhage
3. Epilepsy
4. The unconscious patient
5. Stroke
6. Suspected meningitis

1. HEAD INJURIES (see flowchart, taken from NICE Head injury guidelines)

Note that requests can be made by doctors of Registrar level or above only.
INVESTIGATION FOR CLINICALLY IMPORTANT BRAIN INJURY

CT imaging of the head is the primary investigation of choice

Selection of adults for CT scanning of the head

Are any of the following present?

- GCS < 13 when first assessed in emergency department
- GCS < 15 when assessed in emergency department 2 hours after the injury
- Suspect open or depressed skull fracture
- Sign of fracture at skull base (haemotympanum, ‘panda’ eyes, cerebrospinal fluid leakage from ears or nose, Battle’s sign)
- Post-traumatic seizure
- Focal neurological deficit
- > 1 episode of vomiting

Any amnesia or loss of consciousness since the injury?

- Yes
- No

Are any of the following present?

- Age ≥ 65 years
- Coagulopathy (history of bleeding, clotting disorder, current treatment with warfarin)
- Dangerous mechanisms of injury:
  - Pedestrian/cyclist struck by a motor vehicle
  - Occupant ejected from a motor vehicle
  - Fall from > 1 m or 5 stairs

- Yes
- No

Request CT scan immediately

No imaging required now

- Imaging should be carried out and results analysed within 1 hour of request being received by radiology department
- Imaging should be carried out within 8 hours of injury, or immediately if patient presents 8 hours or more after the injury
- If patient presents out of hours and is ≥ 65, has amnesia for events more than 30 minutes before impact or there was a dangerous mechanism of injury, it is acceptable to admit for overnight observation, with CT imaging the next morning, unless CT result is required within 1 hour because of the presence of additional clinical findings listed above.
**NON-TRAUMA HEAD CT SCANS**

- All non-trauma CT head scan requests can be made by doctors of registrar level or and above between 9am – 5pm.
- Out of hours junior staff should discuss the urgency of a CT scan with their on-call medical consultant, prior to calling the consultant radiologist on-call.

2. **Subarachnoid Haemorrhage**

There should be definite clinical history and physical signs to indicate a suspected subarachnoid haemorrhage and these should include at least one of the following:
- Sudden explosive headache and neck stiffness
- Photophobia
- Focal neurological deficit

In a fully conscious and orientated patient, without focal neurological deficit, presenting at night, CT can justifiably be postponed until the following day. There is an 8am CT slot which can be used for these patients. If there is a progressive neurological deficit or deterioration of the level of consciousness, an urgent CT should be arranged.

It is recommended that lumbar puncture is performed, if a patient with suspected SAH has a normal CT, to look for xanthochromia, but lumbar puncture needs to be delayed by 12 hours from the onset of symptoms to allow for xanthochromia to develop.

3. **Epilepsy**

Emergency out-of-hours CT is not indicated in epilepsy unless there is definite history and/or physical signs to indicate the possibility of an intracerebral abscess or focal neurology. It may be necessary to carry out CT scanning in patients presenting with status epilepticus, particularly if they do not recover quickly.

4. **The Unconscious Patient**

CT is indicated in an unconscious patient in whom there is:
- History of head injury
- No apparent cause and no history available

It must be clearly demonstrated that the emergency after-hours CT will directly change the patient’s immediate management.

5. **Stroke**

Patients presenting with stroke should be transferred/admitted directly to St. George’s or Charing Cross High Dependency Stroke Unit (HASU) for urgent CT scanning and consideration for thrombolysis/thrombectomy. Immediate CT scanning is indicated for the following:
- Patients taking anticoagulant treatment
- Known bleeding tendency
- Depressed level of consciousness
- Unexplained progressive or fluctuating symptoms
- Papilloedema, neck stiffness or fever
- Severe headache at onset
Thrombolysis in acute ischaemic stroke
This is no longer performed in Kingston Hospital. Patients who have suffered an acute stroke must be transferred urgently to the Hyperacute Stroke Unit at St. George’s Hospital. Refer to the section: Acute stroke and T.I.A.

6. Suspected Meningitis
Emergency out-of-ours CT scanning is not routinely indicated in patients with suspected meningitis.

CT scanning is ONLY indicated prior to a lumbar puncture if the patient is:
- 60 years old or older
- immunocompromised
- has a history of CNS disease
- has had seizures within 1 week of presentation
- has evidence of raised intracranial pressure including papilloedema
- has focal neurology
- has had a fall in the Glasgow coma scale with depression of consciousness.

It is important to appreciate that a negative CT scan prior to lumbar puncture does not indicate the lumbar puncture may be ‘safely’ performed.

In patients with meningitis initial treatment should NOT be withheld if there may be a delay in obtaining appropriate investigations and LP can be safely performed. Under these circumstances management of the patient should be dictated by clinical findings.

RESPIRATORY ARREST
Link consultant: Dr. Anne Blyth

Respiratory arrest must be reversed rapidly if the patient is to survive. Any patient at risk of respiratory arrest or who has been resuscitated after respiratory arrest should be referred to the Critical Care Outreach Team (bleep 869) at the earliest opportunity. The cause should be determined as soon as possible. Common causes in hospital include:
- Acute respiratory disorder, e.g. asthma, severe pneumonia
- Acute on chronic respiratory failure
- Overdose of respiratory depressant drugs, e.g. morphine, barbiturates
- Obstruction, e.g. foreign body. Laryngeal impaction quite often leads rapidly to cardiac arrest. The heart will probably re-start with a few chest compressions and before intubation has been attempted. The possibility of obstruction should always be kept in mind. Arrest can also occur in patients who are already intubated if the tube is suddenly obstructed
- Neuromuscular failure, e.g. Guillain-Barre syndrome, myasthenia gravis. In these conditions there is usually a warning period of decreasing vital capacity and tidal volume. This should be looked for as dyspnoea may be absent until the failure is well advanced
- Secondary to cardiac arrest
- Plugging of a tracheostomy

Once obstruction by a foreign body has been excluded or removed, the initial management involves insertion of an airway and breathing by means of mouth-to-
mask or bag and mask techniques. If cardiac output has ceased (as judged by the pulse), external cardiac compression must be undertaken. In most patients, subsequent treatment will consist of endotracheal intubation followed by manual ventilation with 100% oxygen. Intubation should be attempted by the first person arriving with the necessary experience; in difficult cases this will need the help of an anaesthetist. Continued bag and mask ventilation is the best option if intubation skills are not available.

The underlying cause of the arrest should be treated. Non-specific respiratory stimulants are of little value. However, when the arrest has been caused by an opiate, naloxone should be given.

**For post-operative respiratory depression:**
Give naloxone IV 100 – 200 micrograms (1.5 – 3 micrograms/kg). If the response is inadequate, give further doses of 100 micrograms every two minutes.

**For acute opioid or opiate overdose:** (see BNF for specific guidance on dosing)
Initially give 400 micrograms, then 800 micrograms for up to 2 doses at 1 minute intervals if there is no response to preceding dose, then increase to 2 mg for 1 dose if still no response (4 mg dose may be required in seriously overdosed patients), then review diagnosis; further doses may be required if respiratory function deteriorates.

If IV access is not available, naloxone can be given IM or subcutaneously. The drug is not effective in buprenorphine overdose but will occasionally work in patients with alcohol overdose. If arrest is secondary to benzodiazepine overdose, try flumazenil IV (200 micrograms over 15 sec followed by 100 micrograms every 60 sec if required, up to 1 mg total dose). Use with caution if other psychotropic drugs (especially tricyclic anti-depressants) may have been ingested as their toxic effects may be potentiated; or if the patient is known to be benzodiazepine dependent; or if the patient is epileptic and has been taking a benzodiazepine for a prolonged period. Flumazenil has a short duration of action; the patient should remain under close observation until all possible central benzodiazepine effects have subsided.
In most patients, intermittent positive pressure ventilation will be required. This should be carried out on the ICU under the strictest supervision. Even if the patient is deemed not to require intermittent positive pressure ventilation, any patient who has had a respiratory arrest should be closely watched for the next 24 hours. If the patient has hypercapnic acute (on chronic) respiratory failure (the arterial pH will be <7.3) it might help to give non-invasive intermittent positive pressure ventilation. Discuss the options with the on-call respiratory SpR/respiratory nurse specialist/outreach team/nursing staff on Hamble ward.

If the patient has a plugged tracheostomy, clear the secretions by suction, ensure the cuff is inflated and seek advice from an anaesthetic or respiratory registrar urgently. Guidelines for the care of patients with tracheostomies are available on the intranet.
SEPSIS: DETECTION AND MANAGEMENT
Link consultant: Dr. Ram Kumar

Patients who are diagnosed with Red Flag Sepsis, sepsis and septic shock as set out in the SEPSIS SCREENING AND MANAGEMENT TOOL (below), must have treatment started in a time critical fashion.

**Think ‘could this be sepsis’ if:**
- Looks ill, feels very unwell and/or carer concerned
- Is triggering a NEWS Score
- Has any sign of infection

**Low Risk of Sepsis**
- Sign of infection
- NEWS <5 &/or
- Normal behaviour
Consider further sepsis screening & use standard protocols to treat

**Identify the source of infection**
- Pneumonia
- Urinary Tract Infection
- Abdominal pain or distension
- Cellulitis/infected wound
- Device-related infection
- Meningitis
- Yes, but source unclear
- Other (please specify)

**Indicators of clinical concern (Red Flags)?**
- Single NEWS scores of 3
- Lactate >2
- Not passed urine in last 12 hours or u/o <0.5 ml/kg/hour
- Non-blanching rash, mottled/ ashen cyanotic
- Organ dysfunction
- Recent chemotherapy

**Are there risk factors?**
- Recent Chemotherapy
- Impaired immunity (any cause)
- Risk of Neutropenic sepsis
- Trauma, surgery or invasive procedure (within 6 weeks)
- Older (>75 years) or frail
- Indwelling lines/catheters/IV drug misusers/any breach in skin integrity
- Pregnant or recently pregnant

**CRITERIA FOR ORGAN DYSFUNCTION:**
- SBP<90 mmHg or MAP<65 mmHg or SBP<40 mmHg of patient’s baseline
- Increased oxygen requirement to maintain SpO2 > 90%
- Creatinine > 177 μmol/L or Urine output < 0.5 mL/kg/hr for > 2 hours
- INR > 1.5 or APTT >60 secs
- Lactate > 4 mmol/l
- Bilirubin >70 mmol/l
- Platelet count < 100 x 10⁹/L

**Escalate for medical review**
- Take full set of bloods & VBG/ABG
- Take patient history & assess

**Identify the source of infection**

- Device-related infection
- Meningitis
- Yes, but source unclear
- Other (please specify)
If your patient has sepsis, start **SEPSIS SIX MANAGEMENT** within **1 hour** of presentation

**SUSPECT SEPSIS AND PERFORM SEPSIS 6**

1. **Administer oxygen.** Aim sats > 94%
   Aim for sats of 88-92% if the patient is at risk of CO₂ retention

2. **Take Blood cultures**
   Consider CSF, urine, sputum cultures etc. Source control.

3. **Give IV antibiotics within one hour of identification of sepsis**

4. **Give IV fluids**
   If hypotensive/lactate > 2mmol/l, 500ml stat of 0.9% sodium chloride or Hartmann’s solution
   Repeat if clinically indicated up to 30ml/kg/hour

5. **Check serial lactate levels.**
   Corroborate high VBG lactate with arterial sample.
   If lactate >4mmol/l, call Critical Care and recheck after each fluid challenge of 10ml/kg

6. **Measure urine output.**
   Consider urinary catheter. Commence on hourly fluid balance

- Observations minimum 1 hourly or continuous monitoring for High risk patients. See Trust’s ‘Adult Observations recording and escalation policy’.
- Ensure urgent senior review with results within 1 hour of presentation
- If patient remains unwell after delivery of Sepsis Six or is clearly critically ill at any time, contact the Critical Care Outreach (Bleep 868/869) and/or ITU Registrar (Bleep 009) immediately!

**WHEN TO ATTEMPT CARDIO-PULMONARY RESUSCITATION**

Link consultant: Dr Chooi Lee

All patients should receive cardio-pulmonary resuscitation (CPR) in the event of cardiac arrest unless specific ‘Do Not Attempt Resuscitation’ (DNAR) instructions are written in the notes. The Trust takes the position that it is appropriate to consider a patient for a “Do Not Attempt Resuscitation” (DNAR) order in any of the following circumstances:
- When the patient’s condition indicates that attempts at CPR would not be successful.
- When CPR is not in accord with the recorded, sustained wishes of the patient who is mentally competent
- When DNAR is in accordance with a valid applicable advanced directive
- When successful CPR is likely to be followed by a length and quality of life which would not be in the best interests of the patient to sustain.
What does ‘Do not attempt resuscitation (DNAR)’ mean?
- The instruction ‘DNAR’ means that CPR is inappropriate for that particular patient and hence the ‘Cardiac Arrest’ team should not be called automatically in the event of cardiac or respiratory arrest. If such a patient were to collapse or arrest, an immediate assessment must be made as to the cause, and appropriate simple measures taken with regard to airway patency, patient position etc., and a relevant doctor from the appropriate medical team informed immediately. No other attempts at basic or advanced life support should be commenced unless specifically instructed by that medical team.
- DNAR does not affect the patient’s routine therapy (antibiotics, surgery, nutrition, dialysis), which should continue to be provided as normal.

Who should make the decision not to resuscitate?
- The decision not to resuscitate is always a medical one, i.e. made by a doctor. The final responsibility for the decision rests with the consultant in charge of the patient’s care, who is ultimately responsible for the essential documentation and communication of the patient’s resuscitation status. However, the decision should be discussed with all other members of the multidisciplinary team involved in the patient’s care.
- The views of the patient MUST be sought if he/she is mentally competent, as should the views of the immediate relatives and carers, but with due regard to patient confidentiality. Ideally, nursing staff should be present when the decision is discussed with the patient and/or relatives and carers.
- Under the Access of Medical Records Act 1990, a patient (and perhaps relatives) has the right to receive copies of their Medical Record. Thus, soundly-based decisions and full documentation are necessary.
- The decision not to resuscitate should be made as early as possible by a senior member of the medical team in charge of the patient’s care, usually the consultant.
- In certain circumstances a DNAR order may initially be made by the most senior doctor on call (usually a specialist registrar) after seeing the patient and discussing the situation as detailed above. Any decision made by a junior doctor must be communicated to the consultant on call within 24 hours and then subsequently communicated to the patient’s own consultant, at the first available opportunity.

Writing the instructions DNAR in the patients electronic record:
- The instruction ‘do not resuscitate’ and/or ‘DNAR’ should be entered in the patient’s electronic record, together with the reason for the decision, whether or not the decision has been discussed with the patient and/or relatives, dated and timed.
- A paper ‘DNAR’ form should be completed and attached to the inside of the front cover of the hard copy of the patient’s medical notes, and
- The instruction should also be entered in the nursing notes by the primary nurse or the senior nurse, who is responsible for informing all other members of staff.

Review regularly DNAR decisions
The DNAR decision should never be regarded as final, since its appropriateness may vary with the patient’s clinical condition. The decision should be re-considered regularly as part of the patient’s management plan. This should be undertaken at intervals appropriate to the patient’s clinical condition.
- Nurses and Professions Allied to Medicine must be alert to any alteration in the patient’s underlying condition, which might affect the patient’s resuscitation status. Such concerns must be brought to the attention of senior medical staff.
• If a DNAR order is rescinded, the DNAR status entry in the medical notes and electronic record should be struck out with a single line. Nursing documentation will need to be updated accordingly and changes communicated to all staff.

Communicating the policy
All members of the medical and health care team must be aware of the decision that a particular patient is ‘DNAR’. It should be communicated at every nursing hand-over, so that every nurse on the ward knows the resuscitation status of every patient.

SUMMARY RECOMMENDATIONS FOR THE USE OF ANTIBIOTICS

Link consultant: Dr Sneha Patel
Pharmacist: Agnieszka Fryer/Emma Guthrie

The full Antibiotic Guidelines is available on the hospital intranet Policies Information Management System (PIMS)

These are EMPIRICAL guidelines (commenced before a causative organism is known). Consider individual patient factors in all cases: allergies, recent antibiotic history, previous infection with multi-resistant organisms (such as MRSA or ESBL + E.coli), and predisposition to C.difficile infection before choosing an antibiotic. Rationalise antibiotic choice according to culture and sensitivity results.

CLINICAL ADVICE
Advice from a Consultant Microbiologist is available via the Kingston hospital switchboard. This is a consultant referral. Examine the patient before the call and ensure that you have the patient’s notes and drug chart to hand. Out of hours, a Consultant Microbiologist is available for emergency specialist advice if you cannot find it elsewhere (i.e. in this book, full antibiotic guideline, the patient’s notes, or from your senior colleagues). Document the clinical advice in the patient’s CRS record.

SPECIMENS
Before starting antibiotics, obtain appropriate specimens for diagnosis (i.e. for suspected endocarditis, take three blood cultures from three separate venupuncture sites). Specimens must be of good quality, e.g. pus rather than a swab, purulent sputum rather than saliva. Take blood for culture and serology where appropriate. The Trust’s Blood Culture Policy is available on the intranet on PIMS.

All samples should be sent to the Kingston Hospital pathology reception. They are then transported to and processed at the hub South West London Pathology lab based at St George’s Hospital.

URGENT SAMPLES – phone pathology reception x2033 to inform that urgent sample has been sent. Out of hours (5pm to 8:30am & weekends) you must contact the on call microbiology scientist via Kingston or St George’s (0208 725 1255) switchboard to request that a sample is processed urgently.
RESTRICTED ANTIBIOTICS (not applicable to ITU)

Piperacillin-Tazobactam (Tazocin), Temocillin, Meropenem, Teicoplanin, Ciprofloxacin, Clindamycin, Amikacin, Linezolid, Ertapenem, IV Vancomycin, Daptomycin Fosfomycin, Tobramycin and Fidaxomicin are restricted antibiotics. They can only be prescribed on Consultant Microbiologist advice when used outside of these guidelines. Complete the ‘restricted antimicrobials’ form on CRS, document that the drug has been approved, and by whom. Out of hours restricted antibiotics may be prescribed by the SpR or above but must be discussed with the microbiology consultant the next day. All antifungals except Fluconazole and Nystatin are restricted except for use in ITU, Paediatrics and Haematology/Oncology.

GENTAMICIN DOSING AND MONITORING

Only give gentamicin if creatinine is < 300µmol/L. Use the gentamicin dosing algorithm in the full Antibiotic Guidelines and on line Gentamicin Calculator for calculation of first dose. Order gentamicin level (taken 20 hours after dose given) if continuing gentamicin (Appendix A: Antibiotic guidelines).

PENICILLIN ALLERGY or NOT?

True allergy is often confused with drug side effects i.e. nausea, vomiting and diarrhoea. 80-90% of patients who say they are allergic to penicillin are not. An accurate history and nature of the allergy should be taken and documented on the drug chart and in the notes.

Prescribing in Penicillin Allergy

**Penicillin-containing Antibiotics** must not be given to patients with a history of a true penicillin allergy.

**Other Beta-Lactam Antibiotics** can be used with a history of non-severe penicillin allergy (e.g delayed/minor rash). **Avoid** if serious penicillin allergy (e.g anaphylaxis, angioedema, widespread rash).

**Non Beta-Lactam Antibiotics** are safe in patients with penicillin allergy. Remember to consider allergies to other antimicrobials.

NOTES

- **Modify** antibiotic choice if pathogen is identified or if previously resistant organisms (e.g. MRSA, ESBL producer) identified. Check previous and current culture results before starting treatment.
- **Check risk factors for Clostridium difficile**. The Clostridium difficile guidelines are available on the intranet on PIMS.
- **Duration** – use the narrowest spectrum antibiotic for the shortest possible time. Treatment with IV antibiotics should not continue beyond 48 hours, and the total duration (IV and oral) should not exceed 5 days, unless recommended by a microbiology consultant or stated in the antibiotic guidelines.
- **Review DAILY** - Can you STOP? SWITCH to oral? Change to a narrow spectrum antibiotic?
• **Adjust for impaired renal and hepatic function** - you may need to adjust doses in patients with impaired clearance. *(Appendix G: Antibiotic guidelines)*

• **Always document the indication and duration** for antibiotics in the patient’s notes and on the drug chart.

**STOPPING ANTIBIOTIC THERAPY**

The following features indicate a response to initial IV therapy; you should consider changing intravenous to oral antibiotics:

- The absence of positive blood cultures in the past 48 hours
- Temperature <38°C for more than 48 hours
- Oral fluids tolerated (by mouth, NG or PEG tube)
- No ongoing or potential problems with GI absorption, diarrhoea or vomiting
- White cell count and/or CRP are returning to normal
- Pulse Rate <100 beats/min
- Patient is not immunocompromised (HIV positive, neutropenic, on steroids, azathioprine, ciclosporin or cytotoxics)
- A suitable oral antimicrobial is available

**Review and document the need for IV antibiotic therapy daily.**

The following tables contain the summary guidance for urgent and immediate emergency antimicrobial therapy. Refer full [Antibiotic Guidelines] on the intranet, on PIMS.
<table>
<thead>
<tr>
<th>INFECTION</th>
<th>1st LINE ANTIBIOTICS</th>
<th>ALTERNATIVE IF ALLERGIC TO 1st LINE</th>
<th>ORAL SWITCH</th>
<th>Total (iv+po) DURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sepsis of unknown site</td>
<td>Amoxicillin 1g IV TDS plus Gentamicin 0.5mg IV</td>
<td>Teicoplanin 4g IV OD plus Gentamicin 1mg IV OD</td>
<td>Guided by culture results and eventual focus.</td>
<td>5 – 14 days depending on focus and clinical response</td>
</tr>
<tr>
<td>Bacterial Endocarditis</td>
<td>Acute presentation: Fluocloxacin 2g IV QDS (4hrly if &gt;85kg) plus Gentamicin 1mg/kg BD</td>
<td>Vancomycin 4g IV plus Rifampicin 600mg BD PO plus Gentamicin 1mg/kg BD</td>
<td>Oral treatment is not appropriate for endocarditis</td>
<td>2 – 6 weeks Depending on likely causative organism – see full antibiotic guidelines</td>
</tr>
<tr>
<td>Cellulitis</td>
<td>Non-severe: Fluocloxacin 1g PO QDS</td>
<td>Clarithromycin 500mg PO BD</td>
<td>Flucloxacillin 1g PO QDS</td>
<td>5 days</td>
</tr>
<tr>
<td>Infection Exacerbation of COPD</td>
<td>Doxycycline 200mg PO STAT then 100mg OD</td>
<td>Clarithromycin 500mg PO BD</td>
<td>Flucloxacillin 1g PO QDS</td>
<td>5 days</td>
</tr>
<tr>
<td>Community Acquired Pneumonia (CAP) – see CAP pathway</td>
<td>CURB65=0-1 Amoxicillin 500mg PO TDS</td>
<td>Clarithromycin 500mg PO BD</td>
<td>Doxycycline 200mg PO STAT then 100mg OD</td>
<td>5 Days</td>
</tr>
<tr>
<td>Hospital Acquired Pneumonia (HAP): ≥ 5 days after admission</td>
<td>Mild: Doxycycline 200mg PO STAT then 100mg OD</td>
<td>Teicoplanin 4g IV OD plus Clarithromycin 500mg IV PO BD</td>
<td>Amoxicillin 500mg IV TDS +/- Clarithromycin 500mg BD</td>
<td>5 Days Review IV treatment within 48 hrs</td>
</tr>
<tr>
<td>Aspiration Pneumonia</td>
<td>As for Severe HAP, plus Metronidazole 400mg PO/500mg IV TDS</td>
<td>As for Severe HAP, plus Metronidazole 400mg PO/500mg IV TDS</td>
<td>Metronidazole 400mg TDS and Clarithromycin 500mg BD</td>
<td>5 Days Review IV treatment within 48 hrs</td>
</tr>
</tbody>
</table>

Notes relating to the tables:
1. Refer to the Trust blood culture policy on PIMS: Blood Culture Policy
2. For accurate first dose of once daily Gentamicin dosing, it is vital to use the online Gentamicin Calculator on the intranet – click on the box at the bottom of the home intranet page entitled ‘Applications’ (then click on Gentamicin calculator)
3. Teicoplanin IV: Refer to dosing table in Appendix A of the full Antibiotic Guideline.
4. Vancomycin IV: Refer to dosing table in Appendix A of the full Antibiotic Guideline.
<table>
<thead>
<tr>
<th>INFECTION</th>
<th>1st LINE ANTIBIOTICS</th>
<th>ALTERNATIVE IF ALLERGIC TO 1st LINE</th>
<th>ORAL SWITCH</th>
<th>Total (iv+po) DURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholecystitis/Biliary sepsis</td>
<td>Amoxicillin 1g IV TDS plus Metronidazole 500mg IV TDS Plus Gentamicin^2 IV OD</td>
<td>Metronidazole 500mg IV tds plus Gentamicin^2 IV OD</td>
<td>&lt;65yrs: Co-amoxiclav 625mg PO TDS ≥65yrs: Amoxicillin 500mg TDS plus Metronidazole 400mg TDS</td>
<td>5 days Review IV treatment within 48 hrs.</td>
</tr>
<tr>
<td>Clostridium difficile infection (first episode) Stop any additional antibiotics, PPI therapy, and laxatives.</td>
<td>Metronidazole 400mg PO TDS For severe infection, use Vancomycin^1 125mg PO QDS</td>
<td>Vancomycin^1 125mg PO QDS</td>
<td>≤65yrs: Co-amoxiclav 625mg PO tds ≥65yrs: Amoxicillin 500mg TDS plus Metronidazole 400mg TDS</td>
<td>10 days Observe infection control precautions</td>
</tr>
<tr>
<td>Diverticulitis</td>
<td>Cefuroxime 750 mg IV TDS plus Metronidazole 500 mg IV TDS</td>
<td>Metronidazole 500 mg IV TDS plus Gentamicin^2 IV OD</td>
<td>&lt;65yrs: Co-amoxiclav 625mg PO TDS ≥65yrs: Amoxicillin 500mg TDS plus Metronidazole 400mg TDS</td>
<td>5 days</td>
</tr>
<tr>
<td>Meningitis (Bacterial) Notifiable disease: HPU tel: 03443262052 Prophylaxis for contacts – see full antibiotic guideline Consider dexamethasone 10mg iv 6 hourly for 4 days with first dose of antibiotic EXCEPT in septic shock, meningococcal septicemia, immunosuppression and following surgery. Consider Listeria (add Amoxicillin 2g 4 hourly) if immunocompromised or &gt;60 years of age</td>
<td>Ceftriaxone 2 g IV bd for all patients prior to the identification of the organism Refer to Trust Antibiotic guidelines (PIMS)</td>
<td>Oral treatment is not appropriate for meningitis.</td>
<td>7 – 14 days</td>
<td></td>
</tr>
<tr>
<td>Neutropenic sepsis</td>
<td>Refer to section on Neutropenic sepsis (below)</td>
<td>Refer to Trust Antibiotic Guidelines (PIMS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Splenectomy patients</td>
<td>Refer to Trust Antibiotic Guidelines (PIMS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urinary Tract Infection (UTI) Send MSU before antibiotics &gt;65 years – treat only if symptoms present</td>
<td>Nitrofurantoin 50mg PO QDS Do not use if CrCl&lt;45mls/min</td>
<td>Trimethoprim 200mg PO BD Guided by MSU culture.</td>
<td>Female: 3 days Male: 7 days</td>
<td></td>
</tr>
<tr>
<td>Acute Pyelonephritis Send MSU, Blood cultures^1 if indicated.</td>
<td>Severe: Amoxicillin 1g IV tds plus Gentamicin^2 IV OD</td>
<td>Gentamicin^2 IV OD Guided by culture results.</td>
<td></td>
<td>10 days</td>
</tr>
<tr>
<td></td>
<td>Non-severe: Trimethoprim 200mg PO BD Consider Gentamicin^2 with rapid oral switch</td>
<td>Guided by culture results.</td>
<td></td>
<td>10 days</td>
</tr>
</tbody>
</table>

^1: If bacteriuria is present.

^2: 3 times daily.

Note: Antibiotics are prescribed for a minimum of 5 days unless otherwise specified.
COMMUNITY ACQUIRED PNEUMONIA PATHWAY
Link consultant: Dr. Emma Holden
Refer to section full Antibiotic Guidelines on PIMS

Signs and symptoms consistent with an acute lower respiratory tract infection
AND CXR shows new airspace shadowing \( \Rightarrow \) SUSPECT PNEUMONIA

Assess BP, HR, RR, oxygen saturations

Carry out oxygen assessment: titrate to maintain \( O_2 \) sats 94-98% (Pa \( O_2 \geq 8 \) kPA) except in patients at risk of hypercapnia (aim \( O_2 \) sats 88-92%)

CXR and bloods to be done within 2 hours of admission
FBC, U&E, LFT, CRP, sputum culture, blood culture if temp>38°C
Pneumococcal and legionella antigens if CURB65 > 2* (Consider mycoplasma in the young)

Review results and confirm diagnosis, do CURB65* scoring for severity
Use your clinical judgement. Admit and seek senior help if you have any clinical concerns

SEVERE SEPSIS – use SEPSIS BUNDLE. IV antibiotics within 1 HOUR of admission
All others – Antibiotics must be administered within 4 HOURS of admission

MILD 0-1 point
No adverse features

TREAT AT HOME if
• Oral antibiotic appropriate
• No clinical concern

MODERATE – 2 points

Use clinical judgement
Amoxicillin 500mg – 1g po tds + Clarithromycin po 500mg bd - 5/7
True penicillin allergy
Doxycycline

SEVERE 3-5 points

GIVE IV ANTIBIOTICS within 1 HOUR of admission

CONSIDER ITU REVIEW if:
• Persistent hypoxia Pa \( O_2 \) < 8kPa despite high flow oxygen
• Progressive hypercapnia
• pH < 7.3
• Shock BP < 90/60
• UO < 30 mls/hr.
• GCS ≤ 8

*CURB65 severity scoring
• New CONFUSION
• New UREA > 7 mmol/l
• RR ≥ 30/min
• BP ≤ 90/60
• Age ≥ 65

Additional adverse prognostic features:
• Co-existing chronic illness
• Bilateral or multilobar changes on CXR
• Pleural effusion

FOLLOW UP
D/C letter to GP
• GP to repeat CXR in 6/52 if < 50 years old and non-smoker
• Chest clinic FU 6/52 if > 50 yrs or smoker
• Influenza/pneumococcal vaccine for those at risk

ZONE TO RESPIRATORY WARD
Change to oral antibiotics at 48 hours or when clinically improved. Use clinical judgement and:
• Apyrexial for > 24 hours
• BP > 90/60; RR < 24bpm; HR < 100bpm
• Able to take oral antibiotics

If NO clinical improvement >48hrs:
• Repeat CXR (empyema?), FBC, CRP
• Check culture and antigen results
• Discuss with Respiratory bleep 402/422 and/or Microbiology

Consider discharge when apyrexial and stable on oral antibiotics > 24 hrs. Follow-up as above

Link to British lung foundation information leaflet- Pneumonia
**NEUTROPENIA: MANAGEMENT OF NEUTROPENIC FEVER**

Link consultant: Dr Sneha Patel  
Pharmacist: Agnieszka Fryer

Neutropenic sepsis is a serious haematological emergency: the patient must be assessed with a full history, examination and appropriate investigation profile within one hour of presentation. It is essential to inform the duty Haematologist (via switchboard) of all cases of neutropenic sepsis. From 0900 - 1700 on weekdays, inform the haematology SHO/specialist trainee (bleep 542) for haematology patients and Acute Oncology (bleep 086) for solid tumour patients.

**NEUTROPENIC FEVER:**

Patients: Any patient with neutrophils <0.5x10^9/L. *Note: this guideline also refers to patients with normal neutrophil counts but who are known to have neutrophil dysfunction (i.e. myelodysplasia)*

Fever: a single temperature ≥38°C. *Note: some patients may be non-specifically unwell with hypotension, nausea and rigors, but without a fever.*

**RAPID ASSESSMENT:**
- Examine the patient for focal signs of infection and septicaemic shock
- Take blood cultures from a peripheral vein and from the central venous access device (CVAD), if it is present.
- Culture other relevant sites i.e. urine, sputum, throat and skin swabs, including CVAD exit site (if present)
- A chest Xray is not required unless clinically indicated
- Inform duty Haematologist or Bleep 542/086 within 24 hrs of patient’s admission

**START EMPIRICAL ANTIBIOTICS WITHOUT DELAY (within 1 hour):**

**FIRST LINE ANTIBIOTICS**

**Piperacillin-Tazobactam (Tazocin)** 4.5g IV QDS
- **Patients with penicillin allergy:** start with the second line antibiotic regimen.
- **Glycopeptides (Teicoplanin / Vancomycin)** should not be added empirically if the patient has an indwelling line. However, this should be considered in the following circumstances: evidence of infection at exit site (eg pain or pus present), rigors when line is used or flushed.
- **Gentamicin** should not be added empirically but should be considered if evidence of severe sepsis (for dose see once daily gentamycin policy and online gentamicin calculator)
- **If the patient is taking prophylactic Ciprofloxacin, then stop**

Tazocin (Piperacillin- Tazobactam) contains penicillin

The antibiotic regimen may be adjusted once microbiological results are available. If the fever settles and patient is well but still neutropenic, stop antibiotics after 5 days and re-start Ciprofloxacin.
SECOND LINE ANTIBIOTICS (or if the patient is penicillin allergic)
If no response to first line antibiotics after 3 days **Meropenem** 1g IV TDS (approximately 1-2% of penicillin allergic patients may exhibit cross-reactivity to **Meropenem**). Glycopeptides (Teicoplanin / Vancomycin) should not be added empirically if the patient has an indwelling line. However, this should be considered in the following circumstances: evidence of infection at exit site (e.g. pain or pus present), and/or rigors when the line is used or flushed.

THIRD LINE ANTIBIOTICS
In the event of continuous fever by 5 days of treatment with antibiotics, fungal infection should be suspected and the patient should be commenced on AmBisome (liposomal amphotericin) 3mg/kg after discussion with a Consultant microbiologist or haematologist. A high resolution CT scan of the chest (HRCT) should be considered to rule out fungal chest infection. If the patient responds to amphotericin or if a fungal infection is proven then discuss the duration with a Consultant microbiologist or haematologist. **Antifungal Guidelines** are available on the hospital intranet Policies Information Management System (PIMS).

Continue to treat and monitor as follows:

**Intravenous fluids:** Ensure the patient is adequately hydrated to avoid the risk of intravascular fluid depletion and renal impairment.

**Therapeutic drug monitoring:** Check trough levels of **Gentamicin** and **Vancomycin** regularly and adjust dose to achieve a therapeutic, non-toxic level (refer to Trust **Antibiotic Guidelines** for guidance on the use of these antibiotics).

**Renal function:** Monitor serum creatinine and urea whilst patient is on IV antibiotics. Doses of IV antibiotics and other drugs should be adjusted if necessary.

**Electrolyte monitoring:** Patients on aminoglycosides and especially on intravenous amphotericin can lose large amounts of potassium, which must be replaced intravenously. Monitor serum potassium daily. Serum magnesium may also fall and lead to seizures. Monitor magnesium levels at least twice per week and correct as necessary. See section on Electrolyte disturbance: **Magnesium**.

**Review of Sepsis:**
- Daily FBC
- C-reactive protein (CRP) should be done on alternate days
- Repeat blood cultures prior to change in antibiotics or check other cultures if clinical review reveals a possible site of infection
- Consider screening for non-bacterial infections including blood, sputum and urine for fungal infections and serum and/or buffy coat for viral infections
- PCR can be arranged for some infections – discuss with microbiology
- Patients with respiratory infection may need bronchoscopy
Patients who are haemodynamically unstable should be considered for granulocyte-colony stimulating factor, G-CSF (Filgrastim 30 million units sc daily) to abort the period of neutropenia and hasten clinical recovery. When considering the use of G-CSF in severely neutropenic patients, always ask the advice of the Haematology Consultant on call or Acute Oncology Team and contact the ward pharmacist.

**PROPHYLAXIS:** Given only for long periods of neutropenia (less than 0.5x10⁹/L for more than seven days) and/or high risk immune-compromised patients

1. **Oral Ciprofloxacin** Start 500mg BD when neutrophils fall < 0.5 x 10⁹/L. Stop when neutrophils >0.5 x 10⁹/L and if IV antibiotics are initiated.

2. **Antifungals** (discuss with microbiology if the patient has had a previous documented fungal infection)
   - **First line:** Start **Itraconazole suspension** (10mg/ml) dose 2.5 mg/kg PO bd on an empty stomach during neutropenia (0.5 x 10⁹/L) or if yeasts grown from oral flora earlier.
   - **2nd line:** **Posaconazole** loading dose of 300 mg (three 100 mg tablets) twice a day on the first day, then 300 mg (three 100 mg tablets) once a day thereafter e.g. if Itraconazole alters chemotherapy dose via LFT changes.

3. **Corsodyl (Chlorhexidine) mouthwash** Start 10mls QDS when neutrophils fall < 1.0 x 10⁹/L (earlier if clinically indicated). Stop when neutrophils >1.0 x 10⁹/L. Patients should be given their own supply so they can self-medicate.

**SUPPORTIVE CARE:** Neutropenic patients should be nursed in protective isolation in a side room.

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**VASCULAR ACCESS SERVICE for insertion of Intravenous Devices**

Link consultant: Alison Curtis  
Link pharmacist: Roshni Thoppil

<table>
<thead>
<tr>
<th>Line / Device</th>
<th>Duration required</th>
<th>Used for</th>
<th>If not in use flush</th>
<th>Dressings changed</th>
<th>Inserted by</th>
</tr>
</thead>
</table>
| **Peripheral Line** | Short, < 2 weeks | • Infusion of fluids  
• Non-vesicant medications  
• Blood products | Every 24 hrs | Once per week | Carried out on ward by ward team |
| **CVC (Central Venous Catheter) or CVP (Central Venous Pressure)** | Short, up to 7 – 10 days. Re-site when clinically indicated and not routinely (Epic 3, 2014). | • Large volume fluids  
• Vesicant medications, including TPN  
• Monitoring CV physiology | Every 12 hrs | Once per week | Anaesthetists in theatre, book on theatre list and CRS |
| **Midline** | Short, 1 – 4 weeks | Fluids and long term non-vesicant medications | Twice weekly | Once per week | |
| **PICC (Peripherally Inserted Central Catheter)** | Medium, 4 weeks to 6 months | Vesicant medications including TPN | Twice weekly | Once per week | |
| **Tunneled line e.g Hickman** | Long – months to years | Vesicant medications including TPN | Twice weekly | Clean incision site and re-dress at 24 hrs. Inspect daily and assess using Visual Infusion Phlebitis (VIP) score | Radiologists in Radiology, book on CRS under conventional radiology procedure |
| **TIVD (Totally Implanted Venous Device) e.g Portacath** | Long, months to years | Vesicant medications | Twice weekly | N/A | General Surgeon in DSU, fax referral form to surgeon as in guidelines on PIMS |

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For full guidelines, please refer to [Guidelines into the Selection, Care and Management of Intravenous (IV) Devices policy](#) on PIMS
ACUTE CORONARY SYNDROMES
Link consultant: Dr Roy Jogiya, Pharmacist: Catrin Thomas

Patients with acute symptoms suggestive of myocardial ischaemia should be assessed urgently and an immediate 12 lead ECG recorded. If the ECG meets criteria for ST elevation ACS or high risk non-ST elevation ACS (NSTEMI-ACS), treat as below.

If the ECG is initially non-diagnostic, repeat the ECG, start ACS treatment if there is a high suspicion of ischaemic heart disease, and measure troponin.

IMMEDIATE TREATMENT OF ACUTE CORONARY SYNDROMES

Oxygen
Give to all patients with hypoxia (SpO2 <95%), breathlessness or acute pulmonary oedema.

Aspirin
Give a loading dose of soluble aspirin 300mg (chewed orally) immediately, followed by 75mg od for all patients. If allergic or intolerant to aspirin, give a loading dose of ticagrelor or clopidogrel only.

P2Y12 Inhibitor
Give a loading dose of ticagrelor 180mg immediately for STEMI or high risk NSTEMI-ACS. A loading dose of ticagrelor may be given to those who have already been pretreated with clopidogrel. Follow with ticagrelor 90mg bd maintenance.

In patients on oral anticoagulation, those with previous haemorrhagic stroke, who are frail or otherwise at high risk of bleeding, or where the diagnosis is uncertain: give a loading dose of clopidogrel 300mg, followed by 75mg od maintenance.

Analgesia
Morphine 2.5-5mg IV with antiemetic e.g metoclopramide 10mg IV. Do not give by intramuscular injection (avoid all IM injection).

MANAGEMENT OF ST-ELEVATION ACS (STEMI)

Act urgently and seek senior advice (ED or Medical/Cardiology Registrar) early. Target delay from first medical contact to reperfusion therapy is ≤ 60 minutes. Does your patient meet the following criteria?

• Cardiac chest pain: ongoing typical cardiac chest pain lasting >15 minutes.
• ECG criteria for STEMI
  – ST elevation ≥2mm in 2 contiguous chest leads OR
  – ST elevation ≥1mm in 2 adjacent limb leads in the absence of LV hypertrophy or left bundle branch block.
• Consent: the patient can give informed consent.
If the patient meets ALL of the above criteria, arrange immediate transfer to St George’s Hospital.

1. Contact LAS on 0207 827 4555 or 999 and request a critical transfer to St George’s Hospital cardiac catheter lab for primary angioplasty.
2. Give initial treatment for ACS.
3. Contact Cardiology Registrar at St George’s Hospital (0208 672 1255 or direct dial on #6139) to inform of transfer but do not delay whilst awaiting an answer.

If these criteria are not met, in new or presumed new LBBB, or where the diagnosis is uncertain, discuss with the Cardiology Registrar on-call at St George’s Hospital and fax ECGs to St Georges CCU (0208 725 0294).

Other patients that should be discussed with St George’s Hospital urgently that may not meet classical STEMI criteria include those in cardiogenic shock, suspected posterior infarction (ST depression >1mm in leads V1-V4) and high lateral wall infarction (ST elevation in aVL with reciprocal depression in lead III).

**MANAGEMENT OF NON ST-ELEVATION ACS (NSTE-ACS)**

A rise in cardiac troponin is suggestive of NSTEMI and the majority of these patients will require inpatient angiography. Those with a negative troponin are generally low risk, but may warrant inpatient angiography in certain cases, for example those with recurrent symptoms, recent infarction, previous coronary intervention, or known ischaemia on non-invasive testing.

Best practice is to aim for immediate angiography (<2hrs) for very high risk NSTEMI patients and early angiography (<24hrs) for all other NSTEMI patients. Practically, current capacity for angiography means that most patients will be admitted to Kingston for several days whilst awaiting transfer to St George’s, or awaiting diagnostic angiography at Kingston.

Very high-risk patients should be discussed with the Cardiology Registrar on-call at St George’s Hospital and the ECGs faxed to St Georges CCU (0208 725 0294). Patients that are not accepted for immediate transfer must be added to the Inter-Hospital Transfer List (IHT).

**Very high-risk patients** are identified by:
- Chest pain refractory to medical therapy **OR**
- ST depression >1mm or T wave inversion >2mm in 2 or more adjacent leads **OR**
- Recurrent ST changes, intermittent ST elevation, or life-threatening arrhythmia **OR**
- Haemodynamic instability or cardiogenic shock **OR**
- Acute heart failure **OR**
- Initial troponin >400ng/L

If accepted for immediate transfer:
1. Contact LAS on 0207 827 4555 or 999 and request immediate transfer to St George’s Hospital for treatment of non ST-elevation MI.
2. Give initial treatment for ACS, including ticagrelor if not already given. If ticagrelor is contraindicated, give a loading dose of clopidogrel 600mg.
Check troponin, HbA1c and lipids on admission in all patients. If presenting at less than 6 hours after the onset of pain or the initial troponin is elevated, repeat the troponin after 3 hours.

**NSTEMI is excluded by:**
- Single negative troponin (< 14ng/L) at > 6 hours after the onset of pain.
- Two negative troponins 3 hours apart.
- An initial negative troponin with a rise of ≤ 7ng/L at 3 hours.
- An initial positive troponin with a rise or fall of ≤ 20% at 3 hours.

Dynamic troponin elevation alone is not diagnostic for NSTEMI in the absence of a suggestive history, or changes on ECG or cardiac imaging.

In cases where the diagnosis is uncertain, serial troponins may be helpful. Elevated troponin levels may be found in normal individuals. Alternative causes for raised troponin other than MI include:
- Cardiac causes: Tachyarrhythmia, heart failure, hypertensive emergencies, myocarditis, Tako-Tsubso cardiomyopathy, structural heart disease (e.g. aortic stenosis), coronary spasm.
- Non-cardiac causes: aortic dissection, pulmonary embolism, pulmonary hypertension, renal disease, stroke and subarachnoid haemorrhage, rhabdomyolysis.

Admit the patient to a monitored bed. For patients without high risk factors for arrhythmia, ≤ 24hrs monitoring is generally sufficient. Risk factors for arrhythmia include: hemodynamically instability, major arrhythmia on presentation, LVEF <40% or known critical coronary artery disease.

**Further management of patient with Non-ST Elevation ACS (STE-ACS)**
In addition to the immediate treatment above:

**Anticoagulant**
Give fondaparinux 2.5mg subcutaneously OD and continue for up to 8 days, angiography, or discharge, whichever is sooner, unless the patient has been accepted by St George’s Hospital for immediate angiography. In patients already on oral anticoagulants, do not give fondaparinux unless on warfarin with INR <2.

If CrCl is <20ml/min, give 5000units unfractionated heparin IV injection as a bolus, followed by a heparin infusion. Aim for a target APTT ratio 1.5-2.5 (see guidelines for heparin infusion).

**Glyceryl trinitrate**
Give 2 puffs sublingual GTN. Follow this with an infusion if persistent pain, starting at 1mg/hr and doubling the infusion rate every 15 minutes until pain free and SBP maintained at >100mmHg.

**Glucose control**
Patients with or without a history of diabetes mellitus with a blood glucose > 11.0 mmol should be commenced on a variable rate insulin infusion (stop all existing oral anti-diabetic medication), and advice sought from the diabetes specialist nurse or
endocrinology registrar. Hypoglycaemia is associated with poor outcomes and should be strictly avoided.

LONG TERM MANAGEMENT OF ACS
Calculate and document the GRACE score (gracescore.org). Request inpatient echocardiography for all patients. Start treatment before discharge from hospital and remember that drug doses are unlikely to be up titrated by the patient’s GP.

Lifestyle modification
Advise to stop smoking and refer to smoking cessation. Diet and alcohol advice should be given and a referral to cardiac rehabilitation considered.

Antiplatelets
Aspirin 75mg od should be continued lifelong. Dual antiplatelet therapy with aspirin and ticagrelor, or aspirin and clopidogrel should be continued for 1 year, or longer on the recommendation of cardiology. Give with gastric protection for those at high risk of bleeding.

Proton pump inhibitors(PPI) may interfere with the action of clopidogrel. If possible, use ranitidine 300mg bd instead of a PPI. If concomitant use of a PPI is essential (e.g. for the treatment of gastric ulcer), avoid omeprazole and use alternative PPIs such as lansoprazole. Consult cardiology for antiplatelet recommendations in those who also have an indication for oral anticoagulation.

Beta-blockers
Consider starting Bisoprolol 1.25mg to 2.5mg od. Start early at diagnosis to target a heart rate <70 and SBP >90mmHg, and continue lifelong in those at high risk. Titrate up to a target dose of 10mg od. Avoid in those with severe bronchospasm, marked first degree heart block (>0.3 sec), severe bradycardia and pulmonary oedema.

ACE inhibitors
Ramipril 2.5mg od is a reasonable starting dose. Aim to titrate up to 10mg od (over 4-6 weeks). An angiotensin receptor blocker (Candesartan 8mg od) may be useful for patients who are unable to tolerate more than 2 ACE inhibitors due to side effects such as a persistent dry cough for longer than 3 months. Start early at diagnosis and continue lifelong. Monitor renal function and avoid hypotension.

Statins
Atorvastatin 80mg od should be started as soon as possible after diagnosis. The dose may need to be reduced in the event of intolerance, or in patients on interacting drugs eg. Erythromycin, clarithromycin, diltiazem, ciclosporin, or itraconazole. Seek pharmacist advice.

Consider common causes of dyslipidaemia e.g. excess alcohol, hypothyroidism, poor glycaemic control, liver disease and nephrotic syndrome. Seek cardiology advice in cases of potential familial hypercholesterolaemia (TC >7.5mmol/L with a family history of premature IHD OR TC >9.0mmol/L or non-HDL >7.5mmol/L even in the absence of family history), or if TG >10mmol/L that is not due to alcohol excess or poor glycaemic control.
Aldosterone antagonists
Following STEMI, eplerenone 25mg od should be started between 3 and 14 days after diagnosis and increased to 50mg after 4 weeks in those with impaired LV function (<40%) in the presence of heart failure or diabetes.

ANGINA MANAGEMENT
There will be a group of patients in whom due to co-morbidities, unfavourable coronary anatomy, who are low risk and troponin negative, or at their own choice do not undergo angiography. They should receive the same medical therapy as for invasively managed patients. Bear in mind that doses of medical therapy may have to be adjusted in this group of often frail patients, to prevent side effects.

1st line: Beta-blocker or rate limiting calcium channel blocker
Consider stating Bisoprolol 1.25mg to 2.5mg od. Target a heart rate <70 and SBP >90mmHg. Avoid in those with severe bronchospasm, marked first degree heart block (>0.3 sec), severe bradycardia and pulmonary oedema.

In patients with contraindications to beta blockers, diltiazem (Tildiem LA) 200mg od is an alternative. It is mildly negatively inotropic and should be avoided in heart failure.

2nd line: Calcium channel blocker
Amlodipine 5mg od increased to 10mg od, avoiding hypotension. This may be combined with beta blockade.

3rd line: Oral nitrates
Isosorbide mononitrate M/R 30mg od increased to 60mg od after several days (up to 120mg daily). Avoid in hypotension and severe aortic stenosis

4th line: Potassium channel activator (Noricandil)
Noricandil 10mg bd increased to 30mg bd. Avoid in hypotension and heart failure.

5th line: If channel inhibitor (Ivabradine) and Ranolazine
Discuss with cardiology. Ivabradine 5mg bd increased to 7.5mg bd can be used in those intolerant to, or in combination with beta-blockers provided the patient’s heart rate is >70bpm. It cannot be combined with rate limiting calcium channel blockers. Ranolazine 375mg bd can increased up to 750mg bd with caution in those with long QTc and avoided in those with liver cirrhosis.
CARDIAC FAILURE AFTER ACUTE MYOCARDIAL INFARCTION
Link consultant: Dr Tapesh Pakrashi

Some patients develop pulmonary oedema following myocardial infarction. The vast majority of patients with STEMI will undergo primary PCI. However, many patients with NSTEMI will develop heart failure. Although this usually responds to intravenous diuretic therapy, intravenous glyceryl trinitrate (GTN), oxygen, and morphine, some patients need additional therapy. Invasive monitoring and urgent echocardiography may be required in order to optimise LV filling pressures prior to additional measures (inotropic support/afterload reduction). It is also important to monitor urine output and maintain this at or above 30ml/hour. Early referral to the Critical Care Outreach Team and the cardiologists is mandatory. The patient may require consideration for urgent revascularisation and/or invasive circulatory support such as an intra-aortic balloon pump.

CARDIODEMIC SHOCK
Link consultant: Dr Tapesh Pakrashi

The management of low output states and shock presents a difficult problem. The prognosis is poor. It is imperative that advice be sought as soon as possible about ways of supporting the circulation and providing definitive treatment. Early referral to the Critical Care Outreach Team (bleep 868 or 869) is essential.

Management includes optimising preload (using central monitoring), supporting the heart with inotropes (dobutamine 2-20 micrograms/kg/min, dopamine 2-5 micrograms/kg/min), and reducing afterload (with IV glyceryl trinitrate or sodium nitroprusside) and instituting other general measures (oxygen, correcting acidosis). In some cases the use of an intra-aortic balloon pump may be beneficial; discuss with the cardiology team.

In the majority of patients cardiogenic shock post-MI results from extensive LV damage. However, some are secondary to a mechanical complication (VSD or MR) or RV infarction. Echocardiography should identify the cause.
DISORDERS OF CARDIAC RHYTHM
Link consultant: Dr. Arvind Vasudeva

1. SINUS BRADYCARDIA
This requires no treatment unless it is causing symptoms. If treatment is deemed necessary, give atropine 600-1200 micrograms IV in the first instance. Persistent symptomatic bradycardia requires pacing (temporary or permanent). If temporary pacing is required, transvenous pacing under X-ray control is optimal.

2. ATRIOVENTRICULAR BLOCK
First and second-degree block found incidentally do not usually need emergency treatment but further investigation is often necessary. After acute MI, patients with second degree block will need pacing if the block is impairing cardiac function.

Complete (third degree) AV block requires careful evaluation. Patients with symptomatic block usually require immediate pacing even if symptoms have resolved upon arrival. This is preferably achieved by prompt implantation of a permanent pacing system. Complete AV block associated with inferior myocardial ischaemia is usually transient but will require pacing if the heart rate remains slow. When associated with anterior infarction temporary pacing is always indicated regardless of presence or absence of symptoms. Patients with acute bifascicular block following acute myocardial infarction should be considered for temporary pacing particularly if the PR interval is increased or increasing. Temporary pacing can be achieved rapidly by a balloon flotation wire but is rarely needed.

1. SUPRAVENTRICULAR TACHYCARDIA (ATRIAL FIBRILLATION)

The commonest types are:

a) atrial fibrillation, atrial flutter and atrial tachycardia
b) junctional tachycardia (AV nodal and atrioventricular)

Refer to NICE guidance for the management of atrial fibrillation

Obtain a 12-lead ECG in all cases. Paroxysmal arrhythmias should be terminated and preventive treatment started. Chronic arrhythmias which cannot be terminated should be slowed.

AF of recent onset (≤ 24 hours) can be terminated using IV flecainide (1-2mg/kg over 10 min, maximum dose 150mg). Avoid flecainide (oral or IV) in patients with, or at risk of, cardiac failure or dysfunction, and in patients with, or at risk of, ischaemic heart disease. In cardiovascularily unstable patients, acute cardioversion is appropriate (ideally after transoesophageal echo to exclude left atrial thrombus).

Stable and/or chronic AF, flutter and atrial tachycardia can be treated with digoxin or other AV nodal blocking drugs (diltiazem, beta-blockers):
- Digoxin: loading dose 500 micrograms PO, 2nd dose 500 micrograms PO given 6 to 8 hours later, followed by 3rd dose of 250 micrograms PO 6 to 8 hours later
- Bisoprolol: 2.5 to 5 mg PO. Repeated doses can be given if the systolic blood pressure remains over 100mmHg, to a maximum dose of 10 mg PO
- Diltiazem slow release 60 – 90 mg PO. Repeated doses can be given if the systolic blood pressure remains over 100 mmHg, to a maximum dose of 180 mg.
Junctional tachycardias are most effectively terminated with IV adenosine. Give an initial 6mg dose over 2 secs. (Heart transplant patients are very sensitive to the 6 mg dose and so should be given 3 mg initially). If no effect is seen within 1 minute, give a second injection of 12 mg. Further doses are not recommended. Remember, adenosine should not be given to patients with asthma or severe obstructive airways disease. If the patient is refractory to drugs seek advice.

Patients in AF should be considered for anticoagulation as they are at risk of embolic stroke. The CHA₂DS₂-VASc score is the recommended assessment tool. Use the HAS-BLED score to assess risk of bleeding in those starting/on anticoagulation. Document the decision in the notes and discharge plan. Consideration should also be given to elective cardioversion (see below).

<table>
<thead>
<tr>
<th>CHA₂DS₂-VASc score</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congestive heart failure or left ventricular dysfunction</td>
<td>1</td>
</tr>
<tr>
<td>Hypertension</td>
<td>1</td>
</tr>
<tr>
<td>Age ≥ 75</td>
<td>2</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>1</td>
</tr>
<tr>
<td>Stroke, TIA, or systemic thromboembolism</td>
<td>2</td>
</tr>
<tr>
<td>Vascular disease: MI, peripheral vascular disease, aortic plaque</td>
<td>1</td>
</tr>
<tr>
<td>Age 65 – 74 years</td>
<td>1</td>
</tr>
<tr>
<td>Female sex (sex category)</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HAS-BLED bleeding risk score</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>1</td>
</tr>
<tr>
<td>Abnormal renal or liver function (1 point each)</td>
<td>1 or 2</td>
</tr>
<tr>
<td>Stroke</td>
<td>1</td>
</tr>
<tr>
<td>Bleeding</td>
<td>1</td>
</tr>
<tr>
<td>Labile INR</td>
<td>1</td>
</tr>
<tr>
<td>Elderly (&gt; 65 years old)</td>
<td>1</td>
</tr>
<tr>
<td>Drugs or alcohol (1 point each)</td>
<td>1 or 2</td>
</tr>
<tr>
<td>Maximum score</td>
<td>9</td>
</tr>
</tbody>
</table>

People at very low risk, who should not receive anticoagulation, should be identified first, with anticoagulation considered or offered to the remainder, taking bleeding risk into account. Do not offer stroke prevention treatment to people < 65 with AF and no risk factors other than sex (CHA₂DS₂-VASc = 0 for men or 1 for women). For most other people in AF, benefit of anticoagulation outweighs risk of bleeding. For those at increased risk of bleeding, careful consideration and monitoring of bleeding risk is important. Do not withhold anticoagulation soley because the person is at risk of having a fall. A HAS-BLED score of ≥3 indicates that caution is warranted when prescribing oral anticoagulation and regular review is recommended.²

**Atrial Fibrillation and dalteparin**

- For acute AF: start warfarin treatment as normal. Dalteparin cover is not required unless other risk factors are present (e.g. suspected acute coronary syndrome). Refer to consultant haematologist for advice if necessary.
- For AF patients requiring cardioversion: give full therapeutic dose of dalteparin as for DVT/PE treatment, then anticoagulate with warfarin.
**Direct oral anticoagulants (DOACs)**

These drugs have been licensed for stroke prevention in atrial fibrillation and have a more predictable anticoagulant effect; they do not require regular monitoring of INR. They can only be prescribed on the advice of a consultant.

- Dabigatran, a direct thrombin inhibitor - 110mg or 150mg bd.
  - Rivaroxaban, a factor Xa inhibitor - 15mg or 20mg od
  - Apixaban - 2.5mg or 5mg bd
  - Edoxaban – 30 or 60mg od.

They are also licensed for the treatment of VTE and prevention of recurrent DVT and PE in adults.

**CARDIOVERSION**

This is a nurse led service. Day cases are undertaken bi-weekly on Wednesday afternoons in the Day Surgery Unit (DSU). Anticoagulate patients at the time of referral for cardioversion. A recent echocardiogram is also required. Patients will be given a date for cardioversion when their INR level has become therapeutic (INR 2.5 – 3.5, target INR 3), and will need a minimum of three consecutive weeks of therapeutic INR results prior to cardioversion. All patients will be pre-assessed by the Arrhythmia nurse. Post procedure, anti-coagulation is continued for a minimum of 4 weeks, with weekly INR monitoring. Afterwards, the decision to discontinue warfarin is based on the CHA2DS2-VASC score and clinical assessment. Please highlight patients who have a BMI > 35, unstable diabetes, or airways disease.

**4. VENTRICULAR TACHYCARDIA**

This is very common and may present with a wide range of symptoms from moderate discomfort (haemodynamically stable tachycardia) to profound collapse or arrest (haemodynamically unstable tachycardia). Do not be misled into thinking that stability excludes a diagnosis of VT! The commonest causes include acute infarction/ischaemia and chronic left ventricular scarring after infarction.

First get the diagnosis correct by examining the 12 lead ECG. If this cannot be obtained because of collapse, urgent DC shock is required – otherwise record the ECG. Most instances of VT can be correctly diagnosed but, if in doubt, treat broad complex tachycardia as VT. Features of VT include:

- wide QRS complexes (more than 0.14 sec or 3.5 small squares);
- AV dissociation sometimes with capture and fusion beats;
- a leftward axis shift compared to sinus rhythm;
- any previous history of IHD (MI, PTCA, CABG).

Therapy depends on the clinical situation. Remember to check electrolyte levels. If the patient is hypotensive, in cardiac failure or has ischaemia, cardioversion should be performed. If stable, consider using amiodarone: loading dose 300 mg IV in 250 mls glucose 5% over 60 minutes, then 900 mg in 500 mls glucose 5% over 24 hours. The co-administration of magnesium, initial dose 8 mmol (4 ml of 50%) may help when the arrhythmia is refractory.

Do not give more than one additional drug – polypharmacy can be dangerous. If drug therapy fails, or the patient has poor cardiac function, direct current cardioversion (200-360J) under sedation is the best therapy (if help is needed, contact the cardiac registrar for advice). Whatever method used, full facilities for resuscitation must be available. Further specialist cardiological assessment is mandatory in all cases.

**5. VENTRICULAR FIBRILLATION** (see Cardiac Arrest section).
6. **VENTRICULAR ECTOPIC BEATS**
These are ubiquitous and do not require treatment unless they are causing symptoms such as palpitations or dizziness, when the patient should be referred for investigation and management.

7. **ASYSTOLE** (see Cardiac Arrest section).

**HEART FAILURE**

Link consultant: Dr Tapesh Pakrashi

Heart failure is a major cause of mortality and morbidity, especially in the elderly population. The diagnosis is not always straightforward, and requires a transthoracic echocardiogram, particularly to look for treatable causes (e.g. valvular heart disease) and to help distinguish between Heart Failure with Reduced Ejection Fraction (HF-REF) and Heart Failure with Preserved Ejection Fraction (HF-PEF). It is always worth considering whether angiography is indicated (particularly in younger patients who might benefit from revascularisation).

Diagnosis and risk stratification of Heart Failure is aided by natriuretic peptide (BNP & NT-Pro BNP).

**Cut-Offs For Peptides (At Kingston, NT-pro BNP is measured):**

- **Normal** (NT-proBNP < 400 ng/L and BNP < 100 pg/ml)
- **Indeterminate** (NT-proBNP 400 – 2000 ng/L and BNP 100 - 400 pg/ml)
- **Clearly elevated** (NT-proBNP ≥ 2000 ng/L and BNP ≥ 400 pg/ml)

**MANAGEMENT OF ACUTE HEART FAILURE:**
Following initial clinical assessment, the following factors should be considered:
1. Is ventilation/systemic oxygenation adequate?
2. Is there evidence of a life-threatening arrhythmia/bradycardia?
3. Is there hypotension or shock?
4. Is there evidence of Acute Coronary Syndrome (ACS)?
5. Is there severe valvular disease or evidence of an acute mechanical cause?

- Initial therapy consists of oxygenation and intravenous diuretic therapy. Patients with severe heart failure, and those with low cardiac output, are treated much as those with cardiogenic shock.

- Subsequent management should address any treatable causes (arrhythmia, valve pathology, ischaemia, etc.). A number of therapies have been shown to have a beneficial impact on survival in heart failure patients, but they do require caution and careful patient monitoring.

**CHRONIC HEART FAILURE: PHARMACOLOGICAL TREATMENTS**

**Non-Prognostic Therapy**
- **Loop diuretics**: important for symptom control for pulmonary or peripheral oedema, e.g. Furosemide 20-80 mg daily, Bumetanide 1-2 mg daily

- **Thiazide diuretics**: Potent diuretic which may be added to loop diuretic for treatment of resistant oedema (e.g. Metolazone 2.5 mg) – **seek specialist advice.**
Prognostic Therapy

- **ACE inhibitors (ACEI):** important survival benefit. Prescribe ramipril 1.25mg bd or lisinopril 2.5 mg od. It is important that the patient is carefully titrated up to the maximum tolerated target dose (i.e. ramipril 5mg bd or lisinopril 35mg od). Monitor renal function, initially 3 and 7 days after initiation, and then weekly after each dose increase.

- **Angiotensin II receptor antagonists (ARB):** Alternative therapy if there are intolerable side effects to ACE inhibitors. Prescribe candesartan 4mg od and titrate up to target maximum dose of 32mg od. Titrate the dose upwards by doubling the dose at intervals of not less than 2 weeks.

**Contraindications for initiation for ACEI and ARB:**
1. Creatinine > 200umol/L (Use with caution if creatinine 150-200umol/L)
2. Potassium > 5.2 mmols (seek specialist advice)
3. Systolic BP < 90 mmHg

- **Beta blockers:** major impact on survival. Initiate at a low dose and titrate upwards carefully. Prescribe Bisoprolol 1.25 mg od and increase slowly to a maximum tolerated dose, aiming for the target dose of 10 mg od. There is also strong evidence for the use of Carvedilol, depending on side effect profile. Beta blockers should be avoided if the patient’s heart rate is < 50bpm. Significant adverse side effects include: bradycardia, 2nd and 3rd degree heart block, hypotension, fatigue and night terrors. They can be used safely for a significant number of COPD patients who have no significant reversibility and stable airways disease; they can be used with caution in stable non-critical PVD. Nebivolol 1.25 mg od titrated to 10 mg od over 6-8 weeks is a 3rd line option (licensed in those >70 years old).

- **Mineralocorticoid Receptor Antagonists (MRA):** significantly improve all cause mortality in heart failure. Monitor renal function and serum potassium before and during treatment. If K⁺ > 5.2 mmol, seek specialist cardiology advice. Prescribe spironolactone or epleronone:
  1. **Spironolactone:** NYHA class II – IV; commence at 12.5mg. Target dose is 25 - 50 mg od for patients who remain moderately symptomatic despite optimal therapy
  2. **Eplerenone:** NYHA class II with LVSD (EF ≤ 30%), or in stable patients with LV dysfunction (EF≤ 40%) and within 3 to 14 days of an acute myocardial infarction, preferably after starting ACE inhibitor therapy. Initiate at 25mg od with target dose of 50mg by 4 weeks.

- **Ivabradine:** can improve prognosis in patient with LVEF ≤ 30% and resting heart rates of ≥ 75bpm in sinus rhythm, despite being on maximum tolerated dose of beta blocker, or if a beta-blocker is contraindicated. Patient also needs to be maximum tolerated dose of ARB or ACEI, and aldosterone antagonist, before considering. Prescribe 2.5mg bd with target dose 7.5mg bd for rate control. Adjust the dose to achieve a heart rate of ≤ 60bpm. Avoid concomitant calcium channel blockers i.e. verapamil and diltiazem.

- **Digoxin:** does have a beneficial effect on morbidity even if patients are in sinus rhythm, and should be started in patients with worsening or severe heart failure despite ACE inhibitor, beta-blocker and diuretic therapy. Prescribe 125mcg od (62.5mcg od in elderly patients).
Other:

- **Sacubitril Valsartan** (Entresto®) is an angiotensin receptor neprilysin inhibitor, including both a neprilysin inhibitor and an angiotensin II receptor blocker. It is recommended as an option for treating symptomatic chronic heart failure patients with NYHA class II to IV symptoms, LVEF fraction of ≤ 35%, and who are already taking a stable dose of ACEI or ARB. To be prescribed by a heart failure specialist with access to a multidisciplinary heart failure team.

- **Device therapy for Systolic HF**: there are strong evidence for device-based therapies e.g. ICD for secondary prophylaxis or Cardiac Resynchronisation Therapy (Biventricular Pacing/CRT–D or P).

Modern heart failure management requires a multi-disciplinary, holistic approach. It is important to ensure that lifestyle factors are addressed and that sleep disordered breathing and iron deficiency are identified and treated.

**CHRONIC HEART FAILURE: NON-PHARMACOLOGICAL STRATEGY**

- **Fluid Balance should be routine in all patients**
  a) Daily weights
  b) Fluid restriction: 1-1.5 L/day, if overloaded; 1.5 – 2 L/day if at dry weight
  c) Awareness of salt intake ( < 6g / teaspoon is recommended in HF) & avoid ‘LoSalt’ alternatives (high Potassium)
  d) Annual flu and pneumococcal vaccination as indicated
  e) Referral for Cardiac Rehabilitation

- **Heart Failure education via Heart Failure Nurse Specialist (HF CNS):**
  a) Explore heart failure diagnosis with patient & family
  b) Explore heart failure disease modifying therapies and optimisation
  c) Empower patient with self-management tools
  d) Identify anxiety / depression
  e) Give patient the BHF ‘Living with Heart Failure’ booklet

**END OF LIFE PLANNING FOR END STAGE HEART FAILURE PATIENTS**

- Decision made by HF specialist team
- Collaborative work with palliative care team for best patient outcome
- **NICE Quality Standards for chronic heart failure in adults** specialist in-hospital, multi-disciplinary management, a personalised discharge plan and urgent MDT follow-up within two weeks of hospital discharge following a hospitalisation for decompensated heart failure.

**REFERRAL TO INPATIENT HEART FAILURE (HF) TEAM:**

**Suspected heart Failure (Dyspnoea & Fluid overload)**

- Clinical assessment: BP/Pulse/O2 sats/ECG/CXR/FBC/U&E/LFTs/CRP/TSH/NT-ProBNP /History of previous heart failure diagnosis or myocardial infarction
- If NT- ProBNP level is between 400 -2000; request echocardiogram and refer for outpatient HF review. Refer to the HF Clinical Nurse Specialist (CNS) for education
- If NT- ProBNP result > 2000 ng/L; request echocardiogram and inpatient HF cardiologist review and refer to HF CNS
- If already known to Heart Failure team (CRS) – contact Heart Failure team (see below)
SEVERE/MALIGNANT HYPERTENSION
Link consultant: Dr. Arvind Vasudeva

Patients with hypertension who need admission and urgent treatment:
- blood pressure is known to have risen rapidly
- severely raised blood pressure (systolic $\geq 220$ and/or diastolic $\geq 120$ mmHg). The situation becomes an emergency if the raised blood pressure is causing acute target organ damage such as retinal haemorrhages or exudates, papilloedema, myocardial infarction or ischaemia, dissecting aneurysm, pulmonary oedema, encephalopathy, seizures, coma or renal failure. The aim of treatment should be to reduce diastolic blood pressure gradually over 24 hours to around 110-115 mmHg. Too rapid a reduction may result in cerebral or myocardial infarction or acute renal failure. Normal blood pressure should be achieved over several days.

**Oral therapy.** In most patients oral therapy is safer, sufficient and preferred. Start with nifedipine (Retard) tablets (10 or 20mg bd to be swallowed) or amlodipine (5 to 10 mg od). Add a β-blocker (atenolol 50mg od) in patients who have ischaemic heart disease or who develop tachycardia.

**IV therapy.** The administration of hypotensive drugs by IV injection is rarely required and carries the risk of severe hypotension. During such treatment patients should be closely monitored, ideally in an ITU setting. The drugs of choice are nitrates, labetalol and, where phaeo-chromocytoma is known or suspected, phentolamine. Nifedipine capsules (5mg) can be used instead of IV therapy, but may cause severe hypotension and tachycardia; they should only be given under close medical supervision.

**Nitrate** are particularly useful in patients in whom hypertension is associated with left ventricular failure. Give IV glyceryl trinitrate (0.6-12 mg/hr). Titrate dose to give a pre-determined diastolic pressure.

**Labetalol** is given either by slow IV injection (maximum rate 50 mg per minute): 20-80mg every 5-10 minutes or as a continuous infusion (2mg/min). Maximum total dose = 200mg. Watch out for severe postural hypotension.

**Phentolamine** is given in doses of 2-5 mg IV over 1min, repeated as necessary every 5-15 mins.

All patients with severe hypertension will need full investigation to assess whether there is a secondary underlying cause (renal artery stenosis, phaeochromocytoma,
primary aldosteronism). Remember that blood pressure can sometimes rise on withdrawal of alcohol or cocaine.

**DIABETIC KETOACIDOSIS/HYPEROSMOLAR STATES**

Link consultant: Dr Matthew Oldfield
Pharmacist: Nisha Gandhi

**DIABETIC KETOACIDOSIS (DKA)**

Total body deficits of water and potassium are large in established diabetic ketoacidosis. The mainstay of treatment is threefold: intravenous insulin, fluids and potassium. This is a serious condition; ask for critical care input and HDU care (especially if any of the following are present: GCS < 12, pH ≤ 7.0, Creatinine > 200, pregnancy, and/or BP < 90mmHg). In patients with reduced consciousness, protect the airway and consider NG tube insertion in order to prevent aspiration.

The management of DKA has changed and now focuses on resolving the ketoacidosis. Insulin infusions, fluid and monitoring recommendations have all changed. READ THIS SECTION CAREFULLY.

Patients with DKA need to be admitted to HDU (High dependency unit) or AAU (Acute admissions unit) and must not be transferred to a general medical or surgical ward until the ketoacidosis has resolved.

1. Consider causes of coma:

   - **Diabetes-related**
     - Hypoglycaemia
     - Hyperosmolar Hyperglycaemic State (HHS) *Previously known as hyperosmolar non-ketotic coma (HONK)*
     - Diabetic ketoacidosis (DKA)
     - Lactic acidosis

   - **Non-diabetes-related**
     - Alcohol
     - Drug toxicity (including overdose)
     - Head injury
     - Stroke
     - Liver failure

2. Establish airway and intravenous access
3. Confirm diagnosis
   a) blood glucose >11mmol/L (laboratory sample only; use grey bottle)
   b) ketonaemia (blood ketone >3mmol/L) or ketonuria (at least 2+)
   c) acidosis (venous pH <7.3, HCO₃⁻ <15mmol/L)
4. Check K⁺ on urgent lab sample and ensure ECG monitor in place
5. Start treatment – see below for recommended regimen

**Treatment regimen for Diabetic Ketoacidosis (DKA)**

a) Rehydrate and replace potassium
Give 1 litre sodium chloride 0.9% over 30 minutes (consider inserting a central venous line if the patient is very unwell, peripherally shut down, or is in cardiac or renal failure)
then give 1 litre sodium chloride 0.9% over 1 hour
then 1 litre sodium chloride 0.9% + 40 mmol/L KCl* over 2 hours
then 1 litre sodium chloride 0.9% + 40 mmol/L KCl* over 4 hours
then 1 litre sodium chloride 0.9% + 40 mmol/L KCl* over 6 hours

This is a suggested fluid regimen and should be adjusted according to the fluid balance and co-morbidities of the patient. Additional fluid resuscitation may be needed to achieve systolic BP over 95 mmHg, then use the regimen above. Excessive fluid resuscitation risks the development of cerebral oedema. If measuring CVP, give 1 litre sodium chloride 0.9% + KCL every hour until CVP is measured at +4 to +10 cm H₂O.

b) *Potassium (KCl)* should usually be added to the 3rd bag of IV fluid unless the patient is anuric/oliguric or has a K+ > 5.5 mmol/l. Give 40 mmol with each litre of fluid. **The maximum infusion rate of K+ is 20 mmol per hour.** If K+ falls below 4 mmol/L increase potassium replacement.

c) **Insulin is now given as a fixed rate infusion (not ‘sliding scale’) and is based solely on body weight.** Estimate weight if necessary.

- Start IV infusion of soluble insulin: Human Actrapid 50 units made up to 50ml with sodium chloride 0.9% in a syringe driver.
- **Start the IV infusion at a rate of 0.1 unit/kg/hour** (e.g. a patient weighing 70 kg requires 0.1x70 units/hour = 7 units/hour, given as 7 ml/hr).
- **If there is delay in starting the infusion give 0.1 unit/kg Actrapid i.m. stat**

**NB:** Continue to prescribe and give long-acting insulin analogues (Lantus, Levemir or Tresiba) at the usual dose and time subcutaneously.

d) **Metabolic treatment targets** (review 1-2 hourly):
- Blood ketones need to reduce by 0.5 mmol/L/hr (if ketones cannot be measured then HCO₃⁻ can be used (need to increase by 3 mmol/L/hr)
- Capillary Blood Glucose (CBG) to fall by at least 3-5 mmol/L/hr until target range achieved
- If the metabolic parameters are not improving at the desired rate (above), then the rate of the insulin infusion needs to be increased by 1 unit/hour. Review hourly and adjust until the ketones are falling at the correct rate. This process is usually only necessary in the initial part of the regimen i.e. before the 10% glucose is started.
- K⁺ to be maintained between 4.0 and 5.0 mmol/L

e) **Monitor blood glucose.** When the CBG drops to below 14 mmol/L start a 10% glucose infusion **in addition** to the sodium chloride 0.9% fluid replacement. Start the 10% glucose infusion at an initial rate of 125 ml/hour (1 L/8 hours). The patient will need a second intravenous access line.

f) **Monitor CBG hourly and adjust the rate of 10% glucose infusion** according to the table below. The adjustments made to the regimen depend upon whether the patient is already on 10% glucose or not. Guidance is also available on the DKA prescription & monitoring fluid chart.
Use this chart ONLY if the patient has NOT YET started 10% glucose

<table>
<thead>
<tr>
<th>Blood Glucose (mmol/L)</th>
<th>Interpretation</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;14 but rate of change of parameters are greater than the guide in Step (d), above</td>
<td>Perfect</td>
<td>Continue current infusion rate. Re-check in one hour. When glucose ( \leq 14 ), start 10% glucose</td>
</tr>
<tr>
<td>&gt;14 but rate of change of parameters less than those in Step (d), above</td>
<td>Insufficient insulin</td>
<td>Check insulin infusion pump. Increase rate of insulin infusion by 1 unit per hour</td>
</tr>
<tr>
<td>14 or less</td>
<td>Time to start 10% glucose</td>
<td>Start 10% glucose. See Step (e) above for details</td>
</tr>
</tbody>
</table>

Once ketones are falling at the correct rate and 10% dextrose has been started, move to guide below:

Use this chart ONLY if the patient has ALREADY STARTED 10% glucose.

<table>
<thead>
<tr>
<th>Blood Glucose (mmol/L)</th>
<th>Interpretation</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;14</td>
<td>High</td>
<td>Check insulin infusion pump. Decrease rate of 10% glucose by 25 mls/hour</td>
</tr>
<tr>
<td>8-14</td>
<td>Perfect</td>
<td>Continue</td>
</tr>
<tr>
<td>5- 7.9</td>
<td>Low</td>
<td>Increase rate of 10% glucose by a further 25 mls/hour</td>
</tr>
<tr>
<td>&lt;5</td>
<td>Too Low</td>
<td>Give boluses of 100mls of 10% glucose until CBG ( \geq 8 ). Check every 15 minutes. Increase rate of 10% glucose infusion by further 50 mls/hour</td>
</tr>
</tbody>
</table>

Do not re-adjust the insulin rate

g) Monitor potassium, and pH every 2-4 hours. **Use venous blood gas for pH** which is reliable and equivalent to ABG value.

h) Monitor U&Es every 12 hours until acidosis is resolved. If not improving at this rate, increase insulin infusion rate by 1 unit/hr each hour until this is achieved.

**Definition of recovery (resolution of acidosis): venous pH >7.3 and blood ketones < 0.3 mmol/L.** If the patient is not eating and drinking, convert the regimen to a Variable Rate Intravenous Insulin Infusion (VRIII) and fluid regimen as below:

**Insulin:** Start a variable rate intravenous insulin infusion (VRIII) of soluble insulin (human Actrapid 50 units made up to 50 ml with sodium chloride 0.9% in a syringe driver) at 6 units per hour. (Note that this VRIII is not the same one used for peri-operative patients.) Adjust the IV insulin infusion according to the following recommended regimen:

<table>
<thead>
<tr>
<th>Blood glucose (mmol/L)</th>
<th>Insulin dose (units/hour)</th>
<th>Maintenance Infusion fluid Usual rate 1L/8 hours Consider K⁺ requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater than 17</td>
<td>6</td>
<td>Sodium chloride 0.9%</td>
</tr>
<tr>
<td>Sodium chloride 0.9%</td>
<td>5% glucose</td>
<td>5% glucose</td>
</tr>
<tr>
<td>----------------------</td>
<td>------------</td>
<td>------------</td>
</tr>
<tr>
<td>10.1 – 17.0</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>7.1-10.0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4.1-7.0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4.0 or lower</td>
<td>0.5</td>
<td></td>
</tr>
</tbody>
</table>

Check patient for signs of hypoglycaemia

Some patients may need more insulin than the suggested regimen. If the blood glucose is not controlled by the above insulin/fluid regimen, check that the IV access is patent and increase the prescribed dose of insulin.

**NB:** Continue giving any long-acting insulin analogues (Lantus, Levemir or Tresiba) at the usual dose and time subcutaneously.

Review after 24 hours. Once the patient is well and eating and drinking, then re-start the patient on subcutaneous insulin. Seek specialist advice if you are uncertain about the insulin regimen to use.

There is rarely an indication for giving bicarbonate as the acidosis usually self corrects. **DO NOT ADMINISTER BICARBONATE (EXCEPT IN CARDIAC ARREST) WITHOUT SPECIALIST ADVICE.**

**Stopping variable rate intravenous insulin infusion (VRIII):** refer to the section on stopping VRIII – under ‘Management of diabetes during surgery’.
DIABETIC HYPEROSMOLAR HYPERGLYCAEMIC STATE (HHS)
Previously known as HONK: hyperosmolar non-ketotic coma

The management of diabetic hyperosmolar states currently differs from the above guidelines for the management of diabetic ketoacidosis. Fluids are the mainstay of treatment and insulin (when required) is delivered using a fixed rate infusion at a lower rate, based on body weight. Extra care is needed as:

- Patients are generally older and frailer so great care is needed regarding possible multi-system pathology; another underlying diagnosis is extremely common. Mortality is high (50%) and consideration should be given to HDU admission.
- These patients are particularly prone to thrombotic events and should receive prophylactic dalteparin (if there are no contraindications)
- Follow steps 1-5 as above for DKA with the following considerations:

**Diagnosis/Characteristic features of HHS:**
- Hypovolaemia
- Marked hyperglycaemia with serum blood glucose levels usually > 30mmol/L (acquire a laboratory sample, use grey bottle)
- serum Osmolality ≥ 320 mOsm/kg
- absence of significant Ketonaemia (urine ketones ≤ 1+, capillary ketones < 3 mmol/L)
- absence of significant acidosis (pH > 7.3, Bicarbonate > 15mmol/L)
- alterations in mental status are common but is a not a prerequisite to making this diagnosis
- Ketonaemia/acidosis can occur through glucotoxicity which can produce a mixed picture between HHS and DKA
- Acidosis may occur due to a raised lactate or renal impairment

**Critical care/HDU input:**
Consider if any of the following features are present - serum osmolality > 350 mosm/kg, Na+ > 160 mmol/L, pH < 7.1, hypo or hyperkalaemia, impaired GCS, unstable observations, urine output <0.5ml/kg/hr, serious comorbidities.

**Rehydration:**
Fluid loss in HHS is more marked than in DKA and is approx. 100-220ml/kg.
1) Catheterise your patient and carry out hourly fluid balance assessments.
2) Give 1L of sodium chloride 0.9% over one hour. This can be given more rapidly if the SBP is < 90mmHg.
3) Continue with sodium chloride 0.9% aiming to achieve:
- positive fluid balance of 2 -3 L by 6 hours, and
- positive fluid balance of 3 - 6 L by 12 hours, with
- a fall in serum osmolality of 3 – 8 mOsm/kg per hour, and
- a fall in blood glucose levels of 5mmol/L per hour.
4) Monitor glucose and U&Es hourly for the first six hours and calculate serum osmolalities. From 6 to 12 hours, this can be done every two hours.

**Continual assessments and adjustments:**
- If the serum osmolality fails to fall by 3 mOsm/kg or falls by >8 mOsm/kg consider increasing or decreasing the rate of IV fluids respectively.
- If the serum osmolality is increasing, seek specialist advice - do not give hypotonic solutions without specialist input.
- If blood glucose levels fall at <5 mmol per hour, review the fluid balance and consider increasing the rate of fluids if an adequate positive balance has not been
achieved. If an adequate positive fluid balance has been achieved, please refer to the start insulin section below.

- As per the DKA protocol, add 40mmol KCL with each litre of fluid for potassium levels between 3.5 and 5.5mmol/L with a maximum infusion rate of 20mmol of KCL per hour. Seek senior input for potassium levels below 3.5mmol/L. Omit KCL if potassium levels are > 5.5 mmol/L.
- Continually assess for complications of treatment - check for signs of fluid overload and cerebral oedema regularly as this group of patient often have more morbidities and are at high risk of developing complications.
- To avoid hypoglycaemia, aim to keep blood glucose levels between 10 – 15mmol/L within the first 24 hours. Commence 5% or 10% dextrose at 125ml/hr in addition to sodium chloride 0.9% when blood glucose levels drop below 14 mmol/L.

**Insulin:**
This is not routinely needed in the management of HHS but should be started if capillary ketone levels are > 1.0 mmol/L or urine ketones are > 2+. You may also commence insulin if blood sugars are falling at < 5 mmol/L per hour and you have achieved an adequate positive fluid balance.

- When insulin is required, start IV infusion of soluble insulin: Human Actrapid 50 units made up to 50ml with sodium chloride 0.9% in a syringe driver. This is as per the DKA protocol but at a lower fixed rate of 0.05 units/kg/hour.
- Start 5 or 10% dextrose (refer to the rehydration section above) when blood glucose levels fall below 14 mmol/L and aim to keep blood glucose levels between 10 - 15 mmol/L within the first 24 hours.
- Increase or reduce the rate of the insulin infusion by 1 unit per hour if blood glucose levels are not falling adequately or fall too quickly respectively.
- NB: Continue giving any long-acting insulin analogues (Lantus, Levemir or Tresiba) at the usual dose and time subcutaneously

**Resolution:**
- From 12 to 24 hours, U&Es and serum osmolalities can be checked every 4 to 6 hours as long as there has been a steady improvement from presentation.
- Check blood glucose levels hourly.
- Aim to correct the remaining fluid losses over this period but please note that it may take up to 72 hours to achieve this and needs to tailored to your patient’s tolerability/response to treatment so far.
- Refer to the diabetes team for review.
- Once biochemical and clinical parameters are corrected and the patient is eating and drinking, they can be commenced on subcutaneous insulin. Occasionally insulin is not used but this decision must be made by a specialist. If your patient is not yet eating and drinking they can be switched over to a variable rate insulin infusion.
- **Feet:** Please ensure foot checks are done as this group of patients are particularly vulnerable to having/developing foot complications.
HYPOGLYCAEMIA
Link consultant: Dr. Matthew Oldfield
Pharmacist: Nisha Gandhi

Hypoglycaemia occurs when the blood glucose falls below a certain level (in most cases <4 mmol/L). Common signs and symptoms of hypoglycaemia:

- Sweating  
- Shaking  
- Tingling of lips  
- Hunger  
- Slurred speech  
- Aggression  
- Palpitations  
- Nausea  
- Dizziness  
- Difficulty concentrating  
- Change in personality  
- Altered consciousness

Occasionally hypoglycaemia is induced by diabetic drugs used in suicide bids by non-diabetic patients. Other drugs, such as alcohol and aspirin in overdose, may also cause hypoglycaemia. It may also arise as part of an underlying disease such as insulinoma, carcinoid or sepsis (particularly in children and neonates).

**Treatment**

The ‘hypo’ box is located on each resuscitation trolley
Glucagon is located in the ward fridge

**Unconscious, unco-operative, or patients with impaired swallow:**

- Give 80-100ml of 20% Glucose IV bolus. Repeat CBG after 15mins.
- Glucagon 1 mg iv/im/sc is safer in a restless patient (im/sc preferred, not to be given more than once in 24 hrs), but IV glucose will be necessary if there is no response in 10-15 minutes. Glucagon may not be effective in malnourished patients or those with liver disease who have no hepatic glycogen stores.
- Give a snack (2 biscuits or a piece of fruit or glass of milk) as soon as conscious levels improve

**Conscious patients**

- Give 10-20g of oral glucose. This can be given as 3-4 heaped teaspoons of glucose powder or sugar mixed in water. Do not give in a hot drink.
- Then if the next meal is more than 30 minutes away, give patient 2 biscuits or a piece of fruit or a glass of milk.
- Check blood glucose level at 15 minutes intervals and treat if necessary with more glucose until level > 4 mmol/L

**Prolonged hypoglycaemia**

Patients at risk are those on sulphonylureas and those who have taken an accidental or deliberate insulin overdose. They need close observation for at least 24 hours and are likely to require continuous IV 10% glucose and frequent blood glucose monitoring.

It is essential that the Endocrinology team is informed of patients attending A&E with recurrent hypoglycaemia so that appropriate follow-up can be made.
MANAGEMENT OF DIABETES DURING SURGERY
Link consultants: Dr. Matthew Oldfield and Dr. Joanne Glynn
Pharmacist: Nisha Gandhi

Diabetic control should ideally be optimised before admission so that the HbA1c ≤ 69 mmol/mol (8.5%). Overnight admission for routine planned surgery should not be necessary. Avoid prolonged periods of starvation by prioritising patients on operating lists. In general a variable rate intravenous insulin infusion (VRIII) is only required if > one meal is to be missed. Contact the Endocrinology team if necessary.

General principles when prescribing insulins:
- Double check you have the correct insulin type
- In type 1 diabetes, never stop insulin - though adjustments often needed
- Do not use PRN Actrapid - seek advice! However, stat doses of Novorapid may be required

This section contains information on:
1. How to modify diabetic treatment during the peri-operative period
2. How to prescribe perioperative variable rate intravenous insulin infusion (VRIII)
3. How to stop the VRIII and re-start regular diabetic medication

**Perioperative Advice for patients with Diabetes on SGLT2 inhibitors:**
Three members of this new treatment group for type 2 diabetes exist in the UK. They are **Dapagliflozin, Canagliflozin and Empagliflozin**. They work by increasing the amount of glucose that is lost in the urine. They are only licensed for use in type 2 diabetes, are effective medications with a number of benefits to patients and are growing in popularity.

Due to their action they have a rare risk of causing Diabetic Ketoacidosis (DKA). The risk is low (affecting up to 1 in 1000 patients) but increased when the stress of surgery, and pre-operative fasting, is present. The presentation of the DKA is often atypical with relatively normal levels of glucose. Staff and patients should be vigilant for symptoms of diabetic ketoacidosis, including rapid weight loss, nausea or vomiting, stomach pain, excessive thirst, fast and deep breathing, confusion, unusual sleepiness or tiredness, a sweet smell to the breath, a sweet or metallic taste in the mouth, or a different odour to urine or sweat.

If present, check ketones and discuss with a diabetes specialist. Risk factors for ketoacidosis include: low insulin-producing capacity in the pancreas, a sudden drop in a patient’s insulin dose, increased insulin requirement (due to illness, surgery or alcohol abuse) or conditions that can restrict food intake (such as pre-operative fasting) or lead to severe dehydration.
We recommend **omitting the tablet on the day of surgery** and not to re-start medication until the patient is eating and drinking normally the following day.
# Step 1 How to modify diabetic medication for the peri-operative period

<table>
<thead>
<tr>
<th>Medication</th>
<th>Surgery requiring a short starvation period (no more than 1 missed meal)</th>
<th>Surgery requiring a long starvation period (2 or more missed meals)</th>
</tr>
</thead>
</table>
| ORALS and Injectable GLP-1 agents eg Exenatide Liraglutide, Lixisenatide | ▪ Ensure on morning list if possible  
▪ AM List - Give morning dose of Metformin (not if for angiogram/angioplasty) and Pioglitazone, but OMIT all other hypoglycaemics and injectable Exenatide, liraglutide & lixisenatide  
▪ PM List - if eating breakfast, give morning dose of metformin, acarbose, pioglitazone, repaglinide & nateglinide, but OMIT all others (e.g. alogliptin, canagliflozin, empagliflozin, dapagliflozin, gliclazide, glipizide, glimepiride & glibenclamide, linagliptin, sitagliptin, saxagliptin, vildagliptin, & injectable Exenatide, liraglutide & Lixisenatide) for BOTH the morning and evening doses. If on metformin three times a day omit the lunch dose but give the evening dose if eating. | ▪ Omit morning dose of all oral hypoglycaemics & injectable GLP-1 agents  
▪ Start VR III. See step 2. |
| INSULIN          | ▪ See below for guidance on modification of insulin  
▪ Check BMs 1° until eating & drinking.  
▪ If BM > 10mmol, start VR III | ▪ Start VR III when patient misses first S/C insulin dose and meal.  
▪ AM List – Start intravenous fluid and VR III between 6 to 8 a.m.  
▪ PM List – Start intravenous fluid and VR III between 10 a.m. to midday.  
▪ Start VR III earlier if BM > 10mmol/L  . |

**NB:** Metformin – *For procedures involving contrast media* omit on the day of the procedure. Restart 48 hours after procedure if renal function is normal.
**Guideline for peri-operative adjustment of insulin for surgery requiring a short starvation period (includes investigations/procedures e.g. OGD)**

<table>
<thead>
<tr>
<th>Insulins</th>
<th>Day prior to admission</th>
<th>Day of surgery</th>
<th>Patient for am surgery</th>
<th>Patient for pm surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Once daily (evening)</strong></td>
<td>No dose change</td>
<td>Check blood glucose on admission</td>
<td>Check blood glucose on admission</td>
<td></td>
</tr>
<tr>
<td>(e.g. Lantus, Levemir or Tresiba, Insulatard, Humulin I, Insuman Basal)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Once daily (morning)</strong></td>
<td>No dose change</td>
<td>Check blood glucose on admission</td>
<td>No dose change</td>
<td>Check blood glucose on admission</td>
</tr>
<tr>
<td>(e.g. Lantus, Levemir or Tresiba, Insulatard, Humulin I, Insuman Basal)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Twice daily</strong></td>
<td>No dose change</td>
<td>Halve the usual morning dose. Check blood glucose on admission. Leave the evening meal dose unchanged</td>
<td>Halve the usual morning dose.</td>
<td>Check blood glucose on admission. Leave the evening meal dose unchanged</td>
</tr>
<tr>
<td>(e.g. Novomix30, Humulin M3, Humalog Mix, Hypurin porcine Mix, Insuman Comb, twice daily Levemir)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Twice daily - separate injections of short acting</strong></td>
<td>No dose change</td>
<td>Calculate the total dose of both morning insulins and give half as intermediate acting only in the morning. Check blood glucose on admission Leave the evening meal dose unchanged</td>
<td>Calculate the total dose of both morning insulins and give half as intermediate acting only in the morning. Check blood glucose on admission Leave the evening meal dose unchanged</td>
<td></td>
</tr>
<tr>
<td>(e.g. animal neutral, Novorapid, Humalog, Humulin S, Apidra and intermediate acting (e.g. animal isophane, Insulatard, Humulin I, Insuman Basal))</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3, 4, or 5 injections daily</strong></td>
<td>No dose change</td>
<td>Basal bolus regimens: omit the morning and lunchtime short acting insulins. Keep the basal unchanged. Pre-mixed insulin: halve the morning dose, omit lunchtime dose. Check blood glucose on admission</td>
<td>Take usual morning insulin dose(s). Omit lunch time dose. Check blood glucose on admission</td>
<td></td>
</tr>
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<td></td>
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</tr>
</tbody>
</table>
STEP 2 How to prescribe perioperative variable rate intravenous insulin infusion (VRIII)

Peri-operative VRIII is indicated for decompensated diabetes perioperatively and patients anticipated to miss two or more meals.

Start an IV infusion of soluble insulin: **human Actrapid 50 units made up to 50mls with sodium chloride 0.9% in a syringe pump** (i.e. 1ml = 1 unit of insulin). Start the IV maintenance infusion fluid rate at 1 L/8 hours. Alter the infusion fluid rate to maintain accurate fluid balance. Monitor the potassium level and adjust the IV fluids accordingly (aim to keep K⁺ level between 4.0 and 5.0 mmol/L. If there are significant fluid balance or electrolyte abnormalities, seek senior advice.

<table>
<thead>
<tr>
<th>Blood glucose (mmol/l)</th>
<th>Insulin dose (units/hour)</th>
<th>Maintenance infusion fluid (83 – 125ml / hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 17.1</td>
<td>6</td>
<td>0.45% Sodium chloride with 5% glucose and 0.15% Potassium Chloride (10mmol K in 500ml)</td>
</tr>
<tr>
<td>10.1 – 17.0</td>
<td>4</td>
<td>0.45% Sodium chloride with 5% glucose and 0.15% Potassium Chloride (10mmol K in 500ml)</td>
</tr>
<tr>
<td>7.1-10.0</td>
<td>2</td>
<td>0.45% sodium chloride with 5% glucose and 0.15% Potassium Chloride (10mmol K in 500ml)</td>
</tr>
<tr>
<td>4.1-7.0</td>
<td>1</td>
<td>0.45% sodium chloride with 5% glucose and 0.15% Potassium Chloride (10mmol K in 500ml)</td>
</tr>
<tr>
<td>≤ 4.0</td>
<td>0.5 (0.0 if a long acting background insulin has been continued)</td>
<td>0.45% sodium chloride with 5% glucose and 0.15% Potassium Chloride (10mmol K in 500ml)</td>
</tr>
</tbody>
</table>

Check patient for signs of hypoglycaemia

**NB:** Continue any long-acting insulin analogues (Lantus, Levemir or Tresiba) at the usual dose and time subcutaneously.

Blood glucose monitoring: do not leave the VRIII unmonitored for more than 30-60 minutes. Measure blood glucose hourly and adjust the insulin dose accordingly (see below). Aim to keep the blood glucose between 6.0 and 10.0 mmol/L (acceptable range 4-12mmol/L). Electrolytes should also be checked every 24 hours.

- **Blood glucose 14-17 mmol/L or higher:** if blood glucose levels are consistently raised for four hours or more, the VRIII should be increased. If blood glucose is 17mmol/l or greater use a laboratory venous sample to determine blood sugar levels.
- **Patients that may require higher insulin rates:** if they are on large doses of insulin pre-operatively, have pre-existing liver disease, septicaemia, or are on long-term corticosteroids. Contact the Endocrinology team for advice.
- **Blood glucose is 4.5mmol/L or lower:** if blood glucose levels are consistently low for 4 hours or more then the VRIII should be reduced.
- **Symptomatic hypoglycaemia:** resuscitate the patient by increasing the rate of glucose infusion or give 80-100ml of 20% glucose IV bolus. Repeat CBG after 15 minutes.

### Step 3  How to stop the VRIII & re-start regular diabetic medication

Once a patient starts to eat and drink normally, change back to S/C insulin. After major operations, wait until the 2nd meal is eaten post-operatively before stopping the VRIII.

**KEY POINTS:**

1. **Intravenous insulin SHOULD NOT be stopped before S/C insulin given**
2. **Stop the VRIII 60 minutes after the first subcutaneous dose of insulin**

<table>
<thead>
<tr>
<th>Insulin treated diabetic patients (Type 1 and some Type 2)</th>
<th>Non-Insulin treated diabetic patients (Type 2 treated with oral medication and injectable Exenatide, Liraglutide &amp; lixisenatide)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attempt to resume subcutaneous insulin at the normal meal time.</td>
<td>Continue VRIII until the meal is eaten and then stop one hour afterwards.</td>
</tr>
<tr>
<td><strong>Biphasic insulins:</strong> Humalog Mix and Novomix - Give usual dose 5-10mins before breakfast or evening meal; Humulin M, Hypurin porcine Mix, Insuman Comb - Give usual dose 20-30mins before breakfast or evening meal. Do not change at any other time.</td>
<td>Commence all other hypoglycaemics as normal.</td>
</tr>
<tr>
<td><strong>Short-acting insulins:</strong> Apira, Humalog, Novorapid – Give usual dose 5-10 minutes before the next meal; Humulin S, Hypurin &amp; Insuman Rapid – Give usual dose 20-30mins before the next meal</td>
<td></td>
</tr>
</tbody>
</table>

**Diabetes/ Endocrinology Registrar** – bleep 424
**Diabetes Specialist Nurse/Diabetes Day Unit** - extension 6370
**Diabetes/Endocrinology Consultants** – Air Call via Switchboard
**NovoCare helpline** on Novo insulin for health care professionals (manned by diabetes specialist nurses ) – 08456 005 005
  - Mon.-Fri. 5.30pm to 11pm
  - Weekends & public holidays 8.30am to 11pm
HYPOCALCAEMIA

The most prominent feature of low plasma concentrations of calcium is increased neuromuscular activity with parasthesia, then leading to muscle cramps, carpopedal spasm, laryngeal stridor and convulsions. These effects are determined by the levels of ionised calcium and so influenced by plasma pH (available calcium is reduced the more alkaline the plasma).

**Indications for treatment.** Attempts to raise the level of available calcium should be made if the plasma corrected calcium is below 1.8 mmol/L or the patient has unequivocal signs of hypocalcaemia with a low calcium, i.e. tetany, positive Chvostek or Trousseau’s sign, or seizures. To calculate corrected calcium add or subtract 0.02mmol/L for every 1g/L difference in the serum albumin from 40g/L.

**Causes.** While alkalosis increases the likelihood of symptoms and signs, and occasionally (e.g. prolonged hyperventilation) is the sole cause of the clinical picture, other causes include primary hypoparathyroidism, renal failure, vitamin D deficiency and malabsorption. A low plasma Mg$^{2+}$ can also cause hypocalcaemia without any change in total body calcium. Measure magnesium if in doubt – hypomagnesaemic hypocalcaemia should be treated with intravenous magnesium alone. Seek specialist advice.

**Treatment.** Supplements can be given either by mouth or intravenously.
- Oral route. Give 12.5g of calcium carbonate (5g of elemental Ca) over 24h. One Calcichew tablet contains 1.25g calcium carbonate (500 mg calcium). Alfacalcidol should be given in a dose of 1-5micrograms daily.
- Intravenous infusion. Give 10-20 ml (2.2 to 4.5 mmols Ca2+) of 10% calcium gluconate or 10 ml (6.8 mmol Ca2+) of 10% calcium chloride, no faster than 2ml/min. The effect is short-lasting so the infusion should be followed by IV calcium gluconate 40ml (in 500ml 0.9% sodium chloride or 5% glucose) over 24 hours; this will provide 9 mmol of Ca2+. The rate of infusion should be altered according to the rise in the plasma calcium.

HYPERCALCAEMIA

In some patients an increase in serum calcium (albeit small) may produce no symptoms – in others it may cause symptoms varying from nausea, vomiting, constipation, abdominal pain, to thirst, polyuria, confusion and coma.

**Indications for treatment.** Calcium reduction should be attempted in any one with a plasma calcium > 3 mmol/L unless the level is stable and the patient completely asymptomatic. Treatment is often required at lower levels because of symptoms. Hypercalcaemic patients are usually volume depleted and this may need treatment.

**Causes.** Raised calcium can occur as a result of reduced excretion, increased absorption or a shift of calcium between body compartments. More common causes include malignant disease, sarcoidosis, thyrotoxicosis, vitamin D intoxication, calcium-containing drugs, cortisol deficiency, thiazide diuretics and primary hyperparathyroidism.
Treatment. Weigh the patient and record finding before starting treatment. If possible stop drugs that might be contributing to the elevated calcium levels. Give 0.9% sodium chloride to render the patient euvolaemic and increase urine volume up to 200 ml/h. Consider giving furosemide (frusemide) 40-80mg orally or IV, to increase urine flow and calciuresis. If a diuretic is given, it is essential that the patient is not rendered hypovolaemic.

If the plasma calcium is still raised after 24 hours give IV pamidronate: 60-90mg in 0.9% sodium chloride, at a concentration of not more than 90 mg in 250 ml, at a rate not more than 1 mg/minute. The serum calcium should fall within 24-48 hours with the maximum response taking 4-5 days to achieve. Further doses of pamidronate should not be given within this period. If the plasma calcium remains elevated, seek help.

Malignant hypercalcaemia: refer to the ‘Oncology’ section for specialist advice relating to hypercalcaemia associated with malignant disease.

ELECTROLYTE DISTURBANCES: MAGNESIUM
Link consultant: Dr. John Wong
Link pharmacist: Roshni Thoppil

MAGNESIUM: (Reference range: 0.7-1.0 mmol/L)
- Hypomagnesaemia often causes secondary hypocalcaemia and also hypokalaemia and hyponatremia
- Causes of hypomagnesaemia include loop or thiazide diuretics, diarrhoea, high output ileostomies, DKA, refeeding syndrome, high dose PPI therapy.

A patient’s normal daily requirements are 0.1-0.2 mmol/kg
- Possible routes: IV or PO depending on patient’s clinical state, ability to absorb via enteral route, ease of venous access etc
- Very low levels (<0.5mmol/L) should be supplemented intravenously.
- Caution in renal failure – use the lower dose of 12mmol IV

Oral route: Magnesium aspartate sachets 10 mmol; dose 10 mmol OD or BD

IV route: Magnesium Sulphate injection (50% strength gives 2mmol per ml)
Dose: 12-16mmol in 100-250ml sodium chloride 0.9% or Glucose 5% for peripheral administration
Infusion rate: 4mmol per hour for replacement
(Higher rates are used for other indications- see BNF)
ITU protocol: 20mmol in 50-100ml sodium chloride 0.9% run centrally over 2 hours
Recheck plasma levels every 2 days for PO treatment, daily for IV treatment.
ELECTROLYTE DISTURBANCES: PHOSPHATE
Link consultant: Dr. John Wong
Link pharmacist: Roshni Thoppil

PHOSPHATE: (Reference range: 0.8-1.5 mmol/L)

- Causes of hypophosphatemia include alcohol dependence, refeeding syndrome, DKA and metabolic/respiratory acidosis.

A patient’s normal daily requirements are about 0.5 mmol/kg
- Patients with renal impairment may require lower doses.
- Excessive phosphate replacement may lead to hypocalcaemia
- Consideration should be given to correcting other electrolyte disturbances such as hypomagnesaemia

Oral route: Phosphate Sandoz 2 tablets BD (unlicensed indication)
(each tablet has 16.1mmol PO₄, 20.4mmol Na⁺ and 3.1mmol K⁺)

IV route:
Dose: 25mmol (250ml) of a phosphate polyfusor which comes as a 500ml product
Infusion rate: Usually recommend it is run over 24 hours especially if via a peripheral line due to risk of phlebitis
ITU protocol: 25 –50mmol over 12-24 hours.
Max rate: 50mmol over 12 hours via a central line

Recheck plasma levels daily and monitor serum calcium levels.

ELECTROLYTE DISTURBANCES: POTASSIUM
Link consultant: Dr. Debasish Banerjee

HYPOKALAEMIA

Low serum potassium (K⁺) can cause muscle weakness (leading to paralysis), cardiac arrhythmias, and in susceptible patients, hepatic encephalopathy. It can also potentiate the unwanted cardiac effects of digoxin and of drugs that prolong the QT interval.

Indication for treatment. In general, potassium supplements should be given to any patients with a serum potassium < 3 mmol/L, or < 3.5 mmol/L if they are taking a drug that has arrhythmic side effects enhanced by low potassium or who have cardiac disease. Exceptions should be made for patients with renal failure. Hypokalaemia occurring immediately after haemodialysis may be transient and correct itself. Hypokalaemia in those with end-stage renal failure is complex and supplements should not be given without first discussing the case with the renal team.

Causes. Low K⁺ is commonly secondary to increased losses (vomiting, diarrhoea, thiazides, loop diuretics, corticosteroids). It can also be due to alkalosis, beta stimulants, xanthines and insulin, all of which cause potassium to enter cells rather than cause overall deficit.
Treatment. Remember, a plasma K⁺ of 3 mmol/L secondary to potassium loss represents a total deficit of around 200 mmol (plasma K⁺ of 2 mmol/L represents a total deficit of around 600 mmol).

- If possible, and if there is time, first treat the cause.
- Replacement can be by mouth or by intravenous infusion.
- Oral replacement is preferable and safest. Sando-K® (12 mmol/tablet) is the first choice. The usual dose is 40-120 mmol/day (maximum daily dose is 300 mmol).
- Intravenous replacement should be reserved for those:
  i. with symptoms (paralysis, arrhythmia, hepatic encephalopathy)
  ii. in whom the K⁺ is < 2.5 mmol/L
  iii. intolerant of oral K⁺.
- Ready-made 1 litre sodium chloride 0.9% bags containing 20 mmol potassium chloride (KCL) are available. (Ready-made bags with potassium should be prescribed routinely due to the risks associated with diluting strong potassium chloride injection.) 5% glucose is best avoided as a vehicle for K⁺ as it may stimulate insulin secretion and further reduce the serum K⁺.
- Concentrations > 40 mmol in 1 litre should be infused centrally.
- Maximum recommended rate of infusion: 20 mmol/hour. If plasma K⁺ < 2 mmol/L with arrhythmia, 80-100 mmol K⁺ may be given; do not administer more than 40 mmol K⁺ per hour. Because of the risk of serious arrhythmias occurring, ECG monitoring is essential and resuscitation equipment must be available when administering more than 20 mmol K⁺ per hour.

N.B. The risk of thrombophlebitis from infusion of solutions via peripheral veins should be weighed against concern that central K⁺ infusion might worsen cardiac arrhythmia. Remember that the risks of iatrogenic hyperkalaemia are potentially more serious than those of hypokalaemia.

Monitoring. Measure serum K⁺ at frequent intervals. In mild hypokalaemia, where oral replacement therapy is given, monitor K⁺ daily. In severe hypokalaemia, where IV K⁺ is being infused, monitor levels after each infusion. (This will help you decide how much more K⁺ is needed). Continuous ECG monitoring is essential when > 20 mmol/hr K⁺ is infused. Ensure that the need for ECG monitoring is documented in the notes and that nursing staff are made aware of this requirement. Check creatinine at least daily (expect more rapid rate of rise of K⁺ in patients with renal failure).

HYPERKALAEMIA

The clinical problems associated with raised serum potassium are cardiac arrhythmias, which include ventricular fibrillation and asystole.

Indication for treatment. Attempts should be made to lower potassium when serum K⁺ exceeds 6.0 mmol/L.

Causes. Potassium rises when there is reduced renal excretion (as in renal failure, when taking potassium sparing diuretics or an ACE inhibitor, and in Addison’s disease), or when potassium shifts out of cells as in acidosis, diabetic hyperglycemia or cell damage (trauma, burns, haemolysis). Remember that in situations where there has been a shift, the total body K⁺ may be normal (or even low). Measure arterial pH, pCO₂ and pO₂ if in doubt.
Treatment
a) If the ECG is abnormal, give 10ml of 10% calcium gluconate slowly IV, repeating the dose if necessary 30-60 minutes later. (Maximum rate of infusion is 2ml/minute).

b) To move potassium into the cells give glucose/insulin infusion, 50ml of 50% glucose with 10 units of soluble human insulin, over 5 to 15 minutes. If hyperkalaemia persists after a few hours, the infusion can be repeated. Check blood glucose every hour (every 15 minutes in diabetic patients).

c) Check serum K+ levels at least twice daily.

d) Stop all potassium-retaining drugs.

ELECTROLYTE DISTURBANCES: SODIUM IMBALANCE
Link consultants: Dr. John Wong and Dr. Darshi Sivakumaran

Consensus: the diagnosis and management of inpatient hyponatraemia and SIADH

Definition: Na⁺ < 135 mmol/L. Clinically significant if Na⁺ < 125 mmol/L or if the level has fallen rapidly (> 20 mmol/L in 24 hours). However, patients can be symptomatic with milder degrees of hyponatraemia.

Signs and symptoms: commonly leads to confusion, nausea, lethargy, and deterioration in mobility and alertness. Other: oedema, anorexia, muscle weakness, hypertension. Less commonly: cardiac failure, seizures, coma and death. Many patients are asymptomatic and the hyponatraemia is found on routine blood tests.

Causes: it is helpful to consider the possible causes in terms of volume status.

<table>
<thead>
<tr>
<th>Hypovolaemic</th>
<th>Euvolaemic</th>
<th>Hypervolaemic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renal causes</td>
<td>Urine osmolality &gt; 500 mOsmol/L</td>
<td>Renal causes</td>
</tr>
<tr>
<td>Urine Na⁺ &gt; 20mmol/L</td>
<td>Urine Na⁺ &gt; 20 mmol/L</td>
<td>Urine Na⁺ &lt;20 mmol/L</td>
</tr>
<tr>
<td>Addison’s disease</td>
<td>SIADH</td>
<td>Renal failure</td>
</tr>
<tr>
<td>Renal failure</td>
<td></td>
<td>Non-renal causes</td>
</tr>
<tr>
<td>Drugs e.g. diuretics</td>
<td></td>
<td>Cardiac failure</td>
</tr>
<tr>
<td>Non-renal causes</td>
<td></td>
<td>Liver cirrhosis</td>
</tr>
<tr>
<td>(urinary Na⁺ &lt; 20 mmol/L)</td>
<td></td>
<td>Nephrotic syndrome</td>
</tr>
<tr>
<td>Diarrhoea +/- vomiting</td>
<td></td>
<td>5% glucose infusion</td>
</tr>
<tr>
<td>Fistulae</td>
<td></td>
<td>Water irrigation after TURP</td>
</tr>
<tr>
<td>Small bowel obstruction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trauma</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burns</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pseudohyponatraemia – causes include:
• if blood is taken from an arm with an intravenous glucose infusion, Na⁺ will also be reduced
• alcohol
• hypertrygliceridaemia
• hyperglycaemia
Clinical assessment
- Confirm plasma Na\(^+\) below 125 mmol/L.
- Assess the patient’s volume status clinically.
- Tests: send blood and urine at the same time for a) paired plasma and urine osmolality and b) urinary sodium concentration. Also send: blood glucose, lipid profile, random (ideally 9 a.m.) cortisol, TFTs
- Patients on active treatment need U&Es monitored every 24 hours until serum Na\(^+\) is > 135 mmol/L. Consider checking 9a.m. cortisol level

<table>
<thead>
<tr>
<th>Serum osmolality</th>
<th>Urine osmolality</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raised</td>
<td>Raised</td>
<td>Dehydration</td>
</tr>
<tr>
<td>Reduced</td>
<td>Reduced</td>
<td>Fluid excess</td>
</tr>
<tr>
<td>Normal</td>
<td>Reduced</td>
<td>Excess fluid intake/diuretics</td>
</tr>
<tr>
<td>Raised</td>
<td>Reduced</td>
<td>Diabetes insipidus</td>
</tr>
<tr>
<td>Reduced</td>
<td>Raised</td>
<td>SIADH (investigate underlying cause)</td>
</tr>
</tbody>
</table>

Treatment (treat if Na\(^+\) is below 125 mmol/L or the patient is symptomatic):
- Aim to raise the serum sodium by no more than 10 mmol/L in 24 hours.
- If hyponatremia is not acute, lasting >48 hours, rapid correction carries risk of osmotic demyelination.
- Stop offending drugs- thiazide, SSRI, PPI, ACE inhibitor, loop diuretics
- Acute severe hyponatremia is a medical emergency and should be treated immediately without waiting for the diagnosis of the cause.
- Hypertonic saline should be reserved for patients with seizures or other life threatening neurological complications of hyponatraemia. Seek senior help for this and monitor for central pontine myelinolysis

Assessment of volume status – difficult
- If a patient’s fluid status is unclear despite full clinical examination, give an 1L infusion of 0.9% sodium chloride over 12 hours.
- Hypovolemic patients will respond well with Na\(^+\) rise of 5mmol/L; patients with SIADH will not improve or worsen.
- Re-check Na\(^+\) 6 hours after starting the 0.9% sodium chloride infusion.

Hyponatraemic hyponatraemia
- Common – often due to renal or GI sodium loss.
- Give 0.9% sodium chloride slowly IV.
- Calculate how much to give using the following formula:
  \[
  \text{Sodium requirement (mmol)} = 0.6 \times \text{body weight (kg)} \times (\text{desired sodium - actual sodium})
  \]

Euvolaemic hyponatraemia
- Confirm hypotonic hyponatremia: plasma osmolality <275, Urine osmolality >100.
- If plasma osmolality >275, consider causes of hypertonic hyponatraemia e.g. hyperglycaemia.
- If urine osmolality <100 – consider primary polydipsia, beer protomania, low solute diet associated with reduced ability to excrete free water
- Check urine Na\(^+\) - if >20 – SIADH (investigate cause)
- If urine Na\(^+\) <20 – this reflects intravascular volume depletion, re-consider the volume status (hypervolaemia or hypovolaemia)
- Restrict fluids to 0.5-1L/day (see below)
Consider demeclocycline if no response to fluid restriction (you must always check with a Consultant first). Refer to BNF for the dose.

**Hypervolaemic hyponatraemia**
- Restrict fluids to 0.5-1L/day (see below)
- Restrict oral sodium intake e.g. salt containing foods
- Treat the underlying disorder
- Give diuretics as necessary (water excreted in excess of Na⁺)

**Fluid restriction**
- Restriction of water should be less than the amount of free water excretion
- Furst Formula- Urine Na+ plus urine K+/ Serum Na
  - If <0.5- restrict to 1 litre
  - If 0.5-1 – restrict to 500 ml
  - If >1- no fluid restriction
- Look for underlying cause
HYPERNATRAEMIA

Definition: serum Na$^+$ > 145 mmol/L. Clinically significant if the concentration is > 155 mmol/L, or if there has been a rapid rise (> 20 mmol/L in 24 hours). However, patients can be symptomatic with milder degrees of hypernatraemia.

Signs and symptoms: range from mild confusion to seizures and coma. Be aware of thirst and other signs of dehydration: dry mucous membranes, reduced skin turgor, hypotension and oliguria (lab features may include increased PCV, albumin and urea if water deficient).

Causes: Usually due to water loss in excess of sodium loss:
- Dehydration (e.g. diarrhoea, vomiting, burns)
- Excessive IV saline
- Diabetes insipidus (suspect if large urine volumes)
- Osmotic diuresis (e.g. hyperglycaemia)

Treatment: Aim to decrease sodium level by no more than 8 mmol/L in 24 hours.
1. Stop water loss (e.g. treat diarrhoea)
2. Calculate water deficit using the following formula:
   \[
   \text{Water deficit}^* = \frac{\text{Total Body Weight (Kg)} \times 0.6 \times \text{Plasma Sodium (mmol/L)} - 140}{140}
   \]
   *Formula assumptions: 1) no sodium deficit; 2) total body water distribution; 3) steady state
3. Replace fluid with 5% glucose.
   a) In the first 24 hours replace one third of the calculated water deficit.
   b) Thereafter, maintain usual fluid replacement with appropriate fluids depending on serum sodium level.

MANAGEMENT OF ACUTE SEVERE COLITIS

Link consultant: Dr. Markus Gess
Link Pharmacist: Jasmin Patel

Diagnose acute severe colitis by using the Truelove and Witts Criteria below:

<table>
<thead>
<tr>
<th></th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bowel movements (no. per day)</td>
<td>&lt; 4</td>
<td>4–6</td>
<td>= or &gt; 6 plus systemic upset</td>
</tr>
<tr>
<td>Blood in stools</td>
<td>No more than small amounts of blood</td>
<td>Between mild and severe</td>
<td>Visible blood</td>
</tr>
<tr>
<td>Pyrexia &gt;37.8°C</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Pulse &gt; 90 bpm</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Anaemia (Hb ≤ 105 g/L)</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>ESR (mm/hour)</td>
<td>30 or below</td>
<td></td>
<td>Above 30</td>
</tr>
</tbody>
</table>
Acute severe colitis is a Medical emergency. Admit all patients with any features of acute severe colitis.

Please inform the IBD CNS of any IBD patients who attend hospital and inform the Gastroenterology team/ward Consultant of any patients admitted with acute severe colitis urgently (on the same day of admission).

IBD CNS: Fiona Donovan Tel: 02089342760
Trust email: IBDHelpline@kingstonhospital.nhs.uk

If admitted on a Friday, ensure that the patient is reviewed daily by the medical registrar over the weekend. If the patient deteriorates, or there is no improvement of symptoms within 48 hours, contact the on-call Gastroenterologist and Surgical team; this patient is likely to need ‘rescue’ medical therapy (usually, infliximab infusions) or colectomy surgery.

The colectomy rate in acute severe colitis is 30%. On day 3 of intravenous steroid treatment, an assessment is made. Indicators of those more likely (~85% risk) to need a colectomy are: stool frequency >8/day, or stool frequency >3/day + CRP>45. Other poor prognostic signs include: presence of deep ulcers on flexible sigmoidoscopy, pyrexia, tachycardia, hypoalbuminaemia, high platelet count, dilated colon on abdominal Xray, tender abdomen and those with severe co-morbidities.

Management of Acute Severe Colitis
1. On admission and daily thereafter, perform FBC, U&E, LFT (note albumin level), CRP, and Abdominal Xray (look for ‘thumbprinting’ indicating inflammation, and colonic dilatation suggesting toxic megacolon).
2. Send stool cultures x3 (for MC&S) and stool cultures for C. Diff (even in the absence of antibiotic use).
3. Strict Stool chart recording stool frequency, type (as per Bristol stool chart) and presence of blood. Ask the patient to self-record as well as the nursing staff.
4. Commence hydrocortisone 100 mgs IV qds and prophylactic dose dalteparin (unless contraindicated)
5. Give IV fluid and electrolyte replacement to correct and prevent dehydration or electrolyte imbalance
6. Consider parenteral iron or blood transfusion to maintain a Hb >100 g/L.
7. Daily review of blood tests, stool chart & physical abdominal examination looking for signs of abdominal tenderness or distension.
8. Request URGENT inpatient flexible sigmoidoscopy with biopsy request with no bowel preparation. Aim to be performed within first 24 hours.
9. Acute severe ulcerative colitis is sometimes difficult to distinguish from infective colitis and microbiology results should be obtained urgently. It may be appropriate to commence both corticosteroids and antibiotics (particularly if pyrexial). If no initial improvement, consider checking CMV serology and titres (high levels suggesting CMV colitis).
10. Avoid opiates as they may mask the true stool frequency and exacerbate colonic distension. Similarly, stop anticholinergic and anti-diarrhoeal drugs.
11. If adverse signs (see above) still present at day 2, please request pre-biologic screening tests: Chest Xray, T-spot for TB, VZV serology, HIV, HBV & HCV serology).
Management of mild to moderate colitis

Consider discharging the patient on a tapering dose of oral prednisolone, starting at 40 mgs PO od and reducing by 5mg per week. Prescribe concomitant Adcal D3 BD. Arrange for the patient to be followed up in a Gastroenterology clinic within 6 weeks.

ACUTE UPPER GASTROINTESTINAL BLEEDING
Link consultant: Dr Markus Gess

IMMEDIATE ASSESSMENT

The priority of management is resuscitation and stabilisation.

1. Assess and document the Blatchford score
2. Obtain IV access; insert 2 large bore intravenous cannulae
3. Prescribe initial fluid resuscitation with crystalloid or colloid
4. If there is on-going haematemesis or cardiovascular shock, resuscitate by transfusing red blood cells
5. Perform a rectal examination to look for melaena
6. Order FBC, U&Es, LFTs, Group and save, clotting screen
7. Cross match blood and transfuse if needed (aim for Hb >100g/L)
8. Perform and review ECG if the patient has ischaemic heart disease or is >40 years old
9. Consider inserting a urinary catheter +/- CVP line to aid fluid monitoring
10. Consider giving proton pump inhibitor. There is limited evidence of the usefulness of this intervention but it may reduce the need for endoscopic therapy at the time of gastroscopy.
11. Omit anticoagulants, including aspirin and clopidogrel, after weighing up whether the risks of the GI bleed outweigh the risks of stopping therapy. Omit antihypertensive medication.

Correcting coagulopathy
If the patient is significantly bleeding AND
- Platelets <50, transfuse platelets
- On warfarin and/or INR is prolonged >1.5, give Vitamin K and Prothrombin Complex Concentrate (refer to the Haematology section: bleeding while anticoagulated). If the patient is anticoagulated because he/she has a prosthetic heart valve, discuss reversal of anticoagulation with a consultant haematologist
- Not on warfarin and INR is prolonged > 1.5 consider using FFP, but discuss with consultant haematologist.

Suspected variceal bleed (e.g. history of chronic liver disease or cirrhosis, deranged LFTs, ascites etc)
- Prescribe IV Terlipressin (Variquel®) 1-2 mg stat (according to body weight – see below)
Dosing: IV Terlipressin (Variquel®)

<table>
<thead>
<tr>
<th>Bodyweight</th>
<th>Stat dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 50 kg</td>
<td>1 mg</td>
</tr>
<tr>
<td>50 – 70 kg</td>
<td>1.5 mg</td>
</tr>
<tr>
<td>&gt;70 kg</td>
<td>2 mg</td>
</tr>
</tbody>
</table>

Followed by maintenance dose of 1 mg every 4-6 hours for up to 72 hours

- Prescribe Tazocin (piperacillin-tazobactam) 4.5g TDS IV for up to 5 days. Please contact a microbiologist if patient has a penicillin allergy.

**The priority of management is resuscitation and stabilisation**

Once the patient has been resuscitated and stabilised, calculate the Blatchford score:

**BEFORE ENDOSCOPY:**

**Calculate the BLATCHFORD score before endoscopy**

<table>
<thead>
<tr>
<th>Blood urea mmol/L</th>
<th>Score</th>
<th>Systolic BP (mmHg)</th>
<th>Score</th>
<th>Other markers</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;6.5</td>
<td>0</td>
<td>&gt;110</td>
<td>0</td>
<td>Pulse &gt; 100/min</td>
<td>1</td>
</tr>
<tr>
<td>6.5-7.9</td>
<td>2</td>
<td>100-109</td>
<td>1</td>
<td>Melaena</td>
<td>1</td>
</tr>
<tr>
<td>8.0-9.9</td>
<td>3</td>
<td>90-99</td>
<td>2</td>
<td>Syncope</td>
<td>2</td>
</tr>
<tr>
<td>10-25</td>
<td>4</td>
<td>&lt;90</td>
<td>3</td>
<td>Hepatic disease</td>
<td>2</td>
</tr>
<tr>
<td>&gt;25</td>
<td>6</td>
<td></td>
<td></td>
<td>CCF</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>None of these</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Haemoglobin</th>
<th></th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td></td>
<td>Score</td>
</tr>
<tr>
<td>&gt;130</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>120-129</td>
<td>&gt;120</td>
<td>0</td>
</tr>
<tr>
<td>100-119</td>
<td>100-119</td>
<td>1</td>
</tr>
<tr>
<td>100-119</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>&lt;100</td>
<td>&lt;100</td>
<td>6</td>
</tr>
</tbody>
</table>

If the Blatchford score is 0 you may consider early discharge with outpatient endoscopy. If the Blatchford Score is 1 or more, arrange urgent inpatient endoscopy.

**How to arrange urgent inpatient endoscopy**

- **Keep patient NBM from midnight**
- **Before 1200 noon, contact the Level 6 endoscopy unit (extension 2885).**
- **After this time contact either:**
  - one of the gastroenterology registrars (bleep 432/433), or
  - the Endoscopist of the day (one of the consultant gastroenterologists) via switchboard (Mon-Fri 0900-1700)
- **Outside of these times, contact the on call gastroenterology consultant if the patient cannot be stabilised and if he/she requires emergency endoscopy**
- **Involve the ITU team if the patient is very sick and cannot be resuscitated or if there is airway compromise secondary to haematemesis.**
- **If a non-variceal upper GI bleed patient remains unstable despite resuscitation, inform the on call surgical team in case their input is required.**
AFTER ENDOSCOPY

Calculate the full ROCKALL score and note the predicted mortality

<table>
<thead>
<tr>
<th>Age</th>
<th>Score</th>
<th>Endoscopic diagnosis</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 60</td>
<td>0</td>
<td>No lesion or Mallory Weiss</td>
<td>0</td>
</tr>
<tr>
<td>60-79</td>
<td>1</td>
<td>All others</td>
<td>1</td>
</tr>
<tr>
<td>≥ 80</td>
<td>2</td>
<td>Malignancy</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shock</th>
<th>Score</th>
<th>Major signs of recent haemorrhage</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>0</td>
<td>Blood in upper GI tract, ulcer with adherent clot, visible or spurting vessel</td>
<td>2</td>
</tr>
<tr>
<td>Pulse &gt;100 plus systolic BP &gt;100</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systolic BP &lt; 100</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Co-morbidity</th>
<th>Score</th>
<th>Full Rockall score</th>
<th>Predicted mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>0</td>
<td>&lt; 2</td>
<td>0%</td>
</tr>
<tr>
<td>CCF, IHD or major co-morbidity</td>
<td>2</td>
<td>2</td>
<td>0.2%</td>
</tr>
<tr>
<td>Renal/liver failure or disseminated malignancy</td>
<td>3</td>
<td>3</td>
<td>2.9%</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td></td>
<td>5.3%</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td></td>
<td>10.8%</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td></td>
<td>17.3%</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td></td>
<td>27%</td>
</tr>
<tr>
<td></td>
<td>&gt;7</td>
<td></td>
<td>41.1%</td>
</tr>
</tbody>
</table>

MANAGEMENT

Non-variceal bleeding
Follow the management plan as directed by the Endoscopist. Check FBC, clotting and U&Es (at least) daily. Following endoscopic therapy for non-variceal bleeding, patients should be treated with an IV PPI infusion (Hong Kong regimen):

- Omeprazole 80mg in 100mls 0.9% sodium chloride over 40 minutes, then
- Omeprazole at 8mg/hr infusion for 72 hrs as per Trust prescribing guidelines (i.e. the CRS prescribing ‘power plan’)

If there is any evidence of re-bleeding, discuss the patient immediately with a gastroenterologist. Repeat endoscopy, interventional radiology or surgery may be appropriate for unstable patients who re-bleed after endoscopic treatment.

Helicobacter pylori
Eradicate if found. Consult the full Antibiotic Guidelines on PIMS (gastrointestinal infections) for the antibiotic regimen. For patients with gastric and duodenal ulcers, give omeprazole 40 mg po od for at least 6 weeks. Arrange follow up endoscopy after 6-8 weeks for all patients with gastric ulcers, to ensure the ulcer has healed. Follow-up endoscopy is not necessary in patients with duodenal ulcers unless the gastroenterologist says otherwise.
**Variceal bleeding**

After endoscopy, stop IV terlipressin once haemostasis has been achieved, or after 3-5 days. Continue antibiotics for 5 days. When the patient can eat, IV antibiotics can be changed to oral.

If the variceal bleeding is not controlled by endoscopy, a Sengstaken tube may be required. Contact one of the gastroenterology registrars or consultants; he/she may need to discuss the patient with King’s College Hospital Liver Unit or Royal Free Hospital Liver Centre regarding the transfer of the patient for a trans-jugular intrahepatic portosystemic shunt (TIPS).

**Sengstaken tube:** if bleeding continues despite terlipressin and endoscopy, consider inserting a stiffened Sengstaken tube. These are available from the fridge in the level 6 Endoscopy unit. The tube is inserted with the patient lying on his/her left side whilst intubated. Check the tube’s position by injecting air down gastric port and auscultating over the patient’s stomach; if correctly placed, gastric suction will produce copious amounts of blood. *Cautiously inflate the gastric balloon with 300ml of water (only when it is inserted to more than 40cm)* and pull the tube back until resistance is felt at the gastro-oesophageal junction (35 to 40cm). Tape the tube to the mouth or use a split tennis ball to hold it in position. Do not use static weights or traction. Put the gastric aspirate port on free drainage, and the oesophageal aspirate port on gentle suction. Regularly clear the patient’s oropharynx with gentle suction. Do a CXR to check that gastric balloon is below diaphragm, at the gastric cardia. Re-scope the patient within 24 hours and do not leave the tube inflated for more than 24 hours at a time.

**MANAGEMENT OF DECOMPENSATED CHRONIC LIVER DISEASE**

Link consultant: Dr. Markus Gess  
Link pharmacist: Jasmin Patel

Patients with chronic liver disease can remain stable (compensated) for prolonged periods but are at risk of rapid decompensation. Frequent causes of acute decompensation are hypovolaemia (e.g. secondary to a GI bleed), alcohol excess, sepsis, drugs and renal dysfunction (NB: remember that patients with chronic liver disease often have reduced muscle mass and have lower baseline serum creatinine level). The development of hepatocellular carcinoma and/or portal vein thrombosis can also lead to rapid decompensation.

**Investigations**

**Blood Tests**
1. FBC, U&Es, creatinine, clotting screen  
2. Random Glucose or BM measurement at the bedside  
3. Liver function tests, including γGT, bone profile, AST  
4. Alpha-fetoprotein (AFP)  
5. Arterial blood gases including lactate if patient has encephalopathy, renal impairment or sepsis  
6. Viral screen/liver autoantibodies & immunoglobulins/ferritin/copper studies etc as appropriate (if the aetiology of the liver disease is unclear)  
7. Septic screen if pyrexial or raised inflammatory markers: blood cultures, urine cultures, sputum cultures and ascitic tap (discuss with microbiology – microscopy
result needs to be available on the SAME DAY; if spontaneous bacterial peritonitis is suspected, send ascitic fluid in culture medium bottles)

**Imaging**
1. **CXR**
2. Abdominal ultrasound (to confirm liver fibrosis/cirrhosis; define focal lesions, duct dilatation, patency of portal vein, hepatic veins; measure spleen size; look for ascites)

**Management of Ascites**
1. Treatment may not be needed if the patient is asymptomatic; if complicated by hyponatraemia or renal dysfunction, discuss with Gastroenterology team
2. Perform diagnostic paracentesis - ask for urgent cell count to check for spontaneous bacterial peritonitis (SBP) defined as >250/mL
3. Send sample for culture/biochemistry/cytology
4. If moderate volume ascites and if plasma Na⁺ ≥ 130mmol/L and renal function is normal, give Spironolactone 100mg ± Furosemide 40mg daily. Measure weight daily
5. Target weight loss at ~0.5kg/day. The dose of both diuretics can be increased simultaneously every few days to achieve target weight loss; maintain a 100:40 ratio up to a maximum of 400mg Spironolactone: 160mg Furosemide. Do daily U&Es (rapid electrolyte changes can lead to encephalopathy/central pontine myelinolysis).
6. If hyponatraemic, restrict Na⁺ to 2g/day (88mmol) and fluid restrict to 1.5litres/day (request review by dietician in the first instance)
7. If massive ascites is present (tense abdomen; compromised respiratory and/or renal function), perform paracentesis and discuss with the gastroenterology team. Replace every 2 litres drained with 100 ml 20% albumin. Keep drain in for a maximum of 6 hours or until 12 litres removed (whichever is sooner)

**Note** that patients with confirmed SBP or renal impairment should not have paracentesis until infection or acute kidney injury (AKI) is adequately treated.

**Management of Infection and SBP**
1. If the patient is pyrexial >37.5 or inflammatory markers are significantly raised, infection needs to be considered.
2. Take blood cultures; urine dip±MSU; sputum culture if productive cough; ascitic tap & send ascitic fluid in culture medium bottles
3. If the ascitic WBC is >250/mL (neutrophils) or >300/mL (lymphocytes), the patient is likely to have SBP. While awaiting culture results start Tazocin (piperacillin-tazobactam) 4.5g IV TDS (For true penicillin allergy, discuss with microbiology). After an episode of SBP, prophylactic antibiotics are beneficial. Ask the gastroenterology team for advice.

*Exceptions are for patients with malignancies, lymphoma and peritoneal metastases who may have a high white cell count in the peritoneal fluid

**Management of Coagulopathy**
1. Give Vitamin K (menadiol sodium phosphate) 10mg PO od for 3 days. If severe coagulopathy, Vitamin K (phytomenadione) can be given IV 10mg as liver patients often do not absorb it (maximum 40mg in 24 hours).
2. Do not give FFP/Platelets unless patient is bleeding
3. Note that moderate coagulopathy is not in itself a contraindication to central line insertion or ascitic tap.
MANAGEMENT OF HEPATIC ENCEPHALOPATHY
1. Measure arterial ammonia levels
2. Give lactulose 20mL tds (titrate dose to achieve at least 2 loose stools/day), via nasogastric tube if necessary
3. Give phosphate enemas bd/tds, if insufficient response to oral/NG lactulose or in those not compliant with oral medication
4. Stop diuretics if plasma Na\(^+\)<130mmol/L (increases risk of encephalopathy)
5. Avoid sedatives, opioids, or any other constipating agents
6. Hepatic encephalopathy often occurs in the context of upper GI bleeding, sepsis, acute renal dysfunction – search, diagnose and treat these factors
7. Consider broad spectrum antibiotics if underlying infection is suspected but not immediately obvious (send septic screen) – discuss with microbiologist
8. Consider tracheal intubation to protect airway in patients with grade III/IV encephalopathy (Glasgow Coma Scale≤10)
9. Remember to consider other causes of reduced GCS, eg sepsis, Wernicke’s (give Pabrinex I+II tds iv), intracranial bleed (consider CT head)

MANAGEMENT OF RENAL IMPAIRMENT
In the context of advanced liver disease, renal impairment has a very poor prognosis if not corrected quickly. Remember that most patients with chronic liver disease have lower baseline serum creatinine levels due to low muscle mass (a serum creatine of 100μmol/L may represent significant renal impairment)
1. Stop diuretics, stop NSAIDs; consider stopping ACE inhibitors, angiotensin II receptor antagonists and other anti-hypertensives
2. Catheterise bladder and ensure meticulous fluid balance charts are kept (close liaison with nursing staff) – refer to the section: Acute kidney injury
3. Check and document urinary sodium
4. Perform arterial blood gas including lactate measurement
5. Have a low threshold for central venous line (internal jugular) insertion to help assess volume status and guide fluid management (remember that in massive ascites the CVP will be elevated)
6. If the patient is hypovolaemic, initial fluid resuscitation is key – colloids, sodium chloride, ringer lactate or even glucose solution can be used (be guided by U&Es; use 0.9% sodium chloride in significant hyponatraemia but use cautiously in patients with large volume ascites)
7. Following initial fluid replacement, use human albumin solution to maintain adequate intravascular filling (eg 100mls of 20% Human Albumin Solution IV bd)
8. If urine output remains inadequate start Terlipressin 0.5-1mg iv QDS (use lower doses in patients with significant coronary artery disease or peripheral vascular disease)

** NSAIDs are contraindicated in all patients with liver disease.

NUTRITION
Patients with chronic liver disease are often malnourished. Feeding should be enteral, if necessary with a nasogastric tube. Consult dietitians early as these patients are often in a catabolic state and have increased calorie requirements. General recommendations are:
- high protein diet (caution: may exacerbate hepatic encephalopathy)
- high calorie diet
- low salt diet
- Thiamine replacement - Pabrinex I+II IV over 30 mins for a minimum of 3 doses (bd or tds), then thiamine 100mg po tds for 2 weeks or longer
NASO-GASTRIC (NG) TUBE PLACEMENT
Lead consultant: Dr Lay-May See

Misplaced NG tubes can result in significant mortality and morbidity and feeding into a patient’s lungs is a ‘Never’ event.

Prior to initiating NG feeding:
• A clear indication should be documented
• It should be discussed with the patient and/or relatives (and documented)
• Referral to a dietitian (+/- SALT) should be made

Tube Insertion and pH checks
The following algorithm (next page) should be used when inserting NG tubes and performing placement checks. Aspiration and checking pH should be used FIRST line to confirm position. NG tubes should not be inserted overnight unless they are required for critical medication

Placement Checks - CXR
CXRs to check NG tube position should only be reviewed by a doctor trained to do so. If there is any doubt as to tube position feeding should NOT be started and a second opinion sought. When reviewing the CXR you should:
1) Confirm that you are reviewing correct x-ray
2) Assess whether the NGT:
   a) Follows the course of the oesophagus?
   b) Bisects the carina?
   c) Crosses the diaphragm in the midline?
   d) Tip is below the left hemidiaphragm?
If these 4 criteria are met then the tube safe to use
If unsure – try altering the brightness and contrast of the image; seek 2nd opinion (SpR or radiologist)
If unsafe – remove and re-site
3) Document your review using the CRS pre-configured proforma (‘CXR review post NGT insertion’)

Repeating placement checks
Tube position (pH and length to nostril) should be rechecked and the method documented:
- Following re-insertion
- At least once daily and always following a rest period prior to giving the feed/flush/medications
- Following episodes of vomiting, retching or coughing
- If visual evidence of tube misplacement

Further information
Please refer to the Adult Enteral Nutrition Guidelines for detailed information on tube feeding, risk assessments in patients acid suppression that consistently have a high pH on aspirate and guidance on re-feeding syndrome.
NASO-GASTRIC TUBE ALGORITHM

- Estimate NEX measurement (place exit port of the tube at tip of nose, extend tube to earlobe, and then to xiphisternum)
- Insert fully radio-opaque tube for feeding
- Confirm and document secured NEX measurement
- Aspirate using 50 ml syringe and gentle suction

Aspirate not obtained

Try each of these techniques to help gain aspirate:
- Turn the person onto his/her left side
- Inject 10-20 ml air into the tube using a 50 ml syringe
- Wait for 15-30 minutes before aspirating again
- Advance tube by 5-10 cm
- Give mouth care to patients who are nil by mouth (to stimulate gastric secretion of acid)
- DO NOT FLUSH or put anything down the tube before gastric placement has been confirmed

Aspirate obtained

Test on CE marked pH indicator paper for use on human gastric aspirate

NB where pH is between 5 and 6, a second competent person should check the reading or retest

Aspirate not obtained

pH NOT between 1 and 5.5

pH between 1 and 5.5

Proceed to x-ray: ensure that the reason for x-ray is documented on the request form

Competent clinician (with evidence of training) to review and document that the tube follows the midline, the tip is clearly visible below the left hemi-diaphragm and it is safe to feed the patient via the NG tube

NO

DO NOT FEED or USE THE NG TUBE
Consider re-siting the tube or call for senior advice Any tubes identified to be in the lung should be removed immediately

YES

PROCEED TO FEED or USE TUBE
Record result in the notes and on NUTRITION CARE PLAN (CRS) before each feed/medication/flush

A pH between 1 and 5.5 is reliable confirmation that the tube is not in the lung; however, it does not confirm gastric placement as there is a small chance the tube tip may sit in the oesophagus where it carries a higher risk of aspiration. If there is any concern, the patient should proceed to x-ray in order to confirm tube position. See Adult Enteral Feeding Guidelines on the intranet for further guidance if patients on acid-inhibiting medication consistently have a pH of 6 or more.
**MANAGEMENT OF OBSTRUCTIVE JAUNDICE**  
Link consultant: Dr. Neil Galletly

**Investigations**
1. FBC, U and E, LFTs, CRP, Clotting screen  
2. ABG and lactate if evidence of sepsis or pancreatitis  
3. Blood cultures if pyrexial  
4. Abdominal ultrasound – if common bile duct (CBD) and duct dilatation is detected then MRCP is often not necessary. Please refer the patient to the Gastroenterology or Upper GI Surgery team as soon as possible (urgently).

**Management**
1. If Bilirubin >100 μmol/L then admit patient for urgent ERCP, If evidence of ascending cholangitis then start iv antibiotics according to Trust guidelines.  
2. Urgent ERCP at St Georges – Please fax ERCP referral form (found on Intranet under Forms) to 0208 725 3965 and call one of the Gastroenterology SpRs (bleep 432/433) or Dr Galletly (via switchboard) to discuss.  
3. Keep patient NBM from midnight and please arrange transport and an escort for the patient to get to SGH. Stop clopidogrel (if safe to do so) and correct clotting and platelet abnormalities prior to ERCP. Consider urgent Percutaneous Transhepatic Cholangiography (PTC) if unable to get urgent ERCP appointment (you will need to discuss PTC with one of the interventional radiologists).

**MANAGEMENT OF PATIENTS WITH BLEEDING DISORDERS**  
Link consultant: Dr. Samir Zebari

Kingston Hospital is recognised as a Haemophilia Centre within the national network (UKHCDO). The majority of patients registered on the UKHCDO national database of bleeding disorders will carry a green Special Medical Card, which specifies their deficiency and its severity, also the hospital of registration and the contact particulars.

The two commonest inherited bleeding disorders are haemophilia and von Willebrand disease.

**HAEMOPHILIA**

**Types and severity of Haemophilia**
There are two main types of haemophilia - haemophilia A (factor VIII deficiency) is much more common than haemophilia B (factor IX deficiency). Both are inherited as X-linked disorders and so mainly affect males, but some female carriers may have low enough levels to have clinically mild disease.

The clinical severity of haemophilia is classified according to the factor level as:
* Severe : factor level <1% of normal  
* Moderate : factor level 1 – 5% of normal  
* Mild : factor level >5% of normal

**Bleeding complications**
The more severe the deficiency, the more likely the patient is to have spontaneous bleeding, mainly in the form of musculo-skeletal or bleeding following trauma. For severe haemophiliacs, spontaneous bleeding can be reduced by using prophylactic (usually home-based and self-administered) infusions of factor VIII/IX two or three
times a week, but the levels of factor achieved will likely prove inadequate for protection against surgical/trauma-induced bleeding. They need, therefore, the same consideration/strategy of care as those who are not on maintenance therapy.

The most dangerous haemorrhagic event in haemophilia care is CNS bleeding, whether intracranial or intraspinal. This rarely occurs spontaneously and it usually follows trauma, although the trauma event may have been minor and may have occurred some days or even weeks before.

Other life-threatening bleeding includes:
- within the oropharynx/neck (jeopardising the airway)
- from the upper gastro-intestinal tract (oesophagus/stomach/duodenum)
- blunt/penetrating injury to the chest or abdomen.

Limb injury risks intra-muscular bleeding with the chance of creating a “compartment syndrome”, jeopardising limb function, and, in extreme cases, limb viability. Predisposing factors are arterial or venous cannulation, or intramuscular injections. **NEVER give a haemophiliac an intra-muscular injection.**

Management

**Major surgery/trauma**
For major surgery/trauma, the principles of care are common to all grades of severity of haemophilia:
- Infuse enough Clotting Factor Concentrate (CFC), all clotting factors currently used as recombinant factor VIII (rFVIII) or Factor IX (rFIX) to reach the required target level (see table below)
- Infuse CFC frequently enough to ensure the level does not become subnormal – for haemophilia A, this is normally every 8 - 12 hours, for haemophilia B every 24 hours.
- Monitor the factor level as frequently as feasible to ensure the level remains adequate

<table>
<thead>
<tr>
<th>Site of bleeding</th>
<th>Target level (%) (using Clotting Factor Concentrate infusion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNS/head</td>
<td>80-100</td>
</tr>
<tr>
<td>Head/neck</td>
<td>80-100</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>80-100</td>
</tr>
<tr>
<td>Ophthalmic</td>
<td>80-100</td>
</tr>
<tr>
<td>Major surgery</td>
<td>80-100</td>
</tr>
<tr>
<td>Kidney</td>
<td>50</td>
</tr>
<tr>
<td>Deep laceration</td>
<td>50</td>
</tr>
<tr>
<td>Joint</td>
<td>40-50</td>
</tr>
<tr>
<td>Muscle</td>
<td>40</td>
</tr>
<tr>
<td>NB: ilio-psoas</td>
<td>80-100</td>
</tr>
</tbody>
</table>

The exact dose of CFC to be given depends on the body weight of the patient in kilogram, the baseline factor level, the increment required, and the product being used -consult the manufacturer’s package insert. (Each unit of rFVIII will rise FVIII level by 2% and rFIX rise FIX level by 1%). In order to achieve 100% level
of FVIII in a patient with severe haemophilia, i.e factor VIII level of less than 1% and his weight 70Kg, you need to give 3500units of r FVIII (50 units x 70kg).

Minor bleeding:
Not all haemophiliacs will need treatment with CFC on every occasion - this particularly applies to those with a milder deficiency:

For minor bleeding (e.g. from the mouth) treatment with an anti-fibrinolytic agent such as tranexamic acid, may suffice. In others, an infusion of desmopressin (DDAVP) may produce an adequate rise in the factor VIII level to stem/prevent bleeding – this does not apply to haemophilia B. Desmopressin should only be used in those patients who have previously responded to a test or treatment dose with an adequate increment in factor VIII level. A combination of desmopressin and tranexamic acid may be appropriate for some episodes.

**VON WILLEBRAND DISEASE**

Von Willebrand disease (vWD) is an inherited bleeding disorder resulting from a quantitative or qualitative deficiency of von Willebrand factor – a plasma glycoprotein with essential platelet-dependent functions in primary haemostasis and a carrier for factor VIII in the circulation. Its inheritance is autosomal recessive and so can affect both males and females, and usually presents with easy bruising, menorrhagia or bleeding from other mucosal surfaces.

Treatment of vWD depends on the nature of the bleeding episode, the type and severity of the vWD, the patient’s previous history and response to treatment (particularly their response to DDAVP), and the potential risks of treatment.

Desmopressin (DDAVP) and tranexamic acid are commonly used in vWD and may be all the bleeding episode needs. Unlike haemophilia, where recombinant factor VIII products are now preferred, in vWD virally-inactivated plasma-derived (Humate-P) are still the mainstay for those who need an infusion of factor VIII, as the recombinant products do not contain von Willebrand factor.

**Other bleeding disorders**
The focus of this section has been haemophilia and vWD. The same principles of management will apply to patients with other inherited bleeding disorders, but the detail will vary according to the deficiency and its severity.

**Summary**
**In dealing with bleeding in known or suspected bleeding disorder patients:**

- Establish, if possible, the deficiency and its severity from the patient’s green card.
- Avoid intramuscular injections and unnecessary arterial/venous cannulation.
- Avoid aspirin and non-steroidal medication
- Always contact one of the consultant haematologists as soon as possible – available 24 hours a day through the hospital switchboard.
DEEP VEIN THROMBOSIS and
PULMONARY EMBOLISM (AMBULATORY CARE ONLY)
Link consultant: Dr Sangeeta Atwal ext. 2043
Ambulatory Emergency Care (AEC) extension 3883
Alex Dunkerley (DVT Nurse) extension 6416
Anticoagulation Clinic ext. 2041

Both Ambulatory Care Pathways are available on the intranet Patient Information Management System (PIMS), links below:

KHFT DVT Ambulatory Emergency Care Pathway
KHFT Pulmonary Embolus Ambulatory Care Referral form

Guidance on the management and treatment of Upper Limb DVT, superficial Vein Thrombosis and treatment of venous thromboembolism in patients with Active Cancer can also be found on PIMS.

Protocol for the ambulatory investigation and treatment of DVT
The aim of this protocol is to ensure that all patients with a suspected DVT are investigated in an appropriate and timely way.
1. Patients who do not have a DVT should be referred back to the GP for the management of their symptoms.
2. Patients with a DVT should be treated in the community if it is safe to do so. The aims of treatment are to resolve the thrombus and prevent the immediate complications of extension of the thrombus and embolisation. In the long-term, effective early treatment minimises the likelihood of post-phlebitic syndrome: varicose veins and venous ulcers.

DIAGNOSTIC PATHWAY FOR DVT

The principle of the pathway is as follows:

A D-Dimer is a NEGATIVE PREDICTIVE TEST for venous thromboembolism and should be used in patients with a LOW CLINICAL PROBABILITY ASSESSMENT (CPA) score. If D-dimer negative, these patients do not need an ultrasound scan.

Patients with an INTERMEDIATE or HIGH CPA should have a Doppler ultrasound. Patients with a negative ultrasound should have a repeat scan within one week if the CPA is HIGH and D-DIMER is POSITIVE.

SOURCE OF REFERRAL

Patients present in two ways:
Group 1: After seeing a GP (or other doctors e.g. from hospital clinic, other hospitals within the Trust, or from other Trusts). Patients in group 1 will be seen by the DVT Nurse Specialist in the Ambulatory Emergency Care (AEC) unit between 0900 and 1600 Monday to Friday. Outside these hours, the patients will be seen and assessed in A&E.
**Group 2:** As a self-referral to A&E. *Patients in group 2* must be assessed for their appropriateness for the DVT pathway and ambulatory care in triage/streaming. If appropriate these patients can then be referred to the DVT clinic.

Patients presenting at the A&E reception with suspected DVT will be streamed directly to the Minors area of A&E where they will have a blood tests as outlined in the pathway. Then they return to the waiting room to await triage.

**The blood test request for D-dimer MUST specifically state that you are following the DVT pathway.** This will ensure that the haematology laboratory prioritises the sample within the 1-hour turn-around time.

**HOW TO USE THE CLINICAL PROBABILITY SCORE AND D-DIMER**

The doctor must complete a *DVT pathway*, including clinical details and a *clinical probability assessment score*. Paper copies of the pathways are held in A&E Minors.

- Patients with a **low clinical probability score and a negative D-dimer** are unlikely to have a DVT as the cause of the painful swollen leg and can be discharged back to the GP with a discharge summary.

- Patients with an **intermediate or high clinical probability** should have a Doppler ultrasound. A D-dimer test should be performed but the result does not need to be available to request an ultrasound.

**At this stage, assess whether the patient is suitable to be discharged on treatment whilst awaiting his/her ultrasound scan. Patients who are not suitable (see below for list of exclusion criteria) must be referred to the medical team on-call.**

**PATIENTS UNSUITABLE FOR AMBULATORY TREATMENT FOR DVT (EXCLUSION CRITERIA)**

Refer to the on-call medical SHO/SPR and admit the patient to hospital. The exclusion criteria for ambulatory treatment for DVT are as follows:

- Patients at risk of bleeding if anticoagulated (e.g. liver disease, peptic ulcer, alcohol abuse, uncontrolled hypertension, drugs that potentiate the effects of warfarin)
- Patients at risk of propagation and embolisation of thrombus (bilateral DVT or thrombus extending into the internal or external iliac vessels), pregnancy (if over 18/40 weeks gestation refer to Obstetric team on-call).
- Patients with iliac vein thrombosis should be admitted for CT venogram and the vascular team at St. Thomas’ hospital should be contacted with regard to the suitability for thrombectomy or thrombolysis.
- Patients unable to co-operate with return visits to hospital for scans and treatment (confused and immobile patients, patients requiring front-line ambulance transport)
PATIENTS SUITABLE FOR AMBULATORY TREATMENT FOR DVT

KHFT DVT Ambulatory Emergency Care Pathway (PIMS)

1. Dalteparin should be administered every 24 hours until the scan. Teach patients to self-administer the injections or arrange for a District Nurse to do so. Prescribe dalteparin on the standard scan and treatment letter found on the last page of the pathway.

2. Place the completed DVT pathway and patient’s notes in the DVT tray in A&E reception. An ultrasound scan must be requested on CRS for the patient.

3. Give the patient an appropriate supply of dalteparin and discharge the patient home with the scan and treatment letter explaining how to contact the ultrasound department to arrange a scan on the next working day.

TREATMENT PATHWAY FOR DVT

Negative D-dimer and low clinical probability assessment
Unlikely to be DVT. Discharge the patient with a discharge summary form and send a copy to the patient’s GP. Diagnostic ultrasound is not indicated.

Doppler ultrasound negative for DVT
- If low or intermediate clinical probability, discharge with a discharge summary form and send a copy to the patient’s GP. No further follow-up is required.
- If high clinical probability and positive D-dimer, there is still a small possibility of a DVT so inform the patient that, should symptoms worsen, they should re-attend at their GP surgery or A&E for re-investigation. Discontinue dalteparin. Order a repeat scan to be performed after one week.

Doppler ultrasound confirms DVT
- If the patient is suitable for ambulatory treatment, outpatient treatment and follow-up is organized through the DVT and AEC clinics.
- If the patient is unsuitable for outpatient treatment, admit via the medical SHO. Inpatients should have blood taken daily for warfarin dosing and investigation into cause of thrombus as appropriate. INR should be therapeutic before discharge. – send patient’s blood sample and green ‘Oral Anticoagulation (warfarin) prescription chart and discharge referral form’ to the anticoagulant team in pathology as soon as decision to discharge has been made.
**DIAGNOSTIC PATHWAY FOR PULMONARY EMBOLISM**

Always conduct a PE risk assessment using the Wells score before requesting any investigations, e.g. D-dimer, perfusion scan or CTPA.

**Wells Score – Clinical Pre-test Probability (PTP) for P.E.**

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative diagnosis unlikely</td>
<td>3</td>
</tr>
<tr>
<td>Clinical symptoms/signs of DVT (swelling/pain)</td>
<td>3</td>
</tr>
<tr>
<td>HR &gt; 100 bpm</td>
<td>1.5</td>
</tr>
<tr>
<td>Immobilisation &gt;3 days or surgery within previous 4 weeks</td>
<td>1.5</td>
</tr>
<tr>
<td>Previous DVT/PE</td>
<td>1</td>
</tr>
<tr>
<td>Haemoptysis</td>
<td>1</td>
</tr>
<tr>
<td>Active malignancy (treatment within past 6 months/palliative)</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total score</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Probability of PE using PTP/Wells score:**
- Low Score < 2: Check D-dimer
- Moderate Score 2 – 6: Check D-dimer
- High Score > 6: D-dimer NOT indicated

If the Wells score is low/moderate and the D-dimer is negative, no further investigations are required. Otherwise, request CTPA or Perfusion scan (if CXR normal, no history of asthma or cardiopulmonary disease).

**PATIENTS UNSUITABLE FOR AMBULATORY TREATMENT FOR P.E. (EXCLUSION CRITERIA)**

Refer the patient to the on-call medical SHO/SPR and admit the patient to hospital.

The exclusion criteria for ambulatory treatment for PE include:
- Patients at high risk of mortality according to the Pulmonary Embolism Severity Index (PESI grades III, IV, and V). See the PESI scoring table below.
- Patients at risk of bleeding if anticoagulated (e.g. liver disease, peptic ulcer, alcohol abuse, uncontrolled hypertension, drugs potentiating effects of warfarin)
- Pregnant patients over 18/40 weeks gestation (refer to Obstetric Team on-call).
- Exclusion criteria from the clinical probability assessment (Wells score low/moderate and negative D-dimer)
- Patients unable to co-operate with return visits to hospital for scans and treatment (confused and immobile patients, patients requiring ambulance transport)
- Other exclusion criteria are as any one of the following:

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Exclusion criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse &gt;110 bpm</td>
<td>Co-existing major DVT being treated</td>
</tr>
<tr>
<td>Systolic BP ≤ 100 mmHg</td>
<td>ECG changes/Troponin positive</td>
</tr>
<tr>
<td>Age ≤ 18 or ≥ 70 years</td>
<td>Chronic lung disease</td>
</tr>
<tr>
<td>Bleeding disorder</td>
<td>Heart failure</td>
</tr>
<tr>
<td>Active bleeding in the last 4 weeks</td>
<td>Significant co-morbidity e.g. renal disease or malignancy</td>
</tr>
<tr>
<td>Creatinine ≥ 150 umol/L</td>
<td>Not registered to a local GP</td>
</tr>
<tr>
<td>Platelets ≤ 90 x 10⁹/L</td>
<td>Language/communication difficulties</td>
</tr>
<tr>
<td>Medical Condition</td>
<td>Reason</td>
</tr>
<tr>
<td>-------------------</td>
<td>--------</td>
</tr>
<tr>
<td>Heparin allergy or Heparin induced thrombocytopenia</td>
<td>Unsuitable social circumstances or living alone</td>
</tr>
<tr>
<td>Cerebrovascular disease</td>
<td>Anticipated compliance problem</td>
</tr>
<tr>
<td>Altered mental state (acute or chronic)</td>
<td>Immobile (i.e. not ambulatory)</td>
</tr>
</tbody>
</table>

**Pulmonary Embolism Severity Index (PESI)**

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male gender</td>
<td>1 point per year</td>
</tr>
<tr>
<td>Heart failure</td>
<td>10</td>
</tr>
<tr>
<td>Chronic lung disease</td>
<td>10</td>
</tr>
<tr>
<td>Heart rate &gt; 110 bpm</td>
<td>20</td>
</tr>
<tr>
<td>Systolic BP &lt; 100 mmHg</td>
<td>20</td>
</tr>
<tr>
<td>Respiratory rate ≥ 30 breaths/min</td>
<td>20</td>
</tr>
<tr>
<td>Body temperature &lt; 36°C</td>
<td>20</td>
</tr>
<tr>
<td>Disorientation, lethargy, stupor, coma</td>
<td>60</td>
</tr>
<tr>
<td>Oxygen saturations on air ≤ 90%</td>
<td>20</td>
</tr>
</tbody>
</table>

**Total score**

<table>
<thead>
<tr>
<th>PESI Class</th>
<th>Score</th>
<th>Risk</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I</td>
<td>≤ 65</td>
<td>Very low</td>
<td>0%</td>
</tr>
<tr>
<td>Class II</td>
<td>66–85</td>
<td>Low</td>
<td>1%</td>
</tr>
<tr>
<td>Class III</td>
<td>86–105</td>
<td>Intermediate</td>
<td>3.5%*</td>
</tr>
<tr>
<td>Class IV</td>
<td>106–125</td>
<td>High</td>
<td>10.4%*</td>
</tr>
<tr>
<td>Class V</td>
<td>&gt; 125</td>
<td>Very high</td>
<td>24.4%*</td>
</tr>
</tbody>
</table>

*Not suitable for the PE ambulatory care pathway

**PATIENTS SUITABLE FOR AMBULATORY TREATMENT FOR P.E.**

**KHFT Pulmonary Embolus Ambulatory Care Referral form**

1. Dalteparin should be administered every 24 hours until the scan. Teach patients to self-administer the injections or arrange for a District Nurse to do so. Place the completed PE pathway and patient’s notes in the Ambulatory Emergency Care (AEC) tray in A&E reception.

2. **Do not request a CTPA scan on CRS** as the patient will be assessed in AEC. All pregnant ladies less than 18/40 weeks gestation, with suspected PE, with or without leg symptoms, should have a bilateral lower limb ultrasound requested on CRS. Give the DVT treatment and scan the letter according to instructions in the KHFT DVT Ambulatory Emergency Care Pathway.

3. Give the patient an appropriate supply of dalteparin and discharge the patient home with the standard patient information letter.

4. Ideally, give the patient a copy of his/her own notes to bring to the AEC.

5. Teach patients to self-administer the injections or arrange for a District Nurse to do so.
**TREATMENT FOR DVT AND PE** (non-massive/ambulatory)

Ambulatory patients are all commenced on treatment by either the DVT Nurse or Advanced Nurse Practitioner in the AEC clinic. Patients are given TTO pre-labelled boxes of Dalteparin and warfarin from AAU drug cupboard, National Patient Safety Agency oral anticoagulant information, and record books (kept in the DVT clinic room. Those suitable for direct oral anticoagulants are given information leaflets and an outpatient prescription. All patients are given an NPSA alert card and referred to the anticoagulation clinic.

Treatment is detailed in the Ambulatory Emergency Care Pathways however treatment for ambulatory care patients is also outlined here:

1. **Weigh the patient and prescribe Dalteparin, as below, in the first page of the yellow book.** See table below for dose regimen.
   - The single dose should not exceed 18,000 units. It can be self-administered or arrange for a district nurse or practice nurse to administer it, by contacting the patient’s GP surgery.
   - Dalteparin should be given for a minimum of 5 days and continued until the INR is 2.0 or more.

<table>
<thead>
<tr>
<th>ADULTS</th>
<th>Weight</th>
<th>Dalteparin dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single use, pre-filled, disposable syringes should be used</td>
<td>Under 46 kg</td>
<td>7,500 units daily (once daily)</td>
</tr>
<tr>
<td></td>
<td>46-56 kg</td>
<td>10,000 units daily (once daily)</td>
</tr>
<tr>
<td></td>
<td>57-68 kg</td>
<td>12,500 units daily (once daily)</td>
</tr>
<tr>
<td></td>
<td>69-82 kg</td>
<td>15,000 units daily (once daily)</td>
</tr>
<tr>
<td></td>
<td>83-110 kg</td>
<td>18,000 units daily (once daily)</td>
</tr>
<tr>
<td></td>
<td>111-150kg</td>
<td>Dose according to body weight, split to 100 units/kg bd (use pre-filled syringes to the nearest amount)</td>
</tr>
<tr>
<td></td>
<td>&gt;150kg</td>
<td>Discuss with Haematologist</td>
</tr>
</tbody>
</table>

**Renal failure**
- CrCl <30 ml/min requires either a) switch to unfractionated heparin infusion or b) a dosage reduction in dalteparin of 30-50% and monitoring with Anti Xa chromogenic assay. Take samples 3-4 hours after SC administration for peak Anti-Xa level.
- Split to twice daily dosing to avoid excessive peaks in anticoagulation.
- Therapeutic range for a twice daily regimen is Anti-Xa level 0.4-1.1 U/ml.
- If accumulation of LMWH is suspected, additional measurements, including a trough level on a sample taken 24 hours after the last dose, may be informative.

<table>
<thead>
<tr>
<th>PREGNANCY</th>
<th>Weight</th>
<th>Dalteparin Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use booking or early pregnancy weight</td>
<td>&lt;50 kg</td>
<td>5,000 units twice daily</td>
</tr>
<tr>
<td>Single use, pre-filled, disposable syringes should be used</td>
<td>50-69 kg</td>
<td>7,500 units OM and 5,000 units ON</td>
</tr>
<tr>
<td></td>
<td>70-89 kg</td>
<td>7,500 units twice daily</td>
</tr>
<tr>
<td></td>
<td>90-109 kg</td>
<td>10,000 units twice daily</td>
</tr>
<tr>
<td></td>
<td>110-125 kg</td>
<td>12,500 units twice daily</td>
</tr>
<tr>
<td></td>
<td>&gt;125kg</td>
<td>Discuss with Haematologist</td>
</tr>
</tbody>
</table>

Pregnancy - inject dalteparin into thigh, not abdomen. Monitoring with anti-Xa is only required if at extremes of body weight or if renal impairment (discuss with haematologist)
2. Prescribe a loading dose of warfarin, in the first page of the yellow book, for
the first three days. Arrange INR on the 4th day in the anticoagulant clinic.
The usual loading dose of warfarin is 10mg/10mg/5mg at 6 pm on three consecutive
days with the aim of achieving an INR of 2.0 or more. A smaller loading dose
10mg/5mg/5mg may be appropriate for some patients: the elderly, those on drugs
that potentiate the effects of warfarin (refer to BNF for full list).

**Anticoagulant clinics** are held at Kingston Hospital on Monday and Thursday (new
patients at 14.00). It may be necessary to start the warfarin therapy so as to schedule
the anticoagulant clinic for the 4th day of treatment (i.e. start on Friday for a
Monday clinic, or start on Monday for a Thursday clinic).

3. Fill out the anticoagulant referral form and fax, with the counselling
checklist, to the anticoagulant clinic on 020 8934 3245.

4. Complete all the details in the yellow anticoagulant therapy booklet

5. Give the patient the information sheets for DVT and PE with advice and
contact numbers

   DVT: KHFT DVT Ambulatory Emergency Care Pathway and/or
   Patient.co.uk Deep Vein Thrombosis
   PE: KHFT Pulmonary Embolus Ambulatory Care Referral form
   Patient.co.uk Pulmonary Embolism

The duration of anticoagulation varies and is summarised in the table below:

<table>
<thead>
<tr>
<th>Presenting Features</th>
<th>Target INR (range)</th>
<th>Recommended duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal DVT or PE</td>
<td>2.5 (2.0-3.0)</td>
<td>Minimum 3 months</td>
</tr>
<tr>
<td>Calf vein thrombosis - surgical (post-op), no risk factors</td>
<td>2.5 (2.0-3.0)</td>
<td>3 months then stop</td>
</tr>
<tr>
<td>Calf vein thrombosis - non-surgical, no risk factors</td>
<td>2.5 (2.0-3.0)</td>
<td>3 months then review</td>
</tr>
<tr>
<td>DVT or PE plus continued risk factors</td>
<td>2.5 (2.0-3.0)</td>
<td>Long term or until risk resolved</td>
</tr>
<tr>
<td>Recurrent DVT or PE</td>
<td>2.5 (2.0-3.0)</td>
<td>Long term</td>
</tr>
<tr>
<td>Recurrent DVT or PE despite warfarin</td>
<td>3.5 (3.0-4.0)</td>
<td>Long term</td>
</tr>
</tbody>
</table>

The responsibility for oral anticoagulant control is with the anticoagulant clinic.
The responsibility for follow-up and investigation of any underlying conditions is
with the medical team on-call the day of diagnosis

| Alex Dunkerley DVT Clinical Nurse Specialist ext 6416 |
THROMBOPROPHYLAXIS: RISK ASSESSMENT AND THE USE OF DALTEPARIN (LOW MOLECULAR WEIGHT HEPARIN)

Link consultants: Dr. Sangeeta Atwal and Dr. Samir Zebari
Pharmacists: Ritti Desai

The Trust VTE Policy is available on PIMS (Patient Information Management Service), the hospital intranet facility for guidelines.

It is mandatory that patients ≥ 18 years old have an accurate VTE assessment completed from the CRS task list, within 24 hours of admission. The VTE assessment should be completed on admission, and re-assessed within 24 hours of admission. Weekly re-assessment should only be carried out on each Wednesday. Patients who do not have a VTE assessment within 24 hours can have an “ad hoc” VTE assessment but this does not count towards your/the Trust’s VTE assessment target. All patients should be given a patient information leaflet: ‘Information about DVT and PE’.

**STEP 1: Assess all patients for their level of mobility.** On admission to hospital, all surgical patients, gynaecological patients admitted for surgery, and all medical patients with significantly reduced mobility should be considered for further risk assessment (steps 2 and 3), and anticoagulant dose initiated upon admission. For other specialities, obstetric patients and pregnant gynaecological patients, see specific guidance available on the intranet.

**STEP 2: Assess all patients for thrombosis risk factors.**
1 or more risk factor indicates the need for thromboprophylaxis

<table>
<thead>
<tr>
<th>Patient-related risk factors</th>
<th>Admission-related risk factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &gt; 60</td>
<td>Significantly reduced mobility ≥ 3 days</td>
</tr>
<tr>
<td>Dehydration</td>
<td>Hip or knee replacement</td>
</tr>
<tr>
<td>Active cancer or cancer treatment</td>
<td>Hip fracture</td>
</tr>
<tr>
<td>Known thrombophilia - inherited or acquired</td>
<td>Surgical procedure + total anaesthetic time &gt;90 minutes OR</td>
</tr>
<tr>
<td>Obesity BMI &gt;30kg/m²</td>
<td>Surgical procedure involving pelvis or lower limb and total anaesthetic + procedure time &gt;60 minutes</td>
</tr>
<tr>
<td>Cardiac failure or recent myocardial infarction</td>
<td>Acute surgical admission with inflammatory or intra-abdominal condition</td>
</tr>
<tr>
<td>Diabetic ketoacidosis</td>
<td>Critical care admission</td>
</tr>
<tr>
<td>Acute or chronic lung disease</td>
<td>Anticipated bed rest of &gt; 4days</td>
</tr>
<tr>
<td>Severe sepsis/infection</td>
<td>Immobilising plaster cast</td>
</tr>
<tr>
<td>Inflammatory disease</td>
<td>Lower limb paralysis (excluding acute stroke)</td>
</tr>
<tr>
<td>Personal or family history (first degree relative) DVT/PE</td>
<td>Other</td>
</tr>
<tr>
<td>Use of hormone replacement therapy</td>
<td></td>
</tr>
<tr>
<td>Use of oestrogen containing contraceptive therapy</td>
<td></td>
</tr>
<tr>
<td>Varicose veins with phlebitis</td>
<td></td>
</tr>
<tr>
<td>Pregnancy or Post Partum within 6 weeks. See NICE guidance for specific risk factors</td>
<td></td>
</tr>
<tr>
<td>Myeloproliferative disorders</td>
<td></td>
</tr>
<tr>
<td>Hyperviscosity syndromes</td>
<td></td>
</tr>
<tr>
<td>Nephrotic syndrome (albumin &lt;20)</td>
<td></td>
</tr>
</tbody>
</table>
Step 3: Assess all patients for bleeding risk. Dalteparin should not be prescribed if there is 1 or more contra-indication*

<table>
<thead>
<tr>
<th>Patient-related factors</th>
<th>Admission-related factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active bleeding</td>
<td>Neurosurgery, spinal surgery or eye surgery</td>
</tr>
<tr>
<td>Acquired bleeding disorder (eg severe liver disease, septic shock, DIC)</td>
<td>Lumbar puncture/epidural/spinal anaesthesia within next 12 hours</td>
</tr>
<tr>
<td>Concurrent use of anticoagulants known to increase the risk of bleeding (such as warfarin with INR ≥2)</td>
<td>Lumbar puncture/epidural/spinal anaesthesia within the previous 4 hours</td>
</tr>
<tr>
<td>Acute stroke within 4 weeks (haemorrhagic or ischaemic)</td>
<td>Heparin allergy (including HITTS)</td>
</tr>
<tr>
<td>Thrombocytopenia &lt;75x 10⁹/l or platelet dysfunction</td>
<td>Other procedure with high bleeding risk:</td>
</tr>
<tr>
<td>Severe renal failure (creatinine clearance &lt; 30ml/min), use dalteparin 2500 units SC once a day or unfractionated heparin sodium 5000 units SC twice a day</td>
<td>Percutaneous nephrolithotomy (PCNL)</td>
</tr>
<tr>
<td>Uncontrolled hypertension (&gt;230/120mm Hg)</td>
<td>Trans-rectal ultrasound guided biopsy of the prostate (TRUS)</td>
</tr>
<tr>
<td>Inherited bleeding disorder (eg haemophilia, von Willebrand’s disease)</td>
<td></td>
</tr>
</tbody>
</table>


Step 4: Decide the need for dalteparin +/- anti-embolism compression stockings. Prescribe as appropriate.

<table>
<thead>
<tr>
<th>Risk of VTE</th>
<th>Recommended prophylaxis for Surgical patient</th>
<th>Recommended prophylaxis for Medical patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low (no ticks)</td>
<td>Early mobilisation</td>
<td>Mechanical intervention*</td>
</tr>
<tr>
<td>High (with significant risk of bleeding)</td>
<td>Mechanical intervention*</td>
<td>Mechanical intervention (Do NOT use antiVTE stockings in stroke patients)</td>
</tr>
<tr>
<td>High (with low risk of bleeding)</td>
<td>Dalteparin 5000units od + mechanical intervention</td>
<td>Dalteparin 5000units od</td>
</tr>
</tbody>
</table>

*Mechanical interventions: 1st choice is anti-embolism stockings unless contra-indicated.

Mechanical interventions: Anti-embolism Stockings/ Intermittent Pneumatic Compression Devices
Where anti-embolism stockings are considered, patients should be measured for their application as soon as possible (e.g. on admission to the ward for surgical patients, or in AAU for medical emergency patients). Anti-embolism stockings should be worn from the day of admission until the day of discharge. Patients admitted on the day of surgery should have their anti-embolism stockings fitted before proceeding to theatre. Patients undergoing surgery may also be considered for calf compression boots intra-operatively and postoperatively for major interventions.

Anti-embolism stockings/graduated compression stockings
- For all surgical patients (except those with low VTE risk), consider anti-embolism stockings in addition to dalteparin (unless contraindicated)
- For medical patients, consider anti-embolism stockings only if dalteparin is contraindicated. Do not use anti-embolism stockings in stroke patients.
### Contraindications to anti-embolism stockings

<table>
<thead>
<tr>
<th>Contraindication</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspected or proven peripheral vascular disease</td>
<td>Local condition where stockings may cause damage, eg 'tissue paper skin', dermatitis, gangrene, recent skin graft, pressure sores on heels, cellulitis</td>
</tr>
<tr>
<td>Peripheral arterial bypass grafting</td>
<td></td>
</tr>
<tr>
<td>Peripheral neuropathy</td>
<td></td>
</tr>
<tr>
<td>Known allergy to stocking material</td>
<td></td>
</tr>
<tr>
<td>Extreme deformity of leg</td>
<td></td>
</tr>
<tr>
<td>Use with caution over venous ulcers</td>
<td></td>
</tr>
<tr>
<td>Pedal pulses not palpable</td>
<td></td>
</tr>
</tbody>
</table>

For specific guidelines for individual specialties follow the flow charts available in the [NICE, January 2010 guide: Venous thromboembolism](#).

**Step 5: Sign and date the form on CRS for each assessment**

### General Principles
- Treat until the risk of venous thromboembolism (VTE) has diminished.
- Assess risks and benefits of stopping pre-existing antiplatelet therapy 1 week before surgery and stopping oestrogen containing contraceptives or HRT 4 weeks before surgery.
- Encourage early mobilisation for all patients where appropriate
- Do not allow patients to become dehydrated unless clinically indicated

### Prescribe
- Dalteparin 5000 units s/c od, at 6 p.m. (18:00 hrs)
- For patients of low weight (< 50 kg), reduce the dose to 2,500 units s/c once daily.
- For patients 100 – 150 kg, increase the dose to 5000 units s/c twice daily.
- For patients > 150 kg, increase the dose to 7500 units s/c twice daily.
- For patients with severe renal failure (creatinine clearance < 30ml/min), prescribe unfractionated heparin sodium 5,000 units s/c twice a day or dalteparin 2,500 units s/c once daily. Review on a daily basis and when renal function improves, change to dalteparin 5,000 units s/c once daily.
- Consider anti-embolism stockings (unless contraindicated).

### Timing
Patients going for surgery the following day can be given dalteparin the evening prior to surgery.

### Insertion/ removal of epidurals or spinal cannulae
The timing of doses immediately pre-op and post-op is critical as this may determine the degree of bleeding and whether an epidural or spinal cannulae can be inserted by the anaesthetist. Placement or removal of catheter should be delayed for 12 hours after administration of dalteparin. Dalteparin should not be given sooner than 4 hours after catheter removal.

### Major head injury
Consider anti-embolism stockings. Add dalteparin only if decision documented by SPR or consultant.

### Duration
Consider thromboprophylaxis until mobility no longer significantly reduced. High risk orthopaedic patients should receive prophylaxis for at least 10 days. Extended
prophylaxis (28 days) is recommended post hip fracture and other selected high-risk general surgery patients e.g. after major cancer surgery.

**Administration**
Administer by subcutaneous injection, preferably into the abdomen. For pregnant patients, however, the thigh should be used instead.

**Before discharge offer:**
- information on signs and symptoms of DVT and PE
- information on the importance of seeking medical help and who to contact if DVT, PE or other adverse event suspected

**Monitoring**
Dalteparin can cause heparin-induced thrombocytopenia. Check platelet count before starting treatment and monitor every 7 days thereafter. Do not use dalteparin or heparin if the platelet count is below 75 x 10^9/l; refer to consultant haematologist for advice. Monitor potassium level every 7 days as heparins can cause hypoaldosteronism.

Other monitoring is not routinely required. However, monitoring using anti Xa (pale blue top, citrate bottle) should be carried out in:
- Patients at extremes of body weight (>100kg)
- Women who are pregnant when twice daily (bd) dosing is used
- Patients with a creatinine clearance < 30ml/min

Initially, weekly measurement is advised. Anti Xa levels should be taken 3-4 hours after injection. Document the time of the dalteparin/heparin dose and the blood sample. Anti Xa assay levels should be:
- 0.1-0.5 units/ml for prophylaxis, or
- 0.5-1.0 units/ml for treatment of acute venous thromboembolism.
Discuss with consultant haematologist.

**Management of bleeding**
Dalteparin and other heparins are inhibitors of coagulation factors and are NOT reversed by FFP.
- **Stop dalteparin/heparin treatment until the cause of bleeding is confirmed. Seek senior medical advice.**
- Check platelet count and coagulation screen. If there is no surgical or correctable cause, consider giving protamine.

1mg of protamine will neutralise the effect of 100 units of unfractionated heparin (max dose 50mg). It is much less effective in reversing anticoagulation from low molecular weight heparins (e.g. dalteparin) but can provide some reversal given at the same dose. It may need to be repeated if bleeding persists as it has a shorter half-life than dalteparin (4 hours). Contact Pharmacy or Haematology for specific dosing guidance.
GUIDELINES FOR HEPARIN INFUSION
Link consultant: Dr Sangeeta Atwal, Pharmacist: Ritti Desai

Use of Intravenous Unfractionated Heparin (UFH) Infusion

All healthcare professionals must ensure there is effective communication regarding loading dose and subsequent maintenance dose regimens when prescribing, dispensing and administering unfractionated heparin.

Indications
1. Treatment of suspected or proven pulmonary embolus or deep vein thrombosis where LMWH is contraindicated
2. Treatment of acute arterial embolism or after embolectomy
3. As an alternative to oral anticoagulation in a patient on long-term warfarin undergoing a surgical or other invasive procedure where full anticoagulation needs to be maintained
4. For haemofiltration, post tPA infusion, acute AF, with tenecteplase post MI

Contraindications and Precautions
1. Underlying haemorrhagic disorders
2. Actual or potential bleeding site
3. Previous heparin induced thrombocytopenia or allergy to unfractionated or low molecular weight heparin
4. Severe uncontrolled hypertension
5. Avoid in severe hepatic impairment due to increased risk of bleeding.
6. Monitor in severe renal impairment due to increased risk of bleeding
7. Thrombocytopenia

Protocol and dosage schedule
1. Check for any contraindications prior to starting heparin
2. Check coagulation screen and platelet count prior to starting heparin
3. Prescribe a heparin infusion using the corresponding powerplan on CRS. Ensure that the loading dose and the continuous infusion are prescribed. Follow the instructions on the powerplan and below.
4. Prescribe loading dose: 5000 units bolus IV injection (using heparin 1000 units/ml)
5. Start an intravenous infusion of heparin using heparin 1000 units/ml. Heparin is available in the following preparations: 20,000 units/20 ml and 5000 units/5 mls. No extra dilution is necessary.
6. Prescribe the infusion as: 24,000 units in 24 ml. Start the infusion directly after the loading IV bolus, at an initial rate of 1 ml/hour. The infusion expires after 24 hours (when it has to be re-prescribed).

Monitoring Heparin Therapy
- Check APTT ratio after 4-6 hours. A therapeutic APTT ratio is 1.5-2.5
- If the APTT ratio is outside of this range then adjust infusion rate as outlined in the table below
- Continue checking APTT ratio 6 hourly and adjust infusion rate as appropriate until it is within therapeutic range. Each change of rate must be clearly documented for all healthcare professionals to review.
- Once in therapeutic range check APTT ratio daily. If continued for 5 days or more, check platelet count at least every third day.
- If the hourly rate exceeds 1ml/hour then 36,000 units heparin in 36 ml can be prescribed. The infusion expiry is 24 hours

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• Do not increase the total daily dose beyond 50,000 units. If it is difficult to reach the therapeutic ratio, do not increase the heparin dose. Seek Haematology advice.

<table>
<thead>
<tr>
<th>APTT Ratio</th>
<th>Infusion Rate Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1.2</td>
<td>Give a further loading dose of 5000 units Increase by 400 units per hour (0.4 ml/hr)</td>
</tr>
<tr>
<td>1.2-1.4</td>
<td>Increase by 200 units per hour (0.2 ml/hr)</td>
</tr>
<tr>
<td>1.5-2.5</td>
<td>No change</td>
</tr>
<tr>
<td>2.6-4.0</td>
<td>Stop infusion for 1 hour Reduce by 100-200 units per hour (0.1-0.2 ml/hr)</td>
</tr>
<tr>
<td>&gt;4.0</td>
<td>Stop infusion for 1-2 hours Reduce by 200-400 units per hour (0.2-0.4ml/hr)</td>
</tr>
</tbody>
</table>

**Bleeding in a patient on heparin.** Older patients on heparin for >4 days are most at risk but bleeding can occur in anyone, from any source. Bleeding can be silent into a “third space” such as the retroperitoneum. A falling haematocrit, back pain or even severe anxiety on the part of the patient can give a clue. Arterial puncture sites should be carefully compressed and observed. Any painful swelling should be regarded as haemoma. Do not give any drugs by intramuscular injection.

**Reversal of Heparin INFUSION**
If the patient is on a continuous infusion of heparin via a pump the heparin should be STOPPED (heparin activity will be lost from the plasma within 2 to 4 hrs). If immediate reversal is required give protamine sulphate 25mg – 50mg IV as soon as the heparin infusion has been stopped (rate not exceeding 5mg/minute). (For more specific dosing guidance contact Haematology or Pharmacy).

**Reversal of Heparin INJECTION**
To reverse an intravenous injection of heparin give protamine sulphate (rate not exceeding 5mg/minute), 1mg neutralises 80-100 units heparin when given within 15 minutes of heparin. Maximum dose 50mg. Halve the protamine dose if more than 30 minutes have elapsed since heparin was injected intravenously and quarter the dose if more than 2 hours have elapsed since heparin was injected intravenously. Administration of plasma products will not reverse heparin anticoagulation.

**Heparin Induced Thrombocytopenia (HIT).**
HIT is caused by the development of IgG antibodies directed against a complex of platelet factor 4 (PF4) and heparin. The IgG/PF4/heparin complexes bind to and activate platelets through their Fc receptors resulting in a prothrombotic state that is associated with venous and arterial thrombosis. Typically there is a progressive fall in platelet count between day 5-10 of starting heparin or ≤ 1 day if heparin exposure within 30days. Some can present with evidence of thrombosis and attempts at surgical removal or thrombolysis will fail if heparin is continued. It is crucial to recognise this syndrome and immediately stop heparin (UF and LMWH). An alternative anti-thrombotic agent should be substituted – refer to the Trust HIT Clinical Guideline (PIMS) Seek urgent advice from the Haematology department on-call service.

**Invasive procedures in patients on heparin.** Intravenous UFH should be stopped at least 2 hours before undertaking an invasive procedure.
WARFARIN: INDUCTION AND RE-INDUCTION
Link consultant: Dr Sangeeta Atwal
Anticoagulation clinical nurse specialist bleep 544

Administration is at 6 p.m. for inpatients, ambulatory patients and for TTOs. Counsel the patient on the day of discharge to prevent warfarin being taken twice.

Anticoagulant dosing for inpatients is the responsibility of the ward-based doctors. Advice and support can be obtained from the Anticoagulant Office Health Professionals Helpline on ext 2041 or by contacting the Duty Haematologist via switchboard.

Patients new to warfarin should start using a recognised induction regimen and have daily INRs until a therapeutic INR has been achieved. There is a standard induction regimen and a reduced intensity induction regime for patients over 75 years of age or who have one of the following risk factors: heart failure, renal failure, weight < 55kg, interacting medications (e.g. metronidazole, ciprofloxacin, erythromycin, amiodarone, high dose corticosteroids). Ensure that patients receive appropriate verbal information at the start of therapy.

Patients already on warfarin should have the usual daily maintenance dose recorded on the electronic drug chart to guide the doses given on the ward, although the actual daily dose may vary from the usual maintenance dose because of intercurrent illness and interacting medication.

WARFARIN RE-INDUCTION
If warfarin is stopped during the inpatient stay, rapid re-induction to a therapeutic INR can be achieved using double the usual maintenance dose for the first two days then resuming the usual maintenance dose. Ensure that the INR is checked within the first week of re-induction.

WARFARIN DOSING GUIDELINES

| Venous Thromboembolism INR 2.0 – 3.0 |
| DVT – Minimum 3 months |
| PE – Minimum 3 months |
| Systemic embolus 3 – 6 months |
| Recurrent Thromboembolic Disease (NO concurrent anticoagulation) - Long term |

| Venous Thromboembolism INR 3 – 4 |
| Recurrent Thromboembolic Disease when on warfarin - Long term |
Cardiological INR 2.0 – 3.0
Atrial Fibrillation/Flutter – 3 weeks prior to cardioversion then 4 weeks post and review
Atrial Fibrillation/Flutter – Long term

IHD + Aspirin 75mg daily – Long term (discuss with cardiologist first)
Acute STEMI (Q wave) – 3 months

Rheumatic MVD – Long term
Mitral Valve prolapse – Long term
Mitral Annular Calcification – Long term

Cardiomyopathy – Long term
LV dysfunction/dilatation post MI – Long term

<table>
<thead>
<tr>
<th>Aortic Valves</th>
<th>INR RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>St Jude Medical Bileaflet</td>
<td>2.0 – 3.0</td>
</tr>
<tr>
<td>Carbomedics Bileaflet</td>
<td>2.0 – 3.0</td>
</tr>
<tr>
<td>Meditronis hall tilting</td>
<td>2.0 – 3.0</td>
</tr>
<tr>
<td>Bileaflet Mechanical Valves AND AF</td>
<td>2.5 – 3.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mitral Valves</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tilting disc (Sinus Rhythm)</td>
<td>2.5 – 3.5</td>
</tr>
<tr>
<td>Bileaflet Prosthetic (Sinus Rhythm)</td>
<td>2.5 – 3.5</td>
</tr>
<tr>
<td>Tilting disc/Bileaflet Prosthetic AND AF or multiple prostheses on aspirin</td>
<td>2.5 – 3.5</td>
</tr>
<tr>
<td>Tilting disc/Bileaflet Prosthetic AND AF or multiple prostheses not on aspirin</td>
<td>2.5 – 3.5</td>
</tr>
</tbody>
</table>

| Caged Ball Valves Mitral or Aortic | 3.0 – 4.0 |

WARFARIN INDUCTION REGIMENS: follow the regimen unless advised otherwise

<table>
<thead>
<tr>
<th>STANDARD REGIME Day 1 to 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DAY</strong></td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td>3</td>
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<tr>
<td>Day</td>
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<td>-----</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>1.4</td>
</tr>
<tr>
<td>1.5</td>
</tr>
<tr>
<td>1.6 – 1.7</td>
</tr>
<tr>
<td>1.8</td>
</tr>
<tr>
<td>1.9</td>
</tr>
<tr>
<td>2.0 – 2.1</td>
</tr>
<tr>
<td>2.2 – 2.3</td>
</tr>
<tr>
<td>2.4 – 2.6</td>
</tr>
<tr>
<td>2.7 – 3.0</td>
</tr>
<tr>
<td>3.1 – 3.5</td>
</tr>
<tr>
<td>3.6 – 4.0</td>
</tr>
<tr>
<td>4.1 – 4.5</td>
</tr>
<tr>
<td>&gt; 4.5</td>
</tr>
</tbody>
</table>

REDUCED INTENSITY REGIMEN Day 1 to 4

Use if there is one or more of the following risk factors: age > 75; heart failure; renal failure; weight < 55 kg; interacting medications e.g. metronidazole, ciprofloxacin, erythromycin, amiodarone, high dose corticosteroids

<table>
<thead>
<tr>
<th>DAY</th>
<th>INR</th>
<th>Warfarin Dose (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&lt; 1.4</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>&lt; 1.8</td>
<td>5</td>
</tr>
<tr>
<td>1.8 – 2.0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>&gt; 2.0</td>
<td>OMIT</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>&lt; 2.0</td>
<td>5</td>
</tr>
<tr>
<td>2.0 – 2.2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2.3 – 2.5</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2.6 – 2.9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>3.0 – 3.2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3.3 – 3.5</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>&gt; 3.5</td>
<td>OMIT</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>&lt; 1.4</td>
<td>More than 7</td>
</tr>
<tr>
<td>1.4 – 1.5</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>1.6 – 1.7</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>1.8 – 1.9</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>2.0 – 2.3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2.4 – 3.0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>3.1 – 3.2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3.3 – 3.5</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3.6 – 4.0</td>
<td>OMIT</td>
<td></td>
</tr>
<tr>
<td>&gt; 4.0</td>
<td>OMIT</td>
<td></td>
</tr>
</tbody>
</table>

For both regimens, to calculate the maintenance dose
- The INR should be checked daily for the first 3 days
- Continue Day 4 dose from Day 5 for three days
- Repeat INR on Day 8 – dose/re-test according to result

Anticoagulant advice is always available
Alex Dunkerley DVT Clinical Nurse Specialist ext 6416 or on-call haematology consultant via switchboard
Patients on warfarin are at risk of bleeding both at therapeutic INR due to co-existing conditions (e.g. peptic ulcer, haemorrhagic stroke, trauma) and when overanticoagulated (INR more than 5.0).

When considering what action to take, ask the following questions:

- Why is the patient on warfarin and what are the risks of NOT being anticoagulated?
- Why has the patient become over-anticoagulated?
- How quickly do you want to reverse the anticoagulant effect?
- What risk factors does the patient have for bleeding?
- What are the problems and advantages with the agents used to reverse anticoagulation?

**SUMMARY OF ACTION TO BE TAKEN**

See notes below the table for details of the agents used to reverse anticoagulation:

PCC = Prothrombin Complex Concentrate  
FFP = Fresh Frozen Plasma

<table>
<thead>
<tr>
<th>Clinical Problem</th>
<th>INR</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life-threatening bleeding</td>
<td></td>
<td>Stop warfarin</td>
</tr>
<tr>
<td>• Intracranial</td>
<td></td>
<td><em>Give</em> Vitamin K (phytomenadione) 5 mg by <em>slow IV injection/infusion</em></td>
</tr>
<tr>
<td>• Active bleeding and shock</td>
<td></td>
<td><em>And</em> Prothrombin complex concentrate IV</td>
</tr>
<tr>
<td>• Compartment syndrome</td>
<td></td>
<td>Check clotting screen 20 minutes post administration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If PCC contraindicated, give FFP 15 ml/kg</td>
</tr>
<tr>
<td>Major bleeding</td>
<td></td>
<td>Stop warfarin</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Give</em> Vitamin K (phytomenadione) 5 mg by <em>slow IV injection/infusion</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>And</em> Prothrombin complex concentrate IV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check clotting screen 20 minutes post administration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If PCC is contraindicated, give FFP 15 ml/kg</td>
</tr>
<tr>
<td>Minor bleeding</td>
<td></td>
<td>Withold warfarin for 1 or more days. Re-start at reduced dose when INR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt; 5. Give vitamin K (phytomenadione) 1 – 3 mg by slow IV injection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Repeat Vitamin K at 24 hours if INR still high and bleeding persists</td>
</tr>
<tr>
<td>Unexpected bleeding</td>
<td>Therapeutic</td>
<td>Consider stopping warfarin and reversing anticoagulation as above.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Investigate for underlying cause</em></td>
</tr>
<tr>
<td>For emergency surgery</td>
<td></td>
<td>Stop warfarin</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>For reversal within 6 – 12 hours</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Give</em> Vitamin K 5 mg (phytomenadione) <em>slow IV injection</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>For surgery that cannot be delayed</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Give</em> Vitamin K 5 mg slow IV injection/infusion</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>And</em> Prothrombin complex concentrate IV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Or FFP 15 ml/kg IV infusion if PCC contraindicated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check INR pre-operatively</td>
</tr>
<tr>
<td>Routine/Elective surgery</td>
<td></td>
<td>Refer to next section: Interruption of anticoagulation for surgery</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contact Anticoagulant service for advice on bridging</td>
</tr>
</tbody>
</table>
| Overanticoagulated but not bleeding | INR > 8.0 | Stop warfarin  
Give Vitamin K (phytomenadione) 1 – 5mg by mouth using the paediatric intravenous formulation orally.  
Repeat dose if INR still too high after 24 hours.  
Check INR daily. Re-start warfarin at a reduced dose when INR less than 5.0 |
| INR 5.0-8.0 | Stop warfarin for 1 or 2 days and review  
Reduce subsequent maintenance dose |

**AGENTS USED TO REVERSE WARFARIN ANTICOAGULATION**

**Vitamin K (phytomenadione, Konakion MM)**
Available as IV and oral preparations. The onset of action is quicker if given IV but oral vitamin K is well absorbed and the effect at 24 hours is the same.
- Konakion MM Paediatric is available in 0.2 ml (2 mg) ampoules and the liquid is given orally (it has an unpleasant taste, so give it with a cold drink)
- Konakion MM is available in 1 ml (10 mg) ampoules and is given by slow IV. Anaphylactoid reactions can occur if given at a rate of more than 1 mg/minute. Can also be diluted in 50 ml 5% glucose and infused over 30 minutes.

Vitamin K doses of more than 2 mg cause prolonged resistance to warfarin when re-anticoagulated.  
**Care should be taken in patients with artificial heart valves: get advice from a cardiologist or haematologist. Anticoagulation with heparin may be required**

**Prothrombin Complex Concentrate (PCC - activated coagulation factors II, VII, IX & X)**
PCC is plasma derived and contains activated clotting factors. It may cause a prothrombotic state so do not use in decompensated liver disease or DIC (disseminated intravascular coagulation). It also contains heparin, so do not use if the patient has a known heparin allergy or HITS (Heparin-induced thrombocytopenia syndrome). PCC reverses warfarin immediately and completely. It is more effective than FFP and is a much smaller volume. Each box contains a vial of freeze-dried powder (500 units) and 20 ml water for reconstitution. The dose varies according to the patient’s weight in kilograms and the INR. The Transfusion Department (ext 2046 or bleep 541 out of hours) will supply the correct number of boxes. The maximum dose is 3000 units (6 boxes, 120 ml). A protocol for reconstitution and administration is supplied with the PCC. It should be given immediately after reconstitution and should be infused over 15-20 minutes.

**Always use PCC, without delay, to reverse warfarin in intracranial bleeding, and other cases of major or life-threatening bleeding**

**Fresh Frozen Plasma (FFP)**
FFP is a blood product, obtained from the Transfusion Department. It contains all clotting factors and should only be used for reversal of oral anticoagulant therapy if PCC is contraindicated. It has to be thawed prior to issue and this takes at least 30 minutes. The therapeutic dose is 15 ml/kg. The Transfusion Department will supply the correct volume. FFP only partially reverses the effect of warfarin. Its effects last 6 hours and it may need to be given repeatedly. Check the coagulation screen 20 minutes after administration
Direct oral anticoagulants (DOACs)
Dabigatran, Rivaroxaban, Apixaban, and Edoxaban have been licensed for stroke prevention in atrial fibrillation (and DVT/PE). As these drugs have a more predictable anticoagulant effect, they do not require regular monitoring of INR. Idarucizumab (Praxbind®) is licensed for the reversal of dabigatran only, and is kept in the emergency fridge. The dose of DOAC prescribed for each patient, and the half-life, depends on each patient’s renal and liver function. Discuss, if necessary, with the consultant haematologist on call.

The recommended dose of idarucizumab is 5 g IV as 2 consecutive infusions of 2.5g/50 ml over 5-10 minutes each (or as 2 consecutive 2.5 g bolus injections). A second dose of idarucizumab can be considered in the following situations:

- Recurrence of clinically relevant/life-threatening bleeding with prolonged clotting times, or
- In patients who require emergency surgery/urgent procedure with prolonged clotting times

INTERRUPTION OF ANTICOAGULATION AND ANTIPLATELET THERAPY FOR EMERGENCY SURGERY AND INVASIVE PROCEDURES
Link consultant: Dr. Sangeeta Atwal

FOR ELECTIVE SURGERY: Patients taking oral anticoagulants such as DOACs or warfarin should always seek advice about stopping when they undergo elective surgery or other invasive procedures. To do this safely, there needs to be a full understanding of the reason for anticoagulation, additional risk factors for thrombosis, the risks of stopping anticoagulation, the nature of the procedure and the associated risks of both thrombosis and bleeding. There must be effective and timely communication between the team responsible for carrying out the procedure, the team managing the anticoagulant control, and the patient. Refer to the full Elective Surgery Bridging Anticoagulation guidelines, available on PIMS, on the intranet.

FOR EMERGENCY SURGERY: in situations where the patient has to undergo major surgery immediately and is at very high risk of bleeding, follow below; consider contacting the Haematology consultant.

<table>
<thead>
<tr>
<th>WARFARIN</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>For emergency surgery</td>
<td>INR&gt;1.5</td>
</tr>
<tr>
<td>Specialist advice should be sought from the duty haematologist. Careful thought should be given as to the need for surgery</td>
<td>Stop warfarin</td>
</tr>
<tr>
<td>For reversal within 6 – 12 hours</td>
<td>Give Vitamin K 5mg (phytomenadione) slow IV injection</td>
</tr>
<tr>
<td>For surgery that cannot be delayed</td>
<td>Give Vitamin K 5 mg slow IV injection/infusion</td>
</tr>
<tr>
<td>And Prothrombin complex concentrate IV</td>
<td></td>
</tr>
<tr>
<td>Or FFP 15 ml/kg IV infusion if PCC is contraindicated</td>
<td>Check INR pre-operatively</td>
</tr>
</tbody>
</table>
DOACs – Direct Oral Anticoagulants
Consider carefully the thrombotic risk before stopping DOAC therapy (see below). For emergency surgery, a delay of two elimination half-lives is recommended.

<table>
<thead>
<tr>
<th></th>
<th>Dabigatran</th>
<th>Rivaroxaban</th>
<th>Apixaban</th>
<th>Edoxaban</th>
</tr>
</thead>
<tbody>
<tr>
<td>Half-life</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CrCl ≥50 ml/min</td>
<td>7-17 hrs</td>
<td>7-11 hrs</td>
<td>8-15 hrs</td>
<td>10-12 hrs</td>
</tr>
<tr>
<td>CrCl 30-49 ml/min</td>
<td>17-20 hrs</td>
<td>7-11 hrs</td>
<td>No change</td>
<td></td>
</tr>
<tr>
<td>CrCl &lt;30 ml/min</td>
<td>21-35 hrs</td>
<td>11-15 hrs</td>
<td>No change</td>
<td></td>
</tr>
<tr>
<td>Dosing</td>
<td>BD</td>
<td>OD</td>
<td>BD</td>
<td>OD</td>
</tr>
<tr>
<td>Renal Elimination</td>
<td>80%</td>
<td>33%</td>
<td>25%</td>
<td>50%</td>
</tr>
<tr>
<td>Hepatic metabolism</td>
<td>Very little</td>
<td>33% (CYP3A4,2J2)</td>
<td>75% (CYP3A4)</td>
<td>Very little</td>
</tr>
<tr>
<td>If bleeding/extreme emergency</td>
<td>Idarucizumab 5 g IV infusion</td>
<td>Haemodialysis will remove 65% after 4 hrs</td>
<td>No specific reversal agent</td>
<td>Tranexamic acid 1 g IV Consider Prothrombin Complex Concentrate Vitamin K if INR is elevated</td>
</tr>
</tbody>
</table>

The recommended dose of idarucizumab (Praxbind®) is 5 g IV as 2 consecutive infusions of 2.5g/50 ml over 5-10 minutes each (or as 2 consecutive 2.5 g bolus injections). It is available in the emergency fridge. A second dose of idarucizumab can be considered in the following situations:
- Recurrence of clinically serious bleeding with prolonged clotting times, or
- In patients who require emergency surgery/urgent procedure with prolonged clotting times

ANTIPLATELETS: ASPIRIN AND THIENOPYRIDINES
Always consider carefully the risks of increased cardiovascular events and arterial thrombosis of stopping antiplatelet therapy.

<table>
<thead>
<tr>
<th>Drug</th>
<th>Time to normal platelet function</th>
<th>Mode of action</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSAIDS</td>
<td>24 hrs</td>
<td></td>
</tr>
<tr>
<td>Aspirin</td>
<td>5-7 days</td>
<td>Irreversible inhibiton of COX 1</td>
</tr>
<tr>
<td>Clopidogrel</td>
<td>5-7 days</td>
<td>Irreversible ADP receptor blocker</td>
</tr>
<tr>
<td>Prasugrel</td>
<td>3-5 days</td>
<td>Irreversible ADP receptor blocker</td>
</tr>
<tr>
<td>Ticagrelor</td>
<td>24 hrs</td>
<td>Irreversible ADP receptor blocker</td>
</tr>
<tr>
<td>Dipyramidole</td>
<td>7-10 days</td>
<td>Phosphodiesterase inhibitor</td>
</tr>
</tbody>
</table>

- Aspirin: in medium and high risk non-cardiac surgery, there are no significant difference in bleeding events if the patient continues aspirin therapy
- Clopidogrel: achieves peak plasma level at 2 hours and achieves a plateau of 40-60% platelet aggregation after 3-7 days
  - Half-life = 4 hours; plasma level near zero at 12 hours
  - However platelet lifespan lasts 8 days (so clopidogrel effect lasts 8 days)
  - Fresh platelets are the only way to establish normal coagulation
  - New platelets are not affected by clopidogrel, if the transfusion takes place beyond 6-8 hours of the last ingested dose
  - Platelet transfusion can be used for emergency surgery, but balance the risks against arterial thrombosis
## Direct Oral Anticoagulants – assessing thrombotic risk

<table>
<thead>
<tr>
<th>RISK LEVEL OF THROMBOSIS</th>
<th>Indication for anticoagulant therapy</th>
<th>VTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH</td>
<td><strong>CHA(2)-VASc score &gt;5</strong>&lt;br&gt;Recent (within three months) stroke or transient ischaemic attack, rheumatic valvular heart disease (<em>see note below)</em>*</td>
<td>Recent (within three months) VTE&lt;br&gt;Severe thrombophilia (e.g. Protein C or S deficiency; antithrombin; antiphospholipid antibodies; multiple abnormalities), prior stroke/TIA &lt;3 months before surgery, prior thromboembolism during temporary interruption of anticoagulation, certain types of surgery (e.g. cardiac valve replacement, carotid endarterectomy, major vascular surgery)</td>
</tr>
<tr>
<td>MODERATE</td>
<td><strong>CHA(2)-VASc score &gt;1 or &lt;5</strong></td>
<td>VTE within the past 3 to 12 months&lt;br&gt;Nonsevere thrombophilia (e.g. heterozygous factor V Leiden/prothrombin gene mutation)&lt;br&gt;Recurrent VTE&lt;br&gt;Active cancer (treated within six months or palliative)</td>
</tr>
<tr>
<td>LOW</td>
<td><strong>CHA(2)-VASc score 0 to 1</strong>&lt;br&gt;(assuming no prior stroke or transient ischaemic attack)**</td>
<td>VTE &gt;12 months previous and no other risk factors.</td>
</tr>
</tbody>
</table>

### RE-INDUCTION of DOAC after surgery:
Post-operatively, continue with dalteparin prophylaxis until DOAC restarted on post-op day 1-3 depending on bleeding. Discontinue dalteparin on the day DOAC is started.

## WARFARIN – assessing thrombotic risk

<table>
<thead>
<tr>
<th>RISK LEVEL OF THROMBOSIS</th>
<th>THROMBOTIC RISK GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW</td>
<td>Atrial Fibrillation with no other risk factors(^1)&lt;br&gt;Secondary prophylaxis after VTE with no other risk factors(^2)</td>
</tr>
<tr>
<td>INTERMEDIATE</td>
<td>Bileaflet AVR with no other risk factors(^1)&lt;br&gt;Atrial Fibrillation with other risk factors(^1)</td>
</tr>
<tr>
<td>HIGH</td>
<td>Atrial fibrillation with TIA/CVA &gt;3 months ago&lt;br&gt;Bileaflet MVR with no other risk factors(^1)&lt;br&gt;Secondary prophylaxis after VTE with other risk factors(^2)</td>
</tr>
<tr>
<td>VERY HIGH</td>
<td>Bileaflet MVR with other risk factors(^1)&lt;br&gt;Starr Edwards and Bjork Shiley MVR/AVR&lt;br&gt;Combined AVR and MVR&lt;br&gt;Antiphospholipid syndrome with previous thrombosis&lt;br&gt;VTE or arterial embolus within last month</td>
</tr>
</tbody>
</table>

\(^1\)Arterial Risk Factors = heart failure, previous arterial embolus, TIA or CVA, atrial fibrillation with valve replacement, mitral valve disease

\(^2\)Venous Risk Factors = recurrent VTE (Venous thromboembolism), antithrombin, protein C or S deficiency, antiphospholipid syndrome, active malignancy
RE-INDUCTION of WARFARIN after surgery/procedure: re-load warfarin - if the procedure was uneventful, double the usual daily dose for two days, then resume the usual daily maintenance dose. Re-check INR within 1 week.

Patient information
Patients must be counselled about the following and given clear advice. If possible, this should be written down:
- That there is an increased risk of bleeding when on anticoagulants
- That there is an increased risk of thrombosis/stroke when off anticoagulants
- How and when to stop the warfarin
- How and when to re-start the warfarin
- Whether additional INR blood tests are needed before or after the procedure
- What arrangements have been made to give dalteparin injections
- When to give dalteparin and the dose
- What the symptoms of bleeding might be and who to contact
- What the symptoms of thrombosis or stroke might be and who to contact

For patients attending Kingston or Queen Mary’s Anticoagulant clinic, the helpline number is 020 8934 2030. This is open Mon-Fri 9 a.m. to 4 p.m. Patients not registered with the Kingston Anticoagulant Service (includes Queen Mary’s) will need to get their doctor or nurse to telephone for advice.

The healthcare professionals’ helpline number is 020 8546 7711 ext 2041. This is open Mon-Fri 9 a.m. to 6 p.m. An anticoagulant nurse specialist will deal with these queries in the first instance. The duty haematology consultant is available via the hospital switchboard.

USE OF BLOOD PRODUCTS AND MANAGEMENT OF ADVERSE EVENTS RELATED TO TRANSFUSION
Link consultant: Dr. Sangeeta Atwal

The transfusion of all blood and blood products should be clinically justifiable. The indication for and outcome of transfusion should be documented in the medical notes. Samples for pre-transfusion testing must be clearly labelled with the patient’s FULL NAME, DATE OF BIRTH and HOSPITAL (OR A&E) NUMBER.

MASSIVE HAEMORRHAGE
This includes the following situations where more than 2 litres of blood are lost rapidly:
- Major obstetric haemorrhage
- Major surgical haemorrhage
- Major trauma
- Major gastrointestinal haemorrhage

The successful outcome depends on speed of action, the presence of the most senior staff available and effective communication between all staff involved. To ensure this, it is important to activate a major haemorrhage call: CALL SWITCHBOARD on 2222 and state “Major Haemorrhage, Emergency call”
Management

1. **Restore blood volume** to maintain tissue perfusion and oxygenation. Rapidly infuse crystalloids (and colloids if appropriate) via a large bore (14G) cannulae or central line.

2. **Achieve haemostasis:** Treat any surgical or obstetric cause of bleeding and correct coagulopathy with blood components.

3. **Optimise communication**
   - Declare a major haemorrhage and contact key personnel, namely:
     - Clinician in charge
     - Transfusion laboratory
     - Duty anaesthetist
     - Duty haematology consultant
   - Nominate a co-ordinator to organise, communicate, liaise and document.

4. **Request laboratory investigations**
   - FBC, Transfusion (pink-EDTA), coagulation (INR, APTR, and clauss fibrinogen), biochemistry and blood gases
   - Re-check every 2-4 hours, after every 6 units of blood or blood components.
   - Label specimens carefully and accurately and communicate extreme urgency to porters and laboratories. You may need to give blood components before the results of laboratory tests are available.

**Contact the Consultant haematologist at an early stage to discuss the rational use of blood components.**

5. **Request 6 units of suitable Red Cells**
   - Note that blood loss is often underestimated.
   - Transfusion of blood and other components must be checked at the bedside and documented in the normal way.

<table>
<thead>
<tr>
<th>Use either</th>
<th>Immediate</th>
<th>Uncrossmatched O Negative</th>
<th>Extreme emergency Maximum 2 units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Or</td>
<td>10 minutes</td>
<td>Uncrossmatched ABO group specific</td>
<td>Preferred product. Will be crossmatched after issue</td>
</tr>
<tr>
<td>Or</td>
<td>30 minutes</td>
<td>Fully crossmatched</td>
<td>If time allows</td>
</tr>
</tbody>
</table>

- Provision of RBC will be delayed if the patient has red cell antibodies.
- Note that after transfusion of 10 units, blood is no longer crossmatched.

6. **Request 1-2 pools of Platelets**
   - These are not kept as stock items and can take up to 2 hours to arrive.
   - Aim for platelets >50 x 10^9/l (or >100 x 10^9/l if CNS or multiple trauma).
   - Platelets are often required after 10-20 units of blood or earlier if prolonged hypotension results in disseminated intravascular coagulation (DIC).

7. **Request 12-15 mls/kg Fresh Frozen Plasma (FFP)**
   - Use if PT or APTT ratio is >1.5 and there is continued bleeding. Repeat coagulation screen afterwards to assess reponse.

8. **Request 10-15 units of cryoprecipitate**
   - Use if fibrinogen <1g/l (<1.5g/l in post-partum haemorrhage) and continued bleeding. Repeat coagulation screen afterwards to assess response.

9. **Patients on warfarin** – see previous section on warfarin.
10. **Tranexamic acid – 1g IV bolus** (CRASH-2 trial and WOMAN study), if persistent bleeding prescribe 1g IV QDS

11. **Consider recombinant factor VIIa (rVIIa)**
If 2 or more cycles of FFP/Platelets/Cryoprecipitate have failed to control the bleeding and there is no obvious surgically correctable cause of bleeding then consider using recombinant rVIIa. It is NOT licensed in this setting and is very expensive. There are a number of very important contraindications – discuss with duty haematologist.

**Management of severe acute transfusion reactions (see flow chart below)**
Guidelines for the use of blood products are contained in the ‘Kingston Hospital Transfusion Guidelines’ folder which is to be found on every ward and clinical area on PIMS. The 5th edition (2014) of *‘Handbook of Transfusion Medicine’* is available on [http://www.transfusionguidelines.org](http://www.transfusionguidelines.org). Clinical advice is available from the duty consultant haematologist who can be contacted via switchboard at all times.
MANAGEMENT OF SEVERE ACUTE TRANSFUSION REACTIONS

Symptoms/Signs of Acute Transfusion Reaction
Fever, rigors, tachycardia, hyper or hypotension, collapse, flushing, urticaria, bone, muscle, chest and/or abdominal pain, breathlessness, nausea, malaise

Stop the transfusion
Measure temperature, pulse, BP, respiratory rate, O₂ saturation
Check the identity of recipient, the details on the unit and compatibility form

Mild allergic reaction
Give IV chlorphenamine (chlorpheniramine) 10 mg slowly and restart the transfusion at a lower rate and observe more frequently

Severe allergic reaction
Bronchospasm, angioedema, abdominal pain, hypotension. Discontinue transfusion. Return intact to blood bank along with all other used/unused units. Give chlorphenamine IV 10 mg slowly. Give oxygen and salbutamol nebuliser. Treat severe hypotension with adrenaline (epinephrine) 0.5 ml of 1 in 1000 (i.e. 0.5 mg) IM. Send clotted sample to transfusion laboratory. Saline wash future components

Severe reaction?
Yes
No

Suspected ABO incompatibility?
No
Yes
Recheck pack and patient ID

Mild non-haemolytic transfusion reaction
If temp rise < 1.5°C, observations stable, and otherwise well, give paracetamol. Restart infusion at slower rate. Observe more frequently

Mild fever or urticarial rash only?
No
Yes

HAEMOLYTIC REACTION/BACTERIAL INFECTION OF UNIT
Take down unit and giving set. Return intact to blood bank. Start sodium chloride 0.9% IV infusion. Maintain urine output at >100 mls/hr. Give furosemide if urine output falls. Treat DIC with appropriate blood components. Inform Hospital Transfusion department immediately

Alelophilic reaction/bacterial infection of unit
Take down unit and giving set. Return intact to blood bank with all other used/unused units. Take blood cultures, repeat blood group, crossmatch, FBC, coag screen, biochemistry, urinalysis. Monitor urine output. Start broad spectrum antibiotics if infection suspected. Give oxygen and fluid support. Seek Haematological advice

Fluid overload
STOP INFUSION. Give oxygen and furosemide (frusemide) 40-80 mg IV

↑CVP

Acute dyspnoea/hypotension
Monitor blood gases, CXR, measure CVP/pulmonary capillary pressure. If normal CVP consider TRALI

Transfusion associated acute lung injury (TRALI)
Dyspnoea, ‘white-out’ on CXR. Discontinue transfusion. Give 100% oxygen. Treat as ARDS – ventilate if necessary. Early referral to the Critical Care Outreach Team is essential (bleep 868/869)

SICKLE CELL CRISIS
Link consultant: Dr Sangeeta Atwal

Very few patients with sickle cell diseases (HbSS, HbSC, HbSBthal) live in the Kingston Hospital catchment area. Many live in adjacent catchment areas and are registered at St. George’s or the Hammersmith Hospitals, or are students at Kingston University. They may become unwell locally and attend our A and E department. They may carry with them a ‘Haemoglobinopathy Card’. This will often give helpful advice on aspects of treatment.
PAIN CRISIS
The most common type of crisis presents as agonising and relentless pain. The pain may be localised to a single long bone (typically in the juxta-articular area), present symmetrically in several limbs, or involve the axial skeleton (lumbar spine, ribs or pelvis).

In the Accident and Emergency Department Assessment
1. Patients with sickle cell disease should be triaged as urgent. Pre-analgesia assessments should be kept to a minimum. Our target time for presentation-to-medical assessment is within 30 minutes. Pain control should be given within that time. Pain, respiratory rate and sedation level should be measured every 20 minutes until satisfactory pain relief has been achieved and then at least every 4 hours.
2. For pain, administer IM morphine (10mg for adults unless indicated otherwise on the patient’s haemoglobinopathy card; for children get paediatric advice). Repeat the dose every two hours. For patients requiring high doses of opioids, monitor for adverse events hourly for the first 6 hours, then at least every 4 hours thereafter.

Notes: 1. Pethidine should not be given unless specifically indicated on the patient’s haemoglobinopathy card: it is associated with grand mal seizures in susceptible patients.
2. If a new patient, or a patient without a haemoglobinopathy card requests pethidine and refuses any alternative, then he/she should be referred directly to the Haematology team.
3. Nitrous oxide (Entonox) should not be given: in patients with sickle cell disease it can cause an acute, irreversible neuropathy.

After analgesia, perform a full medical assessment. This should include:
- clinical examination focusing on the chest, abdomen and CNS
- measurement of body temperature, BP, pulse and respiratory rate,
- pulse oximetry measuring O₂ saturation,
- taking blood for full blood count, U&Es, blood culture and group and save
- requesting and reviewing a chest x-ray if the pain is in the chest. Do not x-ray painful bones as it is rarely useful
- checking for clinical signs of any of the life threatening crises (see below).

Action
1. Give oxygen. Ensure airway and ventilation and then start 24% O₂ at 4L/min via a facemask. If pulse oximetry shows saturation of < 92%, increase concentration of inhaled O₂.
2. Fluids. Give at a rate of 1L every 6 hours. Because of problems with venous access give orally if at all possible. For children get paediatric advice.
3. Antibiotics. Fever is usual in crisis and infection is often present. Start an antibiotic as per the following guidelines:
   - For patients who are admitted with uncomplicated painful crisis without specific evidence of infection but who develop pyrexia, commence oral Co-Amoxiclav 625mg TDS, after cultures (blood, urine and any other source that is indicated) have been taken.
   - If penicillin allergic or there are chest signs, or an abnormal CXR, give cefuroxime 1.5 grams IV TDS (unless there is renal impairment) and clarithromycin 500mg PO BD.
   - If symptoms/signs of focal infection are present (e.g. tonsillitis, UTI) consult the hospital antimicrobial policy for drug of choice.
• Stop prophylactic penicillin if any additional antibiotics cover for pneumococcus.
• Patients on desferrioxamine (DFO) who have diarrhoea should be started on ciprofloxacin immediately (after checking records that they are not G6PD deficient) and the DFO stopped. Ciprofloxacin can be stopped if Yersinia infection has been excluded.

Admission
If the patient is to be admitted immediately, contact the Bed Manager and advise the haematology team. No patient admitted with sickle cell crisis should be placed on a ward outside the Medical Unit. After admission to the ward, substitute IM morphine with continuous s/c morphine infusion. Give at the dosage indicated on the patient’s haemoglobinopathy card (usually 10 – 15mg/hr), with additional 5 – 10mg boluses for breakthrough pain. The patient should wait no more than 4 hours in A&E. If, for unavoidable reasons, this delay is extended then the patient should:
1. be given a 2 hourly programme of analgesia
2. have fluid input maintained
3. have antibiotic regime maintained
4. be observed regularly to ensure all vital signs are maintained.

If a patient is discharged from, or leaves A&E, then:
• contact the GP and let him/her know of the attendance and assessment. This may be done by telephoning Balham Health Centre on 0208 700 0615.
• give the patient sufficient analgesia to ensure effective pain management until the patient may see their GP or a specialist nurse counsellor.

LIFE-THREATENING CRISIS
Patients can present with a variety of other acute manifestations which may be rapidly fatal if not recognised and treated quickly.

INFECTION
Patients prone to sickling have reduced splenic function and are at risk of overwhelming septicaemia (pneumococcus, meningococcus, rarely haemophilus) even if taking penicillin prophylaxis. Peak risk is in childhood. The patient may present with fever, shock, seizures, coma, meningitis (often with delayed CSF pleocytosis) or even profuse diarrhoea. Early IV antibiotics (broad-spectrum beta-lactams such as amoxicillin or cefotaxime) and volume support are vital.

SPLENIC SEQUESTRATION
During infection children may suffer a rapid fall in haemoglobin and growth of the spleen – changes often noted by the mother. Death can result from hypovolaemia and anaemia. Early transfusion is vital.

CHEST CRISIS
Assess each patient with acute painful sickle cell episodes for acute chest syndrome if he/she exhibits one or more of the following signs: abnormal respiratory signs or symptoms, chest pain, fever, or signs or symptoms of hypoxia. It sometimes begins as a pain crisis affecting ribs or shoulders. Treat with fluids and oxygen; observe arterial oxygen tensions – a falling PaO₂ will require exchange transfusion which needs expert advice.
GIRDLE SYNDROME
If sickling occurs in the splanchnic bed, the patient may develop abdominal pain with rigidity, loss of bowel sounds and increasing icterus. IV fluids are vital. A surgeon should be consulted to exclude other abdominal events, but surgery should be with-held unless unavoidable, and then only after exchange transfusion.

CEREBRAL SICKLING
Patients can present with strokes, fits, coma, bizarre behaviour or psychosis. Sickling should be excluded in any susceptible patient presenting with such signs. IV fluids are vital and early exchange transfusion a possibility.

BLOOD TRANSFUSION
In a patient with Sickle Cell Disease, blood transfusion can be dangerous. Never give a simple transfusion for anaemia (except in those sequestrating) without reducing the HbS level by exchange. If this precaution is not taken, the blood viscosity will be increased and the patient made worse. Get haematological advice.

SURGERY
Do not plan or carry out surgery without first assessing the patient with the Haematology Team. Special pre- and post-operative care, often including blood exchange, is essential to optimise outcome.

MALARIA
Link consultant: Dr. Sangeeta Atwal

Any patient with symptoms suggestive of infection who has visited or been resident in areas of the world where malaria is endemic should be screened for malaria.

An EDTA sample can be used to make thick and thin films and to perform an antigen test (this is specific for Plasmodium falciparum, and non-specific for other Plasmodium types). Clinical details required include country visited and duration of stay, malaria prophylaxis taken, date of return from abroad, and date of onset of symptoms. It is also helpful to know the country of birth and the usual country of residence of the traveller, as well as the reason for travel. All this information is submitted to the Malaria Reference Laboratory when the samples are sent for confirmation (see below)

If the malaria screen is positive, the species will be identified if possible. A quantification of Plasmodium falciparum infection is required and this will be quoted as a % parasitaemia. The laboratory will check the G6PD status of all patients with a positive malaria screen. Follow-up samples are required to check that the infection has resolved.

The recommendations for the treatment of malaria can be found in section 5.4.1 of the British National Formulary and are regularly updated to reflect current practice.

Clinical advice can be obtained from the London Hospital for Tropical Diseases (0845 155 5000). This is particularly important in difficult cases such as heavy parasitaemia, malaria in children and in pregnancy.
Malaria is a notifiable disease. All cases are also reported to the Malaria Reference Laboratory and both slides and antigen test are routinely sent for confirmation on the next working day.

**HIV AND MEDICAL EMERGENCIES**
Link consultant: Dr. Gill McCarthy, Pharmacist: Dola Awoyemi

Most patients presenting to casualty with an acute HIV related medical condition, usually an opportunistic infection, will not have tested for HIV before and will be unaware of their HIV status. Hence HIV needs to be considered in the differential diagnosis of all patients with acute medical conditions and infections.

The most common risk groups for HIV in this country are men who have sex with men, individuals from high HIV prevalence countries including Africa, Far East and Caribbean and intravenous drug users. However the HIV prevalence amongst intravenous drug users locally is low at less than 2%.

Patients previously undiagnosed with HIV who present with HIV related opportunistic infections may give a history of recent weight loss, diarrhoea, skin problems (seborrhoeic dermatitis, folliculitis and acneiform type rashes) and shingles. They may also have signs related to immunosuppression such as oral candidiasis and oral hairy leukoplakia.

Patients who are known to be HIV positive are usually aware of their most recent CD4 lymphocyte count and viral load. Most opportunistic infections occur in individuals with CD4 cell counts of less than 200 cells per ml. The main exception to this rule is tuberculosis which may occur at any CD4 cell count.

If you suspect anyone may have an HIV related opportunistic infection, please contact the HIV Consultant on call through switchboard for advice.

The most common HIV related opportunistic infections are as follows:

1. **PNEUMOCYSTIS CARINII PNEUMONIA (PCP)**
   This is the most common presenting condition in patients previously undiagnosed with HIV. Patients known to be HIV positive will usually be put on prophylaxis to prevent PCP when their CD4 counts fall below 200 cells per ml. Although prophylaxis with co-trimoxazole is very effective, PCP may still occur.

   **Presentation:** usually insidious onset with fever, malaise, dry cough, increasing shortness of breath on exertion and chest tightness.
   **Signs:** pyrexia, tachypnoea, tachycardia (absence of sputum and crackles helps to distinguish PCP from bacterial pneumonia but note dual infections may occur). Patient may look surprisingly well from the end of the bed!
   **Investigations:**
   - **CXR:** appearances range from normal → perihilar interstitial shadowing → diffuse interstitial shadowing → extensive alveolar consolidation.
   - **Oximetry:** pO₂ may be reduced at rest but usually shows marked desaturation on exertion e.g. after walking or 10 to 20 sit-ups; this is a very useful diagnostic test.
   - **Arterial blood gases:** these are essential for management.
Cytology: PCP can only be diagnosed on cytology or IF (done at St George’s) from broncho-alveolar lavage samples obtained at bronchoscopy. PCP cannot be diagnosed on a routine sputum sample.

Other investigations: sputum culture (if available) including AFB, blood cultures (including TB), FBC, G6PD, U&Es and LFTs

Treatment:
1st line: Co-trimoxazole 30mg/kg QDS for three days, then 30mg/kg TDS for 18 days. This is initially given as an intravenous infusion in 2 to 4 divided doses. Co-trimoxazole IV is available as a solution containing 96mg/ml. Doses less than 40 mls are added to 600 mls of 5% glucose and given over a 90 minute period. Doses over 40 mls are added to one litre of 0.9% sodium chloride and given over 2 hours.
- Patients may be switched to oral Co-trimoxazole once they have improved.
- Avoid Co-trimoxazole in G6PD deficiency.
- Reduce the dose in patients with renal impairment and/or therapy-induced neutropenia or thrombocytopenia
- Give regular anti-emetics
- Side effects: nausea, vomiting, rash, neutropenia, thrombocytopenia, abnormal LFT.
- Monitor: FBC, U&Es, and LFTs, twice weekly.

2nd line: Clindamycin either 450 mg PO or 600 mg IV (if unable to tolerate oral dose) qds and primaquine 15-30 mgs PO od for 21 days. If unable to tolerate oral clindamycin, it may be given IV by diluting in either 100 mls of sodium chloride or 5% glucose over 20 minutes.
- Avoid primaquine in patients with G6PD deficiency.
- Give regular anti-emetics
- Side effects: nausea/vomiting, diarrhoea (C. difficile), rash, abnormal LFTs.
- Primaquine side effects: Methaemoglobinaemia, haemolytic anaemia, neutropenia.
- Monitor: FBC, U&Es, and LFTs twice weekly, stool chart.

3rd line: Pentamidine IV 4mg/kg/day as an infusion once daily for 21 days. To reduce nephrotoxicity, prehydrate with 500mls to 1litre of 0.9% sodium chloride.
- Side effects: hypotension, hypo or hyperglycaemia, acute renal failure.
- Monitor: FBC, U&Es, LFTs, Ca, and Mg, blood glucose twice weekly, blood pressure 4-hourly

Adjuvant steroids: High dose corticosteroids in the treatment of moderate or severe PCP reduce the risk of respiratory failure and death, when given within 72 hours of anti-PCP therapy. Start Prednisolone if arterial pO2 < 9.3 kPa or SpO2 < 92%. Give Prednisolone 40mg bd po for days 1-5; 40mg od for days 6-10; 20mg od for days 11-21, or methylprednisolone IV at 75 % of the oral prednisolone dose until able to tolerate oral medication.

Other considerations in HIV positive patients presenting with pneumonia
All patients should be nursed in a negative pressure side room until tuberculosis has been excluded. HIV patients are at increased risk of MDRTB. The patient may need a diagnostic bronchoscopy. Antibiotic treatment should also cover other infections until these have been excluded. For the treatment of pneumonia, refer to the section on ‘Recommendations for the use of antimicrobial drugs’: respiratory infections. Use the guidelines for Community Acquired Pneumonia (CAP).
2. CEREBRAL TOXOPLASMOSIS
Presentation: may be non-specific with persistent headaches, altered mental state, pyrexia but may include focal neurological signs, seizures, and symptoms and signs of raised intracranial pressure.
Investigations: Urgent CT scan with contrast: multiple ring enhancing lesions are usually pathognomonic for toxoplasmosis. If the initial CT scan is normal, arrange for an urgent MRI scan. Blood tests: FBC, U&Es, glucose, LFTs, toxoplasma antibodies, cryptococcal antigen titre, blood cultures including TB (use special bottles from microbiology), syphilis serology.
Treatment: Start immediate treatment for presumptive toxoplasmosis.
1st line: Sulfadiazine 15 mg/kg PO qds (usually 1-2 g qds) plus pyrimethamine 200 mg PO on the first day in divided doses followed by 50 mg/day (≤ 60kg) or 75mg/day (>60kg) PO daily. Folinic Acid 15 mg PO daily.
- Avoid sulfadiazine in patients with G6PD deficiency
- Side effects: nausea/vomiting, neutropenia, thrombocytopenia, skin rash, abnormal LFTs, crystalluria.
- Monitor: FBC, U&Es, and LFTs three times a week.
- Fluid balance chart to ensure urine output > 1200ml/day.
- Treatment dosage should be continued until clinical signs and symptoms have improved, usually for 6 weeks. Patients need prophylaxis until CD4 > 200cells/ml and VL<50 for three months. If there is significant cerebral oedema and risk of coning, mannitol and high dose corticosteroids may be required. Corticosteroids should be used with caution as they may cloud clinical diagnosis. A follow up scan needs to be arranged 2 weeks into treatment to assess response.

3. CRYPTOCOCCAL MENINGITIS
Presentation: usually insidious in onset with persistent headache, fever, confusion, unsteadiness on legs. Signs of meningism and photophobia are usually absent.
Investigations: FBC, U&Es, LFTs, glucose and blood cultures including TB blood cultures (special bottles from microbiology) and toxoplasma antibodies. Blood sample for cryptococcal antigen titre (a good screening test which can be done on request within an hour). Urgent CT scan to exclude space occupying lesion. If CT scan shows no mid-line shift, proceed immediately to lumbar puncture, including measurement of opening pressure. See LP protocol in immunosuppressed patients (at the end of this section).
Treatment: Liposomal amphotericin B (Ambisome) 1 mg/kg IV od, increasing to 4 mg/kg once daily over four days and flucytosine 25 mg/kg IV four times daily for 2 weeks. May be given via peripheral line. Test dose of 1 mg amphotericin must be given first – liaise with pharmacist.
- Prophylactic treatment following induction therapy is fluconazole 400mg daily for 8 weeks then 200mg daily thereafter.
- Side effects: nausea, dry mouth, abnormal LFTs, renal toxicity.
- Monitor: FBC, U&Es, and LFTs three times a week.
- Discuss with the HIV consultant on call.

4. CYTOMEGALOVIRUS (CMV) RETINITIS
Presentation: peripheral lesions may be noticed on routine fundoscopy, central involvement usually causes visual disturbance.
Investigation: Fundoscopy reveals active retinitis with inflammatory exudates and haemorrhage (so called cottage cheese and tomato ketchup appearance). Consultant ophthalmological assessment from the Royal Eye Unit is required the next day but this should not delay immediate treatment which is required to reduce the risk of blindness.
**Treatment:** Valganciclovir 900 mg PO bd for 14 – 21 days.
If unable to give orally, use ganciclovir 5mg/kg twice daily as an IV infusion over 1 hour (dilute in 100 mls of sodium chloride). Ganciclovir should be handled as a cytotoxic drug. Side effects: neutropenia, thrombocytopenia, renal impairment.
Check full blood count, U&Es and LFTs three times a week.

**DO NOT USE IN PREGNANCY**

**HIV Testing**
HIV testing should be offered routinely in all patients presenting with pneumonia, meningitis, cerebral abscess, PUO, thrombocytopenia, lymphopenia, multidermal shingles, chronic diarrhoea and weight loss, oesophageal / oral candidia, severe psoriasis – particularly new onset, lymphadenopathy etc. The rational for testing should be explained to the patient and verbal consent sought. The laboratory can perform an HIV test and give a result the same day. Rapid HIV testing using a point of care test can be arranged during working hours via the Wolverton Centre by speaking to the senior nurse (ext. 2843) or the Consultant HIV physician on call (secretaries ext 2845) or via switchboard. Determining the CD4 count without consent should not be considered an alternative to HIV testing. HIV positive patients can have normal CD4 counts and HIV negative patients can have low CD4 counts, particularly during acute illness. Performing an HIV test in an unconscious patient or those unable to give informed consent should be discussed with your consultant or HIV consultant on call. If HIV testing is performed in these circumstances, the rationale and benefit to the patient should be clearly documented in the notes.

**Confidentiality**
A patient’s HIV status should not be disclosed to their partner or relatives without the patient’s consent. Do not write “HIV” or “AIDS” on pathology or x-ray request forms which may be inadvertently seen by friends, general hospital staff etc. Use “immunosuppressed” instead. There are a few situations when the GMC considers it permissible to break confidentiality but in all such incidences it is recommended that the case is first discussed with the HIV consultant on call.

**Death Certificates**
Do not write HIV or AIDS on a death certificate. It causes huge distress to partners and relatives and may indeed break confidentiality. However there is still a legal requirement to write the correct cause of death on the certificate. This is most easily overcome by using different terminology that is less stigmatising e.g. use Acquired Immunodeficiency Syndrome instead of “AIDS” or Human Immunodeficiency virus instead of ‘HIV’. Writing the specific cause of death such as Pneumocystis carini pneumonia or cerebral toxoplasmosis will convey similar information. As a last resort, the clause “further information may be available later” may also be ringed. Please discuss with HIV consultant beforehand!
**LUMBAR PUNCTURES IN IMMUNOSUPPRESSED PATIENTS**

<table>
<thead>
<tr>
<th>Sample</th>
<th>Test</th>
<th>Bottle Type</th>
<th>Minimum volume required</th>
<th>Bottle number (order)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSF</td>
<td>Microscopy: cell count &amp; differential, Gram stain, AFB, Indian ink stain</td>
<td>Sterile universal container</td>
<td>1ml</td>
<td>Bottle 1 (2.0mls)</td>
</tr>
<tr>
<td>CSF</td>
<td>Routine cultures: including TB</td>
<td>Sterile universal container</td>
<td>1ml</td>
<td></td>
</tr>
<tr>
<td>CSF</td>
<td>CSF protein</td>
<td>Sterile universal container</td>
<td>0.5ml</td>
<td>Bottle 2 (0.5mls)</td>
</tr>
<tr>
<td>CSF</td>
<td>PCR for MTB</td>
<td>Sterile universal container</td>
<td>2ml</td>
<td>Bottle 3 (4.6mls)</td>
</tr>
<tr>
<td>CSF</td>
<td>PCR for EBV, JC virus, HSV, VZV, CMV</td>
<td>Sterile universal container</td>
<td>0.7ml</td>
<td></td>
</tr>
<tr>
<td>CSF</td>
<td>PCR / serology for Toxoplasma</td>
<td>Sterile universal container</td>
<td>0.2ml</td>
<td></td>
</tr>
<tr>
<td>CSF</td>
<td>Cryptococcal antigen titre (CRAG)</td>
<td>Sterile universal container</td>
<td>0.3ml</td>
<td></td>
</tr>
<tr>
<td>CSF</td>
<td>Syphilis serology</td>
<td>Sterile universal container</td>
<td>0.5ml</td>
<td></td>
</tr>
<tr>
<td>CSF</td>
<td>Cytology</td>
<td>Sterile universal container</td>
<td>0.5ml</td>
<td>Bottle 4 (0.5mls)</td>
</tr>
<tr>
<td>CSF and Blood</td>
<td>CSF glucose and Blood glucose</td>
<td>Grey top vacutainer (with fluoride)</td>
<td>0.5ml</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grey top vacutainer</td>
<td>2 ml blood</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- Total CSF volume required = 7.6mls
- 24 drops from yellow LP needle = 1ml
- Send CSF and blood samples for Chemical Pathology all on one form
- Bottles needed: 2 grey fluoride (one for CSF, one for blood) and 4 plain sterile universal containers
- Forms needed: Microbiology, Chemical pathology, Cytology
- Please telephone microbiology (x2035) beforehand and aim to send samples before midday

**HIV POST-EXPOSURE PROPHYLAXIS**

Link consultant: Dr. Gill McCarthy

There is a small but real risk of HIV infection after accidental exposure to contaminated (HIV-containing) blood or ‘high-risk’ body fluids (amniotic, peritoneal, cerebro-spinal, synovial and pericardial fluids, breast milk, semen, vaginal secretions, body fluid that is blood-stained, saliva in association with dentistry, exudate or other fluid from a burn or other skin lesion) or unfixed tissues and organs. The risk of acquiring HIV infection from a needlestick injury involving a known HIV positive patient is around 0.3%. With prompt treatment with antiviral agents, this risk can be reduced by around 80%.
The risk is greatest following a needlestick injury where the needle is blood stained, the injury is deep, the needle has a hollow bore, the source patient is terminally ill with HIV infection, and where the needle has been in an artery or vein. The risk is also high after percutaneous exposure from contaminated instruments or bone fragments. The risk is less after mucus membrane exposure (around a third of that after needlestick injury) or when blood or other infected body fluids contaminate broken skin. The risk is negligible where contact is with intact skin, or where there has been contamination with ‘low risk’ body fluids such as urine, saliva, vomit or faeces.

Management
If the site of exposure is a wound or non-intact skin, liberally wash (but not scrub) with soap and water. Gently encourage any free bleeding. If exposed area is mucous-membrane, copiously irrigate with water (if contact lenses are worn, irrigate before and after they are removed).

Investigations: take FBC, U&E, LFT, baseline HIV test, Hepatitis B markers including sAb, HCVIgG and a serum save.

Treatment following exposure to a known or high-risk source:
- Should preferably be started within an hour of exposure and certainly within 72 hours of exposure. Consideration may be given to starting treatment after 72 hours in certain high risk cases.
- Involves taking a 4-week course of a combination of three drugs; Truvada (Tenofovir disoprixil 245 mg and emtricitabine 200 mg) one tablet daily, and Raltegravir one tablets twice daily. If the source patient is known and is on HAART, other combinations may be more appropriate – seek advice from the GUM/HIV consultant on call via switchboard. Beware of interactions between HAART and other medications the patient may be taking. Please check the website www.HIV-druginteractions.org or speak to the on call consultant.
- Is complicated if the person exposed is pregnant – seek advice from the GUM/HIV consultant.
- If there is a risk of ‘bleed back’ (contamination of your blood onto the open tissue of the patient), then please seek advice. You will be screened for blood-borne viruses and the patient may need ‘post exposure prophylaxis’.

Emergency 5-day supplies of Truvada and Raltegravir are kept in the Wolverton Centre, A&E and the Emergency drug cupboard.

In the event of exposure of staff:
- during working hours, seek advice immediately from Staff/Student Occupational Health (8.30am-5pm, ext 2615)
- if out-of-hours, attend Accident & Emergency. Inform triage nurse that you must be seen immediately.

Do not depend on a self-risk assessment which is unreliable. Report all injuries. The trust policy is to approach all source patients for consent to test them for HIV, HCV and HBV infections. You will be informed of the results. If you are distressed after such injuries, please contact the Occupational Health Department for support.
This is Post Exposure Prophylaxis (PEP) following potential sexual exposure to HIV. Please contact the on call GUM/HIV physician via switchboard for advice if necessary. During working hours all patients should be referred to the Wolverton Centre. During evenings and weekends patients should be referred to A&E for management. A proforma with an incorporated HIV risk assessment tool is available in A&E and on PIMS (intranet) – please use this to determine risk and whether to give PEPSE.

The estimated risk per exposure from a known HIV positive source partner is:
1 in 65 for receptive anal sex with ejaculation
1 in 170 for receptive anal sex without ejaculation
1 in 161 for insertive anal sex (not circumcised)
1 in 909 for insertive anal sex (circumcised)
1 in 1000 for receptive vaginal sex
1 in 1,219 for insertive vaginal sex

### Summary of Situations when PEPSE is considered

<table>
<thead>
<tr>
<th>Source HIV Status</th>
<th>HIV positive</th>
<th>Unknown HIV status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HIV viral load unknown or</td>
<td>High risk country, bisexual, homosexual, sub-</td>
</tr>
<tr>
<td></td>
<td>detectable (&gt;200copies/ml)</td>
<td>Saharan Africa</td>
</tr>
<tr>
<td></td>
<td>HIV viral load undetectable</td>
<td>From low prevalence country or group</td>
</tr>
<tr>
<td></td>
<td>(&lt;200copies/ml)</td>
<td></td>
</tr>
<tr>
<td>Receptive Anal</td>
<td>Recommend</td>
<td>Recommend</td>
</tr>
<tr>
<td></td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Insertive Anal</td>
<td>Recommend</td>
<td>Consider*</td>
</tr>
<tr>
<td></td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Receptive Vaginal</td>
<td>Recommend</td>
<td>Consider*</td>
</tr>
<tr>
<td></td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Insertive Vaginal</td>
<td>Consider*</td>
<td>Not recommended</td>
</tr>
<tr>
<td></td>
<td>Not recommended</td>
<td></td>
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<tr>
<td>Fellatio with ejaculation</td>
<td>Not recommended</td>
<td>Not recommended</td>
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<td></td>
<td>Not recommended</td>
<td>Not recommended</td>
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<tr>
<td>Fellatio without ejaculation</td>
<td>Not recommended</td>
<td>Not recommended</td>
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<tr>
<td></td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Splash of semen into eye</td>
<td>Not recommended</td>
<td>Not recommended</td>
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<tr>
<td></td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Cunnilingus</td>
<td>Not recommended</td>
<td>Not recommended</td>
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<tr>
<td></td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Sharing injecting equipment</td>
<td>Recommended</td>
<td>Consider</td>
</tr>
<tr>
<td></td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Human Bite§</td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
<tr>
<td></td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Needlestick discarded in community</td>
<td></td>
<td>Not recommended</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not recommended</td>
</tr>
</tbody>
</table>
*Risk may increased in the presence of: blood loss at the time of exposure (menstrual or traumatic), sexual assault, multiple exposures, multiple partners and concurrent sexually transmitted infections (including giving fellatio)
§ A bite is assumed to constitute breakage of the skin with passage of blood
Country specific HIV prevalence can be found in UNAIDS Gap Report:

When to start treatment
- As soon as possible and within 72 hours
- Take pre-treatment blood tests as outlined in proforma (FBC, U&E, LFT, baseline HIV test, Hepatitis B markers and HCV IgG, Syphillis and serum save).

What medication?
Same as for PEP:
- Truvada one tablet daily
- Raltegravir 400 mg one tablet twice daily

See proforma for drug interactions.
Seek advice if source patient is taking antiretrovirals and has known resistance mutations (i.e. has failed previous drug regimes). 5-day starter packs are available in A&E. Note antiretrovirals cannot be prescribed by a GP and must be obtained from the hospital Pharmacy.

Other considerations
- Risk of pregnancy? – check PT
- Emergency contraception – does patient need Levonelle?
- Hepatitis B risk from sexual exposure – hepatitis B immunisation or Hepatitis B immunoglobulin.

Follow up
As the patient to attend the Wolverton Centre the next working day with a completed copy of their PEPSE pro forma (and FAX to 020 8481 0078).

ACUTE STROKE AND TRANSIENT ISCHAEMIC ATTACK
Stroke consultants: Dr Asis Kumar and Dr. Paul O’Mahoney

Stroke is a clinical syndrome which lasts > 24 hours (or results in death) in which an acute focal or global cerebral deficit occurs secondary to cerebrovascular disease. The majority (> 80%) of strokes are due to cerebral infarction. Intracerebral haemorrhage accounts for around 15% of strokes. In patients with transient ischaemic attack (TIA), the neurological symptoms and signs are focal and resolve within 24 hours.

Acute Stroke Unit (Keats Ward)
Keats Ward (extension 2697) has 20 beds which are specifically for acute stroke patients. Good management of patients with stroke reduces overall mortality by 25% and the risk of recurrence by up to 75%. Multidisciplinary team care on a stroke unit reduces complications and improves outcome.
**ACUTE STROKE**

ALL patients with suspected acute stroke, regardless of age or eligibility for thrombolysis, should be admitted directly to a Hyperacute Stroke Unit (HASU) for assessment and emergency stroke treatment. They should not be admitted to Kingston hospital. Our nearest HASUs are a) St. George’s and b) Charing Cross hospitals.

At the HASU, patients should receive brain imaging urgently, at most within 1 hour of arrival, consideration of alteplase (within 3 hours of known onset of symptoms) and consideration of combination of IV thrombolysis and intra-arterial clot extraction if they have a proximal intracranial large vessel occlusion causing a disabling stroke (within 5 hours of known onset of symptoms).

**Emergency Department (ED)/Acute Assessment Unit**
Patients who present directly to ED at Kingston hospital with suspected acute stroke must be discussed urgently with the Stroke SpR on call at St George’s Hospital with a view to a ‘Blue light’ transfer to the HASU via LAS. ALL acute stroke patients must be referred to the HASU regardless of age, co-morbidity or eligibility for thrombolysis. They should not be admitted to the Acute Assessment Unit (AAU) whilst awaiting a HASU bed. DO NOT delay for a brain scan unless directed to by the HASU. On transfer, the patient should be accompanied by a photocopy of the admission notes and any investigation results (if available).

**Referrals from GP**
If the Medical SpR or Consultant on call is contacted by a GP about a patient with a suspected acute stroke, the GP should be advised to call an ambulance and to contact the nearest HASU. Do not admit patients with acute strokes to Kingston hospital.

**Acute in-hospital strokes**
Discuss these patients urgently with the Stroke SpR on call at St George’s Hospital (or Charing Cross Hospital) for consideration of transfer to the HASU for further management. The Elderly care SpR (bleep 463) or Stroke consultant should also be contacted. DO NOT scan the patient unless directed to as this may delay transfer/potential thrombolysis.

If, following discussion with the HASU/Kingston stroke team, it is decided that transfer to the HASU is not appropriate, then patients in whom stroke is the primary medical condition should be moved to a stroke bed on Keats ward. This must be discussed first with the Stroke consultant (or the Elderly care SpR, bleep 463). Those patients in whom acute stroke is not the major current condition will remain under the care of their current medical team with appropriate advice given by the stroke team.

**Repatriation**
From the HASU, stroke patients who require further inpatient treatment and rehabilitation are then repatriated back to their local Stroke Unit (SU) within 72 hours (if medically fit for transfer), but often within 24 hours. A list of Kingston patients waiting to be repatriated from the HASUs is kept on the white board on Keats Ward. Once the date of transfer is confirmed, add the patient’s details onto the On-take list.

Patients who are repatriated will be accompanied by the appropriate documentation including a full discharge summary and photocopy of the HASU medical notes and
drug chart. Imaging is sent via the IEP (Image Exchange Portal) and then downloaded onto the Kingston Hospital PACs by the radiology department.

Upon arrival on Keats Ward, repatriated patients need to be assessed by a member of the medical team and “clerked in” on the paper stroke unit pro forma which is available on the ward (see Assessment of the Stroke Patient – below). Prescribe their medication electronically on CRS. This is to ensure that patients are medically stabilised after transfer and are on the appropriate treatment.

ASSESSMENT OF THE STROKE PATIENT

HISTORY
An accurate history should include:
• Time and mode of onset (sudden or gradual)
• Progression since onset
• Vascular risk factors:
  • Hypertension
  • Diabetes
  • Smoking and alcohol
  • Previous stroke/TIA
  • Ischaemic heart disease (IHD)
  • Peripheral vascular disease
  • Hyperlipidaemia
  • Family history of stroke or IHD

EXAMINATION
• General examination
  Vital signs (especially BP)
  Cardiac and respiratory signs
  Peripheral pulses and the presence or absence of carotid and other arterial bruits

• Neurological examination
  A careful neurological examination should be performed, in particular, noting:
  Conscious level (use the Glasgow coma scale)
  Cognitive function (orientation, language, memory, visuospatial skills)
  Visual fields, speech, swallowing, limb weakness, cerebellar signs
  Reflexes and plantar responses
  Gait assessment
  Presence or absence of incontinence

INVESTIGATIONS

Initial tests
The following should be requested in ALL patients at the time of admission:
FBC, ESR, U&E, blood glucose, lipid profile, CXR (if not performed on the HASU), and ECG.
The following additional blood tests should also be considered in some patients:
• Clotting screen – patients with intracerebral haemorrhage
• Thrombophilia screen (protein C, protein S, antithrombin III, APC resistance, lupus anticoagulant)
• Autoantibody screen
• Anticardiolipin antibody – patients with ischaemic stroke under the age of 60
IMAGING
Essential for the underlying pathology (haemorrhage or infarction), site (e.g. carotid or vertebrobasilar territory), and underlying aetiology (e.g. carotid stenosis or cardiac embolism). In patients who have been repatriated from the HASU, their brain imaging will be sent to Kingston Hospital via the IEP.

CT/MRI scanning: All stroke patients should have a CT or MRI scan as soon as possible and definitely within 24 hours of the vascular event. MRI is the optimal imaging modality in stroke; abnormalities are detected earlier than with CT and is particularly indicated in patients with small infarctions which may not be seen well on CT (lacunar stroke and posterior circulation stroke), and in patients suspected of having carotid/vertebral dissection and cerebral venous thrombosis.

Doppler ultrasound scan (carotid and vertebral): this will be carried out on the HASU prior to transfer. Those patients with non-disabling carotid territory stroke/TIA and symptomatic internal carotid artery stenosis of > 50% need urgent vascular surgery assessment for consideration of carotid endarterectomy (CEA), within 1 week of symptoms.

Transthoracic Echocardiography: should be considered in the following situations after an ischaemic stroke:
- patients with significant cardiac abnormality on examination or on ECG
- ischaemic events in more than one vascular territory (cardio-embolism)
- suspected infective endocarditis
- young patients with an ischaemic stroke with no other explanation
In practice the echocardiographic findings will rarely alter clinical management if the decision has already been made to anticoagulate (e.g. the patient is in AF) or when anticoagulation is contraindicated.

24 hour ECG and/or 7-day tape: in suspected paroxysmal atrial fibrillation (i.e. infarcts affecting multiple cerebral vascular territories) or in young patients with no obvious underlying cause.

MANAGEMENT

ACUTE ISCHAEMIC STROKE

Antiplatelets:
In the acute phase of ischaemic stroke Aspirin 300mg should be given as soon as possible (delay for 24 hours if thrombolysis has been given) for up to 14 days. Aspirin can be administered rectally or by a nasogastric tube if the patient is dysphagic.

Clopidogrel 75mg monotherapy is now the recommended antiplatelet for secondary prevention after acute ischaemic stroke. This should be started when the initial 14-day course of aspirin treatment finishes. Load with one dose of clopidogrel 300 mg first, then continue with 75 mg od thereafter. Note: omeprazole may reduce the efficacy of clopidogrel; ranitidine or lansoprazole should be used instead if gastric protection is needed.

Aspirin and clopidogrel in combination should NOT be routinely used for secondary prevention (only use after discussion and agreement with a stroke consultant).
Dipyridamole modified release 200 mg bd in combination with aspirin 75mg should be used in those patients who are intolerant of clopidogrel or if clopidogrel is contraindicated. Warn the patient of common side-effects such as headache, nausea and diarrhoea. Discontinue if side effects persist.

**Heparin and warfarin:** anticoagulation does not improve outcome in patients with ischaemic stroke and is only indicated in specific circumstances e.g. carotid dissection, cerebral venous thrombosis, or where there is a high risk of a cardio-embolic source (on stroke consultant advice). In patients with atrial fibrillation and disabling ischaemic stroke, anticoagulation should be delayed for two weeks due to risk of haemorrhagic transformation (continue antiplatelet therapy during this time). In patients with atrial fibrillation and non-disabling ischaemic stroke, anticoagulation can be started earlier (seek advice from the stroke consultant).

**Direct oral anticoagulant (DOACs):** Dabigatran, Rivaroxaban, Apixaban, and Edoxaban have been licensed for stroke prevention in atrial fibrillation in certain circumstances. INR monitoring is not needed. They can only be prescribed on the advice of a consultant.

**Anti-hypertensives:** due to impaired cerebral autoregulation following a stroke, precipitous drops in BP may worsen cerebral ischaemia and prognosis; therefore, acute lowering of BP should be avoided. Patients already on antihypertensive medication should continue their usual treatment unless their blood pressure is low. In patients with a systolic BP over 220mmHg and/or a diastolic blood pressure greater than 100 mmHg, blood pressure should be reduced gradually.

However, antihypertensives may be indicated acutely in the following situations: accelerated hypertension, left ventricular failure, hypertensive encephalopathy, aortic dissection (seek senior medical advice).

**Secondary complications**  
Much of the mortality following stroke is from secondary complications:

<table>
<thead>
<tr>
<th>Monitor</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consciousness level</td>
<td>GCS/4 hourly neuro observations. Consider an urgent repeat CT Head to exclude haemorrhagic transformation or hydrocephalus if GCS suddenly drops or worsening neurological signs. Consider also other causes (e.g. infection, electrolyte imbalance, medication, seizures etc).</td>
</tr>
<tr>
<td>Cognitive impairment</td>
<td>Mental test score (AMTS/MMSE/MOCA)</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>Do not treat acutely raised BP without consultant advice (see above). Consider underlying cause (e.g. pain, agitation, acute urinary retention)</td>
</tr>
<tr>
<td>Temperature</td>
<td>Paracetamol PO/PR/IV for fever, identify and treat infection. Consider infection as a cause in cases of acute neurological deterioration.</td>
</tr>
<tr>
<td>Fluid balance</td>
<td>Intravenous fluids initially or via nasogastric tube</td>
</tr>
<tr>
<td>Condition</td>
<td>Treatment/Measurements</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Hyperglycaemia</td>
<td>Sliding scale insulin if glucose remains greater than 10 mmol/L</td>
</tr>
<tr>
<td>Hypercholesterolaemia</td>
<td>Target total cholesterol &lt;4.0, LDL &lt;2.0. Treat with Atorvastatin 80 mg od.</td>
</tr>
<tr>
<td>Oxygen saturation</td>
<td>Oxygen therapy if O₂ sats &lt; 95%, look for underlying cause, airway support if indicated</td>
</tr>
<tr>
<td>Pressure areas</td>
<td>Appropriate pressure relieving mattress/turning</td>
</tr>
<tr>
<td>Seizures</td>
<td>Anticonvulsants. Consider as a cause of fluctuating GCS/acute neurological deterioration</td>
</tr>
<tr>
<td>Swallowing/nutrition</td>
<td>Ensure swallowing is safe before giving food and fluids. If unsafe, keep the patient nil by mouth, insert an IV line or nasogastric tube, and refer urgently for Speech and Language Therapy (SALT) assessment. CXR may be needed to check the position of the NGT. Monitor weekly weight and malnutrition risk score; refer to the dietician if indicated.</td>
</tr>
<tr>
<td>Depression</td>
<td>Common after acute stroke. Mood to be monitored and assessed weekly by the MDT. Refer to the stroke psychologist if appropriate</td>
</tr>
<tr>
<td>DVT/PE</td>
<td>Covidien Intermittent Pneumatic Compression sleeves should be used in all immobile patients for up to 4 weeks after acute stroke. Following this period, a consultant led decision can be made on the use of prophylactic LMWH. LMWH should be avoided in the acute period due to risk of haemorrhage; there is no evidence for the use of anti-thromboembolism/TED stockings.</td>
</tr>
</tbody>
</table>

**Discharge and aftercare arrangements**

Prior to discharge, give advice on driving; those with stroke or TIA must not drive for a minimum of one month and a return to driving is dependent on a satisfactory recovery. Those who have had a stroke with residual neurological deficit must also inform the DVLA. Further up to date information on the medical rules for driving can be obtained from the [DVLA: assessing fitness to drive](https://www.dvla.gov.uk/). Patients should be followed up in outpatient Stroke clinic 6 weeks following discharge.

**SECONDARY PREVENTION - preventing recurrent Stroke/TIA**

- **Individual lifestyle factors** (smoking, alcohol excess, diet, exercise)
- **Clopidogrel** 300 mg loading dose followed by 75 mg daily (after initial aspirin therapy – as described in the acute stroke section, above)
- **High intensity statin therapy** with atorvastatin 20-80 mg daily (unless contraindicated)
  - If not tolerated, use an alternative statin at the maximum tolerated dose
  - Aim to achieve greater than 40% reduction in non-HDL cholesterol, within 3 months of commencing treatment
- Do not prescribe fibrates, bile acid sequestrants, nicotinic acid or omega-3 fatty acid compounds for secondary vascular prevention. Ezetimibe should be used only in people who also have familial hypercholesterolaemia.
- People with primary intracerebral haemorrhage should avoid statin treatment unless it is required for other indications.

**Blood pressure lowering therapy**: aim for optimal blood pressure of \( \leq 130/80 \) (unless severe bilateral carotid artery stenosis, in which case 140-150 mmHg is appropriate). In patients > 55 years old or of Afro-Caribbean origin, initial treatment should be with a calcium channel blocker or a thiazide diuretic; add in an ACE inhibitor or angiotensin II receptor antagonist if target BP not achieved. In patients < 55 years old, ACE inhibitor or ARB should be first choice.

**Atrial fibrillation and anticoagulation**: patients with TIA and AF should be anticoagulated as soon as possible after intracranial bleeding has been excluded, and with an anticoagulant that has rapid onset, provided there are no other contraindications, (e.g. with low molecular weight heparin or Direct Oral Anticoagulant DOAC - the latter confined to people with non-valvular AF and needs consultant recommendation):
- Do not start anticoagulation in people with uncontrolled hypertension
- For people with disabling ischaemic stroke and AF, anticoagulation should be deferred until at least 14 days from onset (to minimise the risk of haemorrhagic transformation); use aspirin 300 mg daily in the meantime
- For people with non-disabling ischaemic stroke, anticoagulation should be deferred for an interval at the discretion of the prescriber, but no later than 14 days from the onset
- People with stroke or TIA in sinus rhythm should not receive anticoagulation unless there is an indication such as a cardiac source of embolism, cerebral venous thrombosis or arterial dissection
- For people with cardioembolic stroke for whom treatment with anticoagulation is considered inappropriate, antiplatelet treatment should not be used for people with absolute contraindications (bleeding). Consider a left atrial appendage occlusion device as an alternative.
- People with ischaemic stroke or TIA who may be eligible for anticoagulation should be considered for prolonged ECG monitoring (24 hours or longer) particularly if they have cerebral ischaemia suggestive of cardioembolism.

**Recurrent TIA or stroke**: patients should receive the same antithrombotic treatment as those who have had a single event. More intensive antiplatelet or anticoagulation treatment should only be given as part of a clinical trial or in exceptional clinical circumstances.

**Symptomatic carotid stenosis** greater than 50% demonstrated on Duplex in patients with non-disabling ischaemic stroke or TIA should be referred urgently to the on call vascular surgery team at St George’s Hospital for consideration of carotid endarterectomy (CEA). CEA should also be considered in patients with a symptomatic 50-69% stenosis in whom surgery can be performed within 2 weeks of the event.

**TRANIENT ISCHAEMIC ATTACK (T.I.A.)**

- Patients with acute focal neurological symptoms that resolve completely within 24 hours (i.e. suspected TIA) should be given aspirin 300 mg immediately and assessed urgently within 24 hours by a specialist physician in a neurovascular clinic (“TIA clinic”) or an acute stroke unit
- Patients with suspected TIA which occurred more than a week previously should be assessed by a specialist physician as soon as possible within 7 days
• Patients and their family/carers should receive information about the recognition of stroke symptoms and the action to be taken if they occur
• A specialist physician should assess the patient before a decision on brain imaging is made, except when haemorrhage requires exclusion in patients taking an anticoagulant or with a bleeding disorder (when unenhanced CT should be performed urgently).
• If brain imaging is deemed necessary and cannot be undertaken within 7 days of symptoms, T2 MRI imaging should be the preferred means of excluding haemorrhage
• Once the patient is given a confirmed diagnosis of TIA, aspirin should be stopped. Clopidogrel (300 mg loading dose and 75 mg daily thereafter) and high intensity statin therapy (atorvastatin 20-80 mg daily) should be started immediately
• Secondary prevention – other factors should be taken into account (see ‘Secondary Prevention’ section above), including lifestyle factors, blood pressure lowering drugs, and anticoagulation if in AF. Patients with non-disabling stroke or TIA who after specialist assessment are considered candidates for carotid intervention should have carotid imaging performed urgently within 24 hours.

Referral to TIA clinic
Patients who have had a TIA now need to be seen within 24 hours of the suspected TIA. They are more likely to have had a TIA if they have the following symptoms:
• Unilateral Face Arm or Leg weakness
• Speech disturbance
• Transient visual loss

Daily TIA clinics take place Monday to Friday, at 1330 on the AAU. Internal referrals must be made via email using the TIA referral form (which can be found in the ‘Forms’ section of the Intranet) to: TIAReferralsInternal@kingstonhospital.nhs.uk

The following information MUST be included on the referral form:
• Patient name, address and telephone numbers (warn patient that they will be contacted the following day by the AAU)
• Brief clinical history including time/date of onset, examination, risk factors
• All patients should have the following tests requested prior to referral: FBC, U&E, ESR, cholesterol, glucose, LFTs, ECG
• Unless there is a contraindication, aspirin 300mg daily should be prescribed
• Patients who have had a stroke or a TIA should be told they must not drive for a minimum of one month.

Weekend/bank holiday high risk patients: Over the weekend (i.e. patients presenting on a Friday afternoon, Saturday or Sunday), when it is not possible to access a TIA clinic within 24 hours, refer high risk patients to the Medical SpR on call (bleep 174).
• Arrange admission to the Acute Assessment Unit via the medical registrar
• The following tests must be performed prior to discharge:
  - Blood tests – FBC, U&E, glucose, LFTs, ESR
  - ECG – document results on CRS
  - CT brain scan
  - Carotid Doppler – referral needs to be made to the on call vascular sonographer (contact via switchboard) no later than 10 a.m.; scans will be performed between 11 a.m. and 1 p.m. only
• If there is no haemorrhage on the CT brain scan, prescribe aspirin 300 mg and atorvastatin 20-80 mg
If 50% or more symptomatic carotid stenosis on Doppler, do NOT discharge the patient until assessed by the Stroke team or discussed with HASU
A high risk patient to be discharged ONLY when ALL of the above investigations are completed and the patient has been started on treatment.

Ensure all patient information and the referral are forwarded to the AAU/TIA clinic and ask the patient to telephone AAU first thing in the morning on the next working day to confirm their TIA clinic appointment

**STROKE AND TIA Referral Pathway**

**Have symptoms resolved?**
- **Yes**
  - Sunday to Friday before 4 p.m.
  - **Yes**
    - REFER TO TIA CLINIC
      - Internal referrals must be made via email using the TIA referral form to: TIAReferralsInternal@kingshospital.nhs.uk
      - NB: Faxed referral are no longer accepted
      - • Arrange FBC, ESR, glucose, cholesterol, U&E, LFTs, ECG
      - • Inform patient that he/she will be contacted within 24 hours
      - • Give aspirin 300 mg
      - • Advise patient not to drive
  - **No**
    - **Yes**
      - ARRANGE BLUE LIGHT TRANSFER TO NEAREST HYPERACTUE STROKE UNIT (SGH)
      - No need to call HASU to refer!
    - **No**
      - Call HASU
      - Refer the patient and arrange transfer to HASU
      - If not accepted by HASU

**Most likely if:**
- • Unilateral Face, Arm, or Leg Weakness
- • Speech disturbance
- • Visual loss

**Have the symptoms occurred within the last 3 hours?**
- **Yes**
  - **Yes**
    - ARRANGE BLUE LIGHT TRANSFER TO NEAREST HYPERACTUE STROKE UNIT (SGH)
    - No need to call HASU to refer!
  - **No**
    - Call HASU
    - Refer the patient and arrange transfer to HASU
    - If not accepted by HASU

- **No**
  - Have the symptoms occurred in the last 48 hours?
    - **Yes**
      - Discuss with Stroke team (or Medical SPR out of hours)
    - **No**
      - Call HASU
CONVULSIVE STATUS EPILEPTICUS IN ADULTS
Link consultant: Dr Dora Lozsadi

Status epilepticus (SE) is defined as continuous seizure activity which has failed to self-terminate. The risks of neurological damage are highest with generalised tonic/clonic (convulsive) seizures. Convulsive SE may present as either a run of discreet generalised tonic/clonic seizures without without regaining consciousness, or continuous generalised tonic/clonic seizure activity.

Most convulsive seizures terminate spontaneously within 3 minutes, and do NOT need emergency treatment. **Convulsive seizures lasting longer than 5 minutes, or recurring without recovery should be managed as Convulsive SE**, unless the patient is known to habitually have longer seizures with self-termination. Search for information about a patient’s seizures: by taking collateral history, looking in the patient’s epilepsy card, diary, or medical notes.

The mortality and morbidity of generalised status epilepticus is high, thus it is important to control fits as soon as possible, to use adequate doses of 1st and 2nd line agents, but not to over-treat patients in whom seizures have terminated but are slow to recover (postictal).

**GENERAL MANAGEMENT**

1st stage (0-10mins)
- Protect the patient from damage - make the environment safe by using padded bed rails. Do not restrain the patient. Place the patient in a semi-prone (recovery) position with the head down to prevent aspiration and to help maintain the airway. The patient should be kept in this position until full consciousness is restored.
- **Note the time**
- During an inter-ictal period, insert an airway and then administer oxygen. Do not attempt to insert anything in the patient’s mouth during a seizure, even if the tongue is injured.
- Administer oxygen. Establish IV access.
- Check BM/blood glucose levels and correct urgently if necessary. If the patient is hypoglycaemic but alcohol dependent or malnutrition is suspected, give thiamine (Pabrinex) BEFORE giving IV glucose. Refer to the section on Hypoglycaemia.
- Measure FBC, glucose, U&E, calcium, LFTs, clotting, and anticonvulsant drug levels. Save/send 5 ml blood and 50 ml urine for toxicology.
- Check ABG and treat acidosis as necessary
- Request a CXR to assess for possible aspiration

**DRUGS:** Check if any pre-hospital benzodiazepines have been given. If two adequate doses of any benzodiazepine have been administered and seizures have recurred within a 24-hour period, move straight to 2nd line/established status treatment.
- The drug of first choice is lorazepam 4 mg given as an SLOW IV bolus injected at 2mg/min. If IV access is not established, buccal midazolam 10 mg or diazepam IV 10 mg is an alternative.
- A second dose of a benzodiazepine may be repeated once within 10-20minutes. Monitor for possible respiratory depression.
2nd Stage (0-30mins)
- Institute regular monitoring (temperature, cardiac, respiration, BP). Consider possibility of non-epileptic status. Check and correct glucose levels (see above) if not already done so
- Alert the on-call anaesthetist
- Send blood tests, ABG, arrange CXR if not already done so

DRUGS: Start iv infusion of a 2nd line antiepileptic drug. Phenytoin and phenobarbital are licensed in the UK as second line agents. Other drugs are listed in the table below.

Second line antiepileptic agents in the treatment of status epilepticus

<table>
<thead>
<tr>
<th>Drug</th>
<th>Loading dose/maximum rate</th>
<th>May be preferable</th>
<th>Contraindicated</th>
</tr>
</thead>
</table>
| Phenytoin             | Dose: 20mg/kg Rate: 50mg/min Infuse into a large peripheral vein or centrally | • Already on phenytoin, suspected poor adherence  
  • Alternatives contra-indicated or previously ineffective | • Hypotension  
  • Bradycardia  
  • Heart block  
  • Porphyria  
  • Myoclonus  
  • Partial or generalized seizures/epilepsy  
  • Overdose: recreational drugs/antidepressants |
| Valproate (Unlicensed)| Dose: 30mg/kg Rate: 10mg/kg/min Maximum dose: 3000mg Infuse into a large peripheral vein or centrally | • Already on Valproate, suspected poor adherence  
  • Generalized epilepsy  
  • Co-morbid migraine, mood disorder  
  • Alternatives contra-indicated or previously ineffective | • Known pregnancy  
  • Pre-existing liver disease or pancreatitis  
  • Known metabolic disorder predisposing to hepatotoxicity |
| Levetiracetam (Unlicensed)| Dose: 40mg/kg; Rate: 6mg/kg/min Maximum dose: 4500mg Infuse into a large peripheral vein or centrally | • Already on Levetiracetam, suspected poor adherence  
  • Need for minimal drug interactions  
  • Alternatives contra-indicated or previously ineffective | May not be best choice in  
  • acute or prior brain injury  
  • known mood./behaviour disorder or psychiatric co-morbidity (may exacerbate) |

3rd Stage (0-60mins)
- Establish aetiology: Gain information (Is there evidence of previous epilepsy, any anticonvulsant drugs, diary or wallet card or bracelet?)
- Consider urgent CT
- Intensive care unit assessment.
- Identify and treat medical complications.

4th Stage (30-90mins). Refractory status epilepticus. Transfer to ICU.
Treatment of Convulsive Status Epilepticus in Adults

- Give oxygen and establish IV access
- Give Pabrinex if suggestion of alcohol dependency or impaired nutrition
- Measure glucose; if hypoglycaemic, refer to the section on hypoglycaemia

Focal/non-convulsive status epilepticus

Seek Neurology advice

Refer all patients with convulsive SE to a senior doctor (SPR/consultant)

Neurology advice is available:
- Neurology at KH: 2487
- Epilepsy SPR at SGH 8134
- Neurology SPR at SGH on call (bleep 7277)

Convulsive status epilepticus

Lorazepam 4 mg IV*  
7-10 minutes

Lorazepam 4 mg IV*  
5 minutes

- Phenytoin 20 mg/kg at rate of 50 mg per minute, or
- Valproate 30 mg/kg at a rate of 10mg/kg/min (max 3000 mg) or
- Levetiracetam 40 mg/kg at a rate of 6 mg/kg/min (max 4500 mg)

Call anesthetist/ITU team

Seizures persisting by the end of the infusion, or 20 minutes since infusion started (whichever is soonest)

Transfer to ITU

*If Lorazepam unavailable, give 10 mg diazepam IV or 10 mg buccal Midazolam. If no IV access, give buccal Midazolam

Adapted from SGH pathway Professor Cock 2016
LUMBAR PUNCTURE
Link consultants: Dr. Ali Al-Memar and Dr. Aram Salehi

Lumbar puncture (LP) is potentially dangerous and should be carried out only in the presence of definite clinical indications, in the absence of any contra-indication, and if possible after CT or MRI scan exclusion of a space occupying intracerebral lesion. It should be performed, or supervised, by someone experienced in the technique. Unless an emergency, it is best done during normal working hours. Remember, most indications for lumbar puncture are relative rather than absolute. If in doubt, contact a neurologist for advice.

The aim of this guide is to help clinicians to improve the safety and efficiency of this diagnostic procedure and to obtain an informed written consent from each patient, according to the GMC guidance for good medical practice. If a patient lacks mental capacity and/or is too unwell, the LP may still be done in the patient’s best interests.

If you are unable to perform LP after two attempts, contact senior colleague and/or consider LP under direct radiological guidance.

Indications for lumbar puncture
1. To obtain CSF to help in the diagnosis of:
   a) Infection – (meningitis, encephalitis or meningo-vascular syphilis), but only after a CT or MRI scan has excluded space-occupying pathology
   b) Subarachnoid haemorrhage, but only when there is high clinical suspicion and the CT scan is negative. Delaying the LP for 12 hours after onset of symptoms will improve the yield.
   c) Inflammatory conditions of the peripheral nervous system eg Guillain-Barre syndrome. In this syndrome it is often worth delaying the lumbar puncture rather than doing it at the onset of symptoms as this will improve the chances of a positive diagnosis
   d) Malignant meningitis
   e) CNS inflammatory conditions such as multiple sclerosis
2. To introduce antimitotics or contrast medium for myelography.
3. To measure CSF opening and closing pressure in a patient with benign intracranial pressure, but only after the presence of a mass has been excluded.

Contraindications to lumbar puncture
- A known intra-cranial mass lesion for example tumour, haematoma, abscess or cerebral oedema. Remember that the swollen brain seen in patients with encephalitis or infarction may act as mass lesion.
- Increased intracranial pressure suggested by CT Scan e.g. midline shift, brain swelling, intracranial bleeding, loss of suprachiasmatic and basal cisterns; OR clinically: vomiting, bradycardia, drowsiness, papilloedema, unilateral 3rd nerve palsy with altered consciousness
- Focal neurological signs.
- Prolonged or frequent epileptic seizures.
- Any possibility of intra-spinal mass lesion.
- Infection in lumbar region.
- Anticoagulation or coagulation defect or low platelet count <50 (platelet 50-100 discuss with senior)
- Cardiorespiratory compromise (stabilise the patient first)
**Imaging before LP**
The following categories of patients need brain imaging prior to LP:
- Immune-compromised
- Known CNS lesion
- Have had a seizure in the last month
- Reduced level of consciousness
- Focal neurological signs on examination
- Papilloedema

**Sample collection and measurements**
Opening pressure should be measured with a manometer in all cases. Measure microscopy, cell count and differential, (gram stain if appropriate), CSF protein measurement and paired serum and CSF glucose levels in all patients. For advice on extra microbiological tests, CSF volumes required, and collection bottles, refer to the section on [Lumbar Puncture in Immunosuppressed patients](#) at the end of the HIV section. For advice on extra neurological tests, discuss with a consultant Neurologist.

**Prepare all materials before commencing the procedure**
- Sterile gloves, sterile dressing pack, sterile gown, mask
- Cleaning antiseptic solution (Chlorhexidine 0.5% or ChloraPrep 3ml Sponge Applicator)
- Sterile drape with hole (if available)
- Spinal needles (ideally Black 22G or Orange 25G to reduce the risk of post LP headache), check them for easy movement of stylet and fitting to manometer
- Sample pots x 4, unscrewed and numbered, especially if RBC cell count is used to diagnose SAH
- Grey top Fluoride oxalate bottle for CSF glucose (10 drops of CSF) alongside a second bottle for biochemistry. Pots 1 and 3 for Microbiology.
- Manometer
- Anaesthetic agent (lidocaine 1%) and 10 ml syringe and 1 orange for subcutaneous first injection and a green needle to infiltrate up to 2 cm deep.
- Grey top Fluoride oxalate bottle for serum glucose and yellow top bottle for serum protein (+/- oligoclonal bands).
- Intravenous access line for each patient, in good working order

**Investigations**
- At least 0.5 ml of CSF needed per bottle, sample 1 and 3 for Microbiology and 2 and 4 for Biochemistry, number 4 is universal bottle for Xanthochromia, to be protected from light on transfer to the lab (increased risk of false negatives).
- Fill the bottom part of the universal containers with at least 1 ml of CSF fluid.
- Document the macroscopic appearance of CSF along with details of the procedure and quantity of the lignocaine that you used.
- Measure and document the CSF opening and closing pressures (normal range 8-22 cm of CSF).
- Cell count and differential, and Gram stain
- Xanthochromia - container should be shielded from external light. A serum protein and bilirubin levels within 24 hours of the LP must also be available. Do Not Send via Pneumatic Tube
- CSF protein
- CSF Glucose (Both CSF and paired serum sample to be in Grey Top Bottle)
If indicated:
- Viral PCR (usually HSV, VZV, Enterovirus)
- Cytology (5 ml CSF at least)
- CSF Oligoclonal bands (Paired serum sample is also required for protein electrophoresis)
- Indian ink for Cryptococcus neoformans

Xanthachromia
For assessment of xanthochromia, the specimen should be collected at least 12 hours after the suspected subarachnoid haemorrhage. The sample should be the last tube collected, ideally at least the third or fourth one. It must be brought to the laboratory protected from light and not sent in the air tube. At least 0.5mL of CSF is required. You must also send a serum sample, taken within 24 hours of the lumbar puncture (to measure protein and bilirubin).

Obtaining Informed Consent
- Clearly document in the CRS record that you have explained the procedure and possible complications to the patient and that he/she has understood it.
- Reassure the patient that LP is an uncomfortable but relatively painless procedure, and that it may take up to 30 minutes
- If your patient is very anxious you may prescribe 2.5-5 mg Diazepam 30 min before procedure.
- Inform the patient that he/she must stay in bed about an hour post procedure to reduce the chance of post-LP headache. It is advisable to ask the patient to empty his/her bladder before the procedure, and ensure adequate oral hydration afterwards.

Potential complications/hazards of lumbar puncture
- Post LP headache may occur within a week in up to 25% of patients, is worse sitting or standing up, and can last 3-4 days. If not responding to rest, increased fluid intake (especially caffeinated drinks) and analgesia, the patient may benefit from re-admission to hospital for blood patch treatment by anaesthetist
- Puncture of lumbar veins
- Subdural or subarachnoid haematoma (this is a rare complication, increased risk with coagulopathy)
- Iatrogenic infection (local or meningitis, rare if aseptic technique)
- Haematoma (local or epidural)
- Nerve root damage (rare; 1:2000-1:15000)
- Deterioration of brain stem function which may lead to death due to coning in the presence of raised intracranial pressure
- Deterioration of spinal cord function due to an obstructive intraspinal mass lesion
### ONCOLOGICAL EMERGENCIES

**Link consultant:** Dr. Katharine Aitken  
**Link nurses:** Ileana Tucker, Emma Margrave, Miles Ripley  
**Out of hours - contact the on call Oncology team at Royal Marsden**

<table>
<thead>
<tr>
<th>ACUTE ONCOLOGY SERVICE (AOS)</th>
<th>Dr Katharine Aitken RMH CNS Emma Margrave and team</th>
<th>KH Mon pm, Tues am, Thurs am KH Ext 2928 or Bleep 086</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BREAST</strong></td>
<td>Dr. Marina Parton RMH Dr Sophie Otter RMH Breast CNS</td>
<td>KH Tues and Wednesday p.m., Sec KH ext 2739 RM Sec 020 7811 8191 (fax 020 7352 5441) KH ext 6363</td>
</tr>
<tr>
<td><strong>CHEMOTHERAPY</strong></td>
<td>Lorraine Hyde (Matron) Lesley Chamberlin –Lead Haem Onc Chemo CNS</td>
<td>RM SWRU Chemo Unit ext 5030 Haematology Day Unit ext 2999 KH bleep 543</td>
</tr>
<tr>
<td><strong>GYNAECOLOGY</strong></td>
<td>Dr. Alex Taylor RMH CNS Rachel Baker</td>
<td>Clinic and MDT alt Fri p.m. RM Sec 020 7808 2581 (fax 020 7808 2258) KH ext 3392 bleep 078</td>
</tr>
<tr>
<td><strong>HAEMATOLOGY/LYMPHOMA</strong></td>
<td>Dr Zaid Abboudi Dr. Vishal Jayakar Dr. Samir Zebari Dr Sangeeta Atwal Lesley Chamberlin CNS On call consultant</td>
<td>Sec KH ext 3515 Sec KH ext 2042 Sec KH ext 2706 Haematology Day Unit ext 2999 bleep 543 Available 24 hours via KH switchboard</td>
</tr>
<tr>
<td><strong>LUNG</strong></td>
<td>Dr. Sanjay Popat RMH SPR CNS (various)</td>
<td>KH Mon, RMH Sec 020 7808 2132 RMH via switchboard ext 4710 KH ext 2780 bleep 087</td>
</tr>
<tr>
<td><strong>SKIN</strong></td>
<td>Dr Jana Natkunarajah Dr Archana Rao Dr Claire Fletcher SpR CNS Saskia Reeken</td>
<td>Sec KH ext 3002 Sec KH ext 3546 KH ext 3546 KH ext 3002 bleep 060 KH ext 3002 bleep 085</td>
</tr>
<tr>
<td><strong>Contact CNS if patient has previous Melanoma diagnosis</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>UPPER GI and COLORECTAL</strong></td>
<td>Dr. Sheela Rao RMH (Medical Oncology) Dr. Katharine Aitken (Clinical Oncology) CNS Upper GI CNS Colorectal</td>
<td>KH Tues and Thurs RMH 020 8661 3159 KH Mon pm, Tues am &amp; Thurs RM sec 0208 661 3664 KH ext 3392 bleep 078 Hazel Shepherd KH ext 3069 bleep 069</td>
</tr>
<tr>
<td><strong>UROLOGY</strong></td>
<td>Dr Yae-Eun Suh RMH (Clinical Oncology) Dr. Alison Reid RMH (Medical Oncology) CNS Olga Champ</td>
<td>KH Tues; RM Sec 020 7811 8336 RMH 0208 661 3799 KH ext 2729 bleep 073</td>
</tr>
<tr>
<td><strong>CANCER of UNKNOWN PRIMARY (CUP)</strong></td>
<td>Patients with a suspected cancer of unknown origin can be referred to the AOS team for management advice and discussion in the CUP MDT (Thursdays within the Upper GI MDT)</td>
<td></td>
</tr>
</tbody>
</table>

**Abbreviations:**  
CNS = Clinical nurse specialist  
KH = Kingston Hospital  
RM = Royal Marsden Hospital  
SWRU = Sir William Rous Unit, Kingston  

**Please contact the relevant CNS or Palliative Care specialist nurses at Kingston hospital for further advice and to offer the patient support.**
ACUTE ONCOLOGY SERVICE (AOS) Bleep 086
The AOS provides specialist oncology expertise to help support medical teams in the management of inpatients with cancer. They aim to review patients within 1 working day of referral (referral form on AOS intranet page). Refer:

- Patients admitted with acute complications related to a known cancer diagnosis or anti-cancer treatment
- Patients admitted who on investigation are found to have a likely cancer diagnosis with no obvious primary
- Provision of background clinical information for patients known to RMH

To refer to AOS bleep 086 or fax a AOS referral form to 020 8934 3116

For comprehensive guidance on the management of all Acute Oncology Emergencies, see the AOS intranet page, with links to the relevant London Cancer Alliance (LCA) AOS Clinical Guidelines

METASTATIC SPINAL CORD COMPRESSION (MSCC)
Details of the MSCC management pathway are available on the intranet Acute Oncology Service guidance.

Early treatment and diagnosis is essential
Metastatic spinal cord compression (MSCC) occurs when the spinal cord or cauda equina is compressed by direct pressure and/or vertebral collapse due to metastatic spread, causing neurological deficit and paralysis. **MSCC is one of the most serious and devastating complications of malignancy; delays in diagnosis and treatment can result in paralysis which impacts on quality of life and prognosis.** The majority of MSCC cases occur in patients with a pre-existing cancer diagnosis; however, in around 20% of patients it is their first cancer presentation.

Symptoms and Signs

- Pain in the middle (thoracic) or upper (cervical) spine
- Progressive or severe lower (lumbar) spinal pain or localised spinal tenderness
- Spinal pain aggravated by straining (eg, at stool, coughing or sneezing)
- Nocturnal spinal pain preventing sleep
- Radicular pain
- Limb weakness and/or difficulty in walking
- Sensory loss or bladder or bowel dysfunction
- Neurological signs of spinal cord or cauda equina compression

Investigation
Whole spine MRI is the investigation of choice. (If an MRI is contra-indicated spinal CT is an alternative). Please note that MRI/dedicated spinal CT is available at Kingston hospital out of hours and weekends, and can be accessed by direct consultant-to-consultant discussion with the radiologist on call. Importantly:

- Imaging must be performed within 24 hours of presentation for any patient with spinal pain suggestive of spinal metastases and with neurological symptoms or signs suggestive of MSCC.
- Imaging must be performed more urgently if there is clear neurological deficit or deterioration.
For patients with pain suggestive of spinal metastases but no neurological signs or symptoms, imaging should be performed as an outpatient within 1 week of presentation.

Consider up-to-date CT brain, chest, abdomen and pelvis as this assists in decision making on the most appropriate treatment modality.

Full neurological assessment including PR examination – if neurological examination is initially normal and symptoms persist, repeat the neurological examination at least daily to monitor for change in signs.

Management of MSCC

- Dexamethasone 16mg PO or IV stat, followed by dexamethasone 8mg BD (IV or PO) with proton-pump inhibitor cover (known or suspected myeloma and lymphoma patients must be discussed with the on call haematologist first)
- Analgesia as described in the WHO pain control ladder (‘Acute pain’ section)
- All patients with radiologically impending or confirmed MSCC must be referred urgently to neurosurgery (St. Georges) and clinical oncology for a radiotherapy opinion (Royal Marsden) by following the MSCC referral pathway. Following review of the imaging and clinical details by both teams, a decision on the optimal treatment modality will be made. During working hours, refer to the AOS team to provide support in following the MSCC pathway and making these referrals.
- The MSCC co-ordinator at St George’s hospital should be contacted on 020 8672 1255 (Bleep 6027). Out of hours contact the neurosurgical SpR on call on bleep 7242. The MSCC Co-ordinator will prompt you to access, complete and e-mail the MSCC referral form to them at Stgh-tr.mscc@nhs.net. Out of hours you may also be asked to complete referral details via www.referapatient.org.
- Simultaneously, contact the Clinical Oncology SpR on call at the Royal Marsden Hospital to notify them of a potential referral for radiotherapy (call 0208642 6011 AND email referral form to rmh-tr.MSCC@nhs.net)
- Please note referrals containing patient identifiable information need to be sent from an nhs.net email account or encrypted (use encrypt button and ensure access password also sent). AOS can send the referral on your behalf if you do not have access to an nhs.net email account.
- Transfer MRI/CT images to MSCC Centre via IEP urgently for review at St Georges and also to the Royal Marsden hospital in parallel
- Decisions regarding the role of surgery or radiotherapy should be made bearing in mind the cancer diagnosis, characteristics of the MSCC, functional level of the patient (neurological and performance status), overall disease status and likely prognosis (known oncologist or AOS can advise on this). In general, patients being considered for surgery should have an expected prognosis of at least 3 months.

Spinal stability

- Patients with severe pain suggestive of spinal instability, or any neurological symptoms or signs suggestive of MSCC, should be nursed flat with neutral spine alignment (including ‘log rolling’ and use of a slipper bed-pan) until bony and neurological stability are ensured. The neurosurgical team will provide an opinion on spinal stability once they have reviewed the MRI. They will give advice on the requirement to immobilise patients in a collar or brace.
- Assume the spine is unstable until an opinion on stability is obtained.

Rehabilitation and Discharge Planning

- Liaise with physiotherapy, occupational therapy, social services and palliative medicine to develop discharge plan
- Review steroid dose and, in liaison with neurosurgical or clinical oncology team, plan reduction after treatment
Prognosis: 70% of patients ambulatory at start of treatment will maintain function, but < 5% of completely paraplegic patients do. Early diagnosis can prevent paraplegia. Inaction can lead to irreversible loss of function.

MSCC referral forms and pathways are available on the AOS Intranet site:

MSCC Treatment algorithm and referral pathway 2016
MSCC Referral form 2016
MSCC St George’s Website and Access Pathways 2016 (scroll down to the bottom)
MSCC KHFT Easy Guide and Checklist
London Cancer Alliance MSCC Clinical Guidelines

SUPERIOR VENA CAVA (SVC) OBSTRUCTION

Obstruction of the SVC or other great veins occurs as a result of direct invasion, extrinsic compression or intraluminal thrombosis. It occurs most commonly in lung cancer (70% of cases) and lymphoma. It should be considered an oncological emergency and the acute oncology team should be contacted.

Presentation
Symptoms and signs include: dyspnoea, facial swelling, and venous distension of the neck, arms, and trunk. The severity of symptoms relates to the rate and the degree of obstruction and development of compensatory collateral venous drainage. Symptoms often made worse by lying flat or bending over.

Diagnosis
- CXR is abnormal in 80% of cases.
- Diagnosis is confirmed by CT with contrast; a venogram is rarely required. Obtain tissue for histology to guide treatment if SVCO occurs as a presentation of a new malignancy (do not wait for results; refer to oncology urgently)

Immediate management
- Irrespective of tumour type radiological stenting should be considered in ALL patients as a possible way to rapidly resolve symptoms.
- Start Dexamethasone 16mg (2 x 8mg doses IV/PO daily) with PPI cover on suspicion of the diagnosis, with a gradual reduction in dose after a response.
- Symptomatic treatment of dyspnoea is a priority; 5mg morphine sulphate oral solution 4 hourly is usually effective.

Specific treatment is guided by tumour type:
- Small cell lung cancer, teratoma and aggressive lymphomas are best treated with appropriate systemic therapy.
- Radiotherapy is the established treatment for NSCLC and other less chemosensitive tumours, providing symptomatic improvement in 70% of cases
- Anticoagulation is usually indicated, but in the case of stenting this should be discussed with interventional radiologist first
MALIGNANT HYPERCALCAEMIA

This is the commonest life-threatening metabolic disorder in cancer. It occurs in 10%-20% of cancer patients, usually due to the production of a PTH-related peptide or other humeral factors. It is most commonly seen with breast carcinoma, myeloma, renal cell carcinoma, SCC lung and other squamous cell carcinomas. It is usually a poor prognostic indicator.

**Diagnosis:**
Albumin adjusted calcium of more than 2.6mmol/l. Significant symptoms often occur once adjusted calcium is greater than 2.7 mmol/l (some patients seem to be much more sensitive than others).

**Symptoms:**
Early symptoms include anorexia, lethargy, and constipation. As the level increases, there can be increasing nausea and vomiting, drowsiness, confusion, abdominal/bone pain and dehydration with polyuria/polydipsia. Death can occur within a few days if left untreated.

**Treatment.**
- Record the patient’s weight.
- Stop drugs known to cause hypercalcaemia.
- Patients with hypercalcaemia are dehydrated due to polyuria and/or vomiting. Oral rehydration may be all that is required for mild asymptomatic cases (adjusted Ca²⁺ < 3.00 mmol/l). Asymptomatic or mildly symptomatic hypercalcaemia (adjusted Ca²⁺ 3.0-3.50 mmol/l) may respond to oral hydration. Severe hypercalcaemia (>3.5mmol/l) requires urgent treatment, with IV rehydration for 24 hours with 0.9% sodium chloride, 4-6 litres aiming to increase urine volume to 200ml/hour. Slower rehydration rates will be needed if there are other co-morbidities.
- Rehydration may provoke hypokalaemia and hypomagnaseamia. Check and replace as necessary.
- Consider giving furosemide (40-80mg PO or IV), to ↑ urine flow and calciuresis. (If a diuretic is given it is essential that patient is not made hypovolaemic)
- Bisphosphonates: Pamidronate 60-90mg (dependent on level of hypercalcaemia) IV diluted with sodium chloride 0.9% to a concentration of not more than 90 mg in 250 ml, given at a rate not exceeding 1 mg/minute. Alternatively, give Zoledronic Acid 4 mg IV diluted with 100 ml sodium chloride 0.9% and give over at least 30 minutes (NB Zolendronic Acid should not be used with renal impairment).
- If renal impairment present, the rate of pamidronate should not exceed 20mg/hour.
- The serum calcium should fall within 24-48 hours with the maximum response taking 4-5 days. Bisphosphonates should not be repeated during this time unless under consultant oncologist instruction.
- Monitor for recurrence of hypercalcaemia, especially where there is no further disease modifying treatment. May need maintenance treatment with bisphosphonates. After the above doses of bisphosphonates, symptomatic hypocalcaemia is not a problem.
- For refractory hypercalcaemia, seek advice from the AOS team.
- Ensure follow-up with the relevant haematology or oncology team following discharge.
- Inform acute oncology team.
For advice on acute pain control, refer the ‘Acute Pain’ section

Treating distressing symptoms promptly and effectively is a key feature of good palliative care. Symptoms can cause acute distress to patients and in turn, to their relatives and staff. Remember that good communication can alleviate fears. It is important to establish where the patient is in their disease trajectory, what treatment options are available to them and the expressed wishes of the patient. Ideally, you want to assess and treat the underlying cause, where possible, but don’t delay relieving symptoms and distress whilst you do this. Pay attention, too, to the appropriate route of administration of drugs for symptom control to ensure their effect.

For informal advice or formal referral, contact the Hospital Palliative Care Team on: x2780 (answerphone), Bleep 070 or contact Dr. Kreeger/Dr Todd via switchboard. The team operates 7 days a week, 9-17.00. At other times you can access medical advice via the CNS on call at Princess Alice Hospice (PAH) on CARELINE: 020 8744 9414.

PAIN CONTROL IN PALLIATIVE CARE
Severe pain is a medical emergency and needs rapid response and regular review. The majority of pain can be controlled using the following basic steps:

- A good assessment of the cause(s) of pain is essential for appropriate management. Different pain may require a different management approach.
- Prescribing Analgesia – The W.H.O. Ladder
  - **Step 1: MILD pain:** Paracetamol +/- adjuvant
  - **Step 2: MODERATE pain:** Weak Opioid (e.g. Codeine/Tramadol.) +/- Paracetamol +/- adjuvant
  - **Step 3: SEVERE pain:** Strong Opioid (Morphine gold standard) +/- Paracetamol +/- adjuvant
- Prescribe REGULARLY + PRN and by mouth unless there is a problem with the oral route. For Morphine, the PRN dose is the equivalent of the regular four hourly dose. Do NOT time limit PRN doses.
- Work your way up the ladder, taking into account the PRN use and effectiveness of treatment. Review cause and effect regularly.

Examples of Adjuvant analgesia include:
- NSAIDS for Bone pain / pleuritic / liver capsule pain
- Antispasmodics for colicky abdominal pain: Hyoscine Butylbromide/Glycopyrronium. (Avoid stimulant laxatives and prokinetic anti-emetics)
- Antidepressants (e.g. Amitriptyline) / Anticonvulsants (e.g. Pregabalin) for neuropathic pain.
- Steroids: used in numerous conditions including the tumour compression of nerves and liver capsule pain.
**Strong Opioids: Morphine:**
- In patients who are opioid naïve, elderly or have mild renal failure, start with Immediate Release (IR) Morphine 2.5 to 5mg PO 4 hourly / Modified release (MR) Morphine 15mg bd, PLUS 2.5 to 5mg PRN IR Morphine. The 24 hour dose will be the same for any preparation.
- Monitor patients at least daily and titrate up according to need and taking into account the use and effectiveness of PRN analgesia. A common dose titration is:

  5mg - 7.5mg - 10mg - 15mg - 20mg - 30mg - 40mg - 60mg
of 4 hourly IR Morphine (or equivalent MR Morphine).

- If pain is not controlled or patient develops side effects, contact Palliative Care Team for advice.
- For patients with renal failure, reduce the dose, increase the dose interval, or consider an alternative strong opioid. Ask the Palliative Care Team for advice.

**Parenteral strong opioids in palliative care:**
Morphine, given subcutaneously, is the drug of choice if there is a problem with the oral route, either as bolus doses regularly, 4 hourly, or via a continuous syringe driver.

**To convert Oral Morphine to SC Morphine, divide the oral dose by two.**
Remember to prescribe subcutaneous Morphine PRN as well.

**Alternative strong opioids**
Other strong opioids are used if there is opioid responsive pain but intolerance/difficulty with Morphine. They include:
- Parenterally: Oxycodone (first line oral alternative to Morphine); Diamorphine, Alfentanil (used as an alternative to Morphine in moderate to severe renal failure);
- Transdermal patches: Fentanyl or Buprenorphine for chronic, stable pain (avoid in acute pain, as titration is slow and there is risk of toxicity with rapid titration. It is better to titrate to pain using quick acting/short acting analgesics and then convert to a patch, once symptoms are better controlled)
- Buccal Fentanyl preparations (for quick onset, short acting relief of incident/breakthrough pain). Discussion with the Palliative Care Team is advised

**Opioid toxicity in palliative care**
If you are concerned about opioid toxicity, reduce the dose and wait for signs of toxicity to subside before re-starting the opioid. **Significant caution is needed in the use of naloxone** in this patient group, as it reverses analgesia as well as toxicity, causing acute distress. Ask the Palliative Care Team for advice.

**THE TERMINAL PHASE**
The recognition of dying will involve a senior member of the clinical team: the consultant or their deputy. Clear documentation of the decision making process and involvement and communication with the patient/family is essential. **Use the CRS End of Life care (EOLc): Recognition of the dying patient decision summary (pre-configured template)**. An individualised approach to care and decision making is best supported through good MDT working. Upon recognition that a person is actively dying and that the focus of care is to provide comfort and support , the **Principles for Dying Patients** provide some useful guidance to support you. You can find these principles on the wards and under ‘Palliative care’ on the intranet
Principles for Dying Patients:
- Medical staff – use the EOLc: medical daily review of the dying patient pre-configured template on CRS for documentation
- Rationalise interventions and medications with the focus on comfort and support.
- Consider the appropriate route for medications, which will usually be subcutaneous. There may not be a need for regular medication if a patient is comfortable.
- Anticipate symptoms by writing up medications PRN, so nurses can respond quickly to distressing symptoms: Midazolam for anxiety/distress, Haloperidol for nausea/delirium, Glycopyrronium for bubbly secretions, Morphine for pain/breathlessness.
- Look in the patient’s mouth and ensure excellent mouth care. The need for antifungal treatment is quite common at this stage.
- Support patients to take oral food/fluids as they are able. Review appropriateness of any clinically assisted food/fluids. Such decisions need to be made following individual assessment.
- Communicate with family members on a regular basis and make sure everyone is aware and present who wants to be.
- Assess spiritual support needs and consider contacting the hospital Chaplain via switchboard.
- Inform the Hospital Palliative Care Team who are also able to offer support and advice: Mon – Sat 9-5 on Ext 2780 or bleep 070. For Specialist Palliative Care Advice outside these times, contact CARELINE on 020 8744 9414 and ask for the CNS on call for Princess Alice Hospice.

Prescribing medications in a syringe driver:
Specific advice on medications and doses can be found on the Intranet under Palliative Care: Prescribing Guidelines for the Dying Patient. Whilst it is always necessary to prescribe prn medications, not everyone needs a syringe pump to provide regular medication. The need for a syringe pump is based on an individual assessment of symptoms and will be unique for each patient. Maintain regular symptom control measures via the subcutaneous route and add in additional requirements following individual assessment.

DISCHARGE PLANNING at the end of life

Where you have identified that a person may be in their last months of life, it is important to take opportunities to talk with them about the aims and choices for care, clarify their wishes and help them to plan ahead (ACP – Advanced Care Planning). It is important to communicate the patient’s views and wishes with their GP and community carers. Information relating to advance care planning can be summarised on a CRS proforma under documentation called ACP/CMC referral form. If a patient consents to having a Co-ordinate My Care (CMC) record, fill out the pro forma and contact the EOLc Administrator on ext 3839, who can create the electronic record.

It is essential to write a thorough discharge summary, particularly with respect to:
1. The diagnosis
2. The understanding of the patient and the carers/family
3. Any discussions or plans about the patient’s future wishes for care when he/she deteriorates.
Medications:
- TTOs **MUST** include s/c medications needed regularly and prn s/c medications for comfort, along with actual or potential syringe driver medications where you anticipate that the patient could deteriorate rapidly.
- For administration of subcutaneous medications in the community, you will need to fill out the relevant community prescription/authorisation chart (some of these can be found on the Intranet under ‘departments’, ‘discharge coordinators’, ‘rapid discharge’ and ‘community drug charts’). The discharge coordinators and palliative care team will be able to advise.

**THE DISCHARGE SUMMARY**

**Clinical Presentation:** Record the patients symptoms currently and at presentation; note also the number of admissions he/she has had in the last 6 months.

**Significant Investigations:** If a decision has been made not to investigate any further, then state this and why. Clearly document the exact findings of all relevant investigations.

**Clinical Course:** Place the bulk of the information here.
- Explain how the diagnosis was made, the treatment that was commenced and the aim of the treatment, e.g. for comfort only.
- Explain the discussions that have taken place with the patient as to what he/she would like to happen if his/her condition deteriorates, e.g. hospice care
- Include any wishes/decisions recorded in an Advanced Care Plan, the patient’s priorities and, very importantly, his/her preferred place of care/death.
- State the patient’s resuscitation status if this has been discussed and agreed.

**Information Given to Patient/Carer:** Include what has been explained to the patient and his/her understanding, summarising key conversations. **Ensure that all the information in the discharge summary has been discussed with the patient and his/her carer(s), in particular: his/her prognosis, and whether the patient has consented to being on the electronic palliative care patient register ‘Co-ordinate My Care’ (CMC).**

**GP actions:**
- State if the Disability Living Allowance or Attendance Allowance has been applied for, as they may need to do this.
- If the patient is dying, request an early GP visit (the GP has to have seen the patient within 10 days prior to death, to prevent referral to the Coroner). If there is potential for the patient to die in transit discuss with patient/family, ambulance team and GP, preferences for whether the body should be taken to the intended destination, or brought back to the hospital. (Use the letter available on the rapid discharge intranet section to inform the ambulance crew). If the former, agree arrangements for writing the death certificate prior to discharge.
- For patients who live in the boroughs of Kingston and East Elmbridge (Surrey): a red bordered copy of the hospital DNACPR paper form can go home with the patient, for review by community services within 7 days. The patient’s own GP should be informed of this in the discharge summary.
POISONING – DRUG OVERDOSE
Link consultant: Dr Helen Draper
Link Pharmacist: Gill Eyers

This section describes the general measures that should be taken to support patients in the first 24 hours after poisoning. It also offers advice on the treatment of some of the more common causes of poisoning. The guidelines are far from exhaustive and so for more detailed information, or for advice on the treatment of less common situations, contact Toxbase (the National Poisons Information internet site) at www.toxbase.org (username: H935; password: BAR88U), or the UK National Poisons Information Service (NPIS) on 0344 892 0111.

GENERAL PLAN OF MANAGEMENT
- Stabilisation (ABC)
- Measures to reduce absorption
- Measures to enhance elimination
- Consider specific antidotes: see RCEM/NPIS antidote guideline list and list of the antidotes stocked (both lists are on the antidote cupboard in A&E resus)
- Follow-up
- Majority recover with supportive care alone

PRIMARY ASSESSMENT (A.B.C.)
- Airway protected?
  If not, crash bleep the anaesthetist on call and intubate patient with a cuffed endotracheal tube. If delayed, lay the patient in the recovery position.
- Breathing/ventilation adequate?
  Check respiratory rate, depth and drive, oxygen saturation + arterial blood gases. If ventilation is inadequate, consider giving naloxone to reverse opiates. Give O₂ to all patients until it is clearly not required.
- Circulation adequate?
  If hypotensive, give IV fluid – initially 0.9% sodium chloride. Introduce a central venous line if help is needed for monitoring fluid replacement. Attach a cardiac monitor to check for dysrhythmias and treat as necessary. Avoid giving vasoconstrictors.
- Assess conscious level and pupil size and reactivity.
- Check body temperature – those with hypothermia may well need warming.
- Is the patient pregnant?
  - If yes, seek advice from the on-call obstetric SpR or Guy’s Poisons Unit.
  - If unsure, consider pregnancy test
- Check U & Es, renal and liver function, blood glucose and acid base balance as appropriate. Do CXR if aspiration a possibility.
- Establish means to monitor vital signs.

IDENTIFY THE POISON
- Take history from patient or relatives (or phone GP) to find out what medications the patient had available, and to assess amount taken and when
- Retain tablets or containers found with patient
- Check paracetamol and salicylate blood levels (4 hours after ingestion if timing possible)
- Consider sending blood, urine, gastric fluid for toxicology
- If information on definitive treatment of specific poisons is needed this can be sought as follows:
a) Use Toxbase
b) If adequate information cannot be obtained by these means, or for further advice on cases that are clinically or toxicologically complex, ring the NPIS.

MEASURES TO REDUCE ABSORPTION OF DRUG/POISON

Removal of drug from the GI tract is controversial. No gastrointestinal decontamination modalities have been shown to reduce morbidity and mortality by controlled clinical studies. The potential benefits of reducing drug absorption may be outweighed by the hazards of the methods used, e.g. aspiration of stomach contents, paradoxical increase in drug absorption. Syrup of ipecac should not be used to induce vomiting. Gastric lavage should not be employed routinely in the management of poisoned patients. There are serious risks associated with gastric lavage (e.g. hypoxia).

Activated charcoal as a single dose to reduce drug absorption

Indications
Presentation within 1 hour of ingestion of a potentially toxic amount of a drug known to be adsorbed to charcoal (check with NPIS if drug not on list).
Adsorbable drugs include:
- antiepileptics (phenytoin, phenobarbital (phenobarbitone), carbamazepine, valproate)
- analgesics (paracetamol, salicylates)
- cardiac drugs (disopyramide, amiodarone, digoxin, calcium channel blockers)
- antidepressants (SSRIs, tricyclics)
- miscellaneous (theophylline, quinine, dapsone)

Presentation 1-2 hours after ingestion of a potentially toxic amount of drug adsorbed to charcoal and known to delay gastric emptying. Such drugs include: salicylates, opioids (sustained release forms), tricyclic antidepressants, sympathomimetics, theophylline.

Contraindications to single dose activated charcoal
- Drugs not adsorbed by activated charcoal (iron, lithium)
- Depressed conscious level, unless airway is protected by cuffed ET tube

SECONDARY ASSESSMENT

Continue to monitor and treat problems that arise in A&E and on the ward.
- Airway and Breathing – monitor respiration and oxygen saturation. Protect airway with cuffed endotracheal tube and support breathing with ventilation as appropriate.
- Circulation – pulse, blood pressure. IV fluids for hypotension. Avoid vasoconstrictors. Cardiac monitor for dysrhythmias if appropriate.
- Conscious level – neurological observations and pupils.
- Body temperature - check.
- Urine output – IV fluids if urine output falls to <400ml/24 hour. Check bladder. If distended, attempt to empty it with fundal pressure before considering catheterisation.
- Other active medical problems? History from patient and/or relatives plus physical examination to assess intercurrent medical problems which may precipitate or complicate overdose.

If there is currently, or potentially, a need for Intensive Care discuss with ITU registrar early.
MEASURES TO ENHANCE GI ELIMINATION OF DRUG/POISON

A. Multiple-dose activated charcoal

Indications
Consider multiple-dose activated charcoal to increase drug elimination if patient has taken a life-threatening dose of carbamazepine, theophylline, phenobarbital (phenobarbitone), quinine or dapsone, or a tricyclic antidepressant.

Contraindications to multiple-dose activated charcoal
• Unprotected airway
• Intestinal obstruction

Protocol
• Give an initial 50 – 100g dose of activated charcoal
• Activated charcoal to be drunk by patient. Consider antiemetic intravenously if charcoal poorly tolerated. Charcoal can be administered via NG tube if patient cannot drink
• Repeat charcoal administration of 50 g every 4 hours (or at least 12.5g/hr). Maximum dose = total of 200g charcoal (i.e. total of 4 doses)
• Continue charcoal until patient’s clinical and laboratory parameters, including plasma drug concentrations, are improving

B. Whole bowel irrigation

Indications
• This may be considered when the patient has taken a life-threatening overdose of a sustained-release or enteric coated drug
• There is also a theoretical benefit after ingestion of packets of illicit drugs or a large dose of iron

Contraindications
• Bowel obstruction, perforation, ileus, GI haemorrhage
• Haemodynamic instability
• Compromised, unprotected airway
• Patients with debility or a medical condition that may be exacerbated by irrigation

Protocol
• Pass 12 French nasogastric tube into stomach and confirm situation with Xray.
• Attach tube to reservoir bag of irrigation solution (polyethylene glycol electrolyte solution) KleanPrep®
• Infuse solution at 1500 – 2000ml/hr (for adults)
• Patient should be seated or at least at 45°
• Continue whole bowel irrigation until rectal effluent is clear

Consult the BNF for drug overdoses other than paracetamol and methotrexate.

MEASURES FOR PARACETAMOL OVERDOSE

In cases of intravenous paracetamol poisoning, contact the UK National Poisons Information Service (NPIS) on 0344 892 0111 for advice on risk assessment and management.
• Toxic doses of paracetamol may cause severe hepatocellular necrosis and, much less frequently, renal tubular necrosis.
• Nausea and vomiting, the only early features of poisoning, usually settle within 24 hours. Persistent vomiting, especially associated with right subcostal pain/tenderness are clinical features of hepatic necrosis. Liver damage is maximal
3–4 days later, leading to encephalopathy, haemorrhage, hypoglycaemia, cerebral oedema, and death.

- To avoid underestimating the potentially toxic paracetamol dose ingested by obese patients > 110 kg, use a body weight of 110 kg (rather than their actual body weight) when calculating the total dose of paracetamol ingested (in mg/kg).
- Acetylcysteine protects the liver if infused up to, and possibly beyond, 24 hours of ingesting paracetamol. It is most effective if given < 8 hours of ingestion. Very rarely, giving acetylcysteine by mouth [unlicensed route] is an alternative if intravenous access is not possible. Contact the National Poisons Information Service for advice.

**Acute overdose**

Hepatotoxicity may occur:
- After a single ingestion of >150 mg/kg paracetamol taken in < 1 hour.
- Rarely, after single ingestion as low as 75 mg/kg of paracetamol taken < 1 hour.
- Patients who have ingested ≥75 mg/kg in <1 hour should be referred to hospital. Consider giving activated charcoal if >150 mg/kg paracetamol has been ingested within the previous hour.

**Acetylcysteine (NAC) treatment**

Measure the plasma-paracetamol concentration at least 4 hours after the time of ingestion; earlier samples may be misleading. Plot the concentration (‘level’) on a paracetamol treatment graph (see below). Treatment should commence immediately:
- if the plasma-paracetamol concentration falls on or above the *treatment line* on the paracetamol treatment graph;
- in all patients who present 8–24 hours after taking an acute overdose of > 150 mg/kg of paracetamol, even if the plasma-paracetamol concentration is not yet available; acetylcysteine can be discontinued if the plasma-paracetamol concentration is later reported to be below the *treatment line* on the paracetamol treatment graph, provided that the patient is asymptomatic and liver function tests, serum creatinine and INR are normal.

The prognostic accuracy of a plasma-paracetamol concentration taken after 15 hours is uncertain, but a concentration on or above the *treatment line* on the paracetamol treatment graph should be regarded as carrying a serious risk of liver damage. If more than 15 hours have elapsed since ingestion, or there is doubt about appropriate management, advice should be sought from the UK National Poisons Information Service.
‘Staggered’ overdose, uncertain time of overdose, or therapeutic excess
A ‘staggered’ overdose is when the patient has ingested the potentially toxic dose of paracetamol over more than one hour. Therapeutic excess is when patient inadvertently ingests a potentially toxic dose of paracetamol during clinical use. The paracetamol treatment graph is unreliable if a ‘staggered’ overdose is taken, if there is uncertainty about the time of the overdose, or if there is therapeutic excess.
- Treat immediately with acetylcysteine if the patient has taken >150 mg/kg of paracetamol in any 24 hour period (unless it is >24 hours since the last ingestion, the patient is asymptomatic, the plasma-paracetamol concentration is undetectable, and liver function tests, serum creatinine and INR are normal.)
- Rarely, toxicity can occur with paracetamol doses between 75–150 mg/kg in any 24 hour period; use clinical judgement and seek senior advice.
- Monitor INR, creatinine and ALT; if these are normal 24 hours after the last ingestion, significant toxicity is unlikely.
Seek advice from the UK National Poisons Information Service whenever necessary.

Acetylcysteine dose and administration
Acetylcysteine is given in a total dose that is divided into 3 consecutive intravenous infusions over a total of 21 hours. The tables below include the dose of acetylcysteine, for adults and children of body weight ≥ 40 kg. Use 5% glucose as the infusion fluid.
**First infusion** (based on an acetylcysteine dose of approx. 150 mg/kg) - add requisite volume of acetylcysteine concentrate for intravenous infusion to 200 mL 5% glucose; infuse over 1 hour.

<table>
<thead>
<tr>
<th>Body weight</th>
<th>Volume of Acetylcysteine Concentrate for Intravenous Infusion 200 mg/mL required to prepare first infusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>40–49 kg</td>
<td>34 mL</td>
</tr>
<tr>
<td>50–59 kg</td>
<td>42 mL</td>
</tr>
<tr>
<td>60–69 kg</td>
<td>49 mL</td>
</tr>
<tr>
<td>70–79 kg</td>
<td>57 mL</td>
</tr>
<tr>
<td>80–89 kg</td>
<td>64 mL</td>
</tr>
<tr>
<td>90–99 kg</td>
<td>72 mL</td>
</tr>
<tr>
<td>100–109 kg</td>
<td>79 mL</td>
</tr>
<tr>
<td>≥110 kg</td>
<td>83 mL (max. dose)</td>
</tr>
</tbody>
</table>

**Second infusion** (based on an acetylcysteine dose of approx. 50 mg/kg; start immediately after completion of first infusion) - add requisite volume of acetylcysteine concentrate for intravenous infusion to 500 mL 5% glucose; infuse over 4 hours.

<table>
<thead>
<tr>
<th>Body-weight</th>
<th>Volume of Acetylcysteine Concentrate for Intravenous Infusion 200 mg/mL required to prepare second infusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>40–49 kg</td>
<td>12 mL</td>
</tr>
<tr>
<td>50–59 kg</td>
<td>14 mL</td>
</tr>
<tr>
<td>60–69 kg</td>
<td>17 mL</td>
</tr>
<tr>
<td>70–79 kg</td>
<td>19 mL</td>
</tr>
<tr>
<td>80–89 kg</td>
<td>22 mL</td>
</tr>
<tr>
<td>90–99 kg</td>
<td>24 mL</td>
</tr>
<tr>
<td>100–109 kg</td>
<td>27 mL</td>
</tr>
<tr>
<td>≥110 kg</td>
<td>28 mL (max. dose)</td>
</tr>
</tbody>
</table>
**Third infusion** (based on an acetylcysteine dose of approx. 100 mg/kg; start immediately after completion of second infusion) - add requisite volume of acetylcysteine concentrate for intravenous infusion to 1 litre 5% glucose; infuse over 16 hours

<table>
<thead>
<tr>
<th>Bodyweight</th>
<th>Volume of Acetylcysteine Concentrate for Intravenous Infusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>40–49 kg</td>
<td>23 mL</td>
</tr>
<tr>
<td>50–59 kg</td>
<td>28 mL</td>
</tr>
<tr>
<td>60–69 kg</td>
<td>33 mL</td>
</tr>
<tr>
<td>70–79 kg</td>
<td>38 mL</td>
</tr>
<tr>
<td>80–89 kg</td>
<td>43 mL</td>
</tr>
<tr>
<td>90–99 kg</td>
<td>48 mL</td>
</tr>
<tr>
<td>100–109 kg</td>
<td>53 mL</td>
</tr>
<tr>
<td>≥110 kg</td>
<td>55 mL (max. dose)</td>
</tr>
</tbody>
</table>

**Continued treatment**
Continued treatment with acetylcysteine (given at the dose and rate as used in the third infusion) may be necessary depending on the clinical evaluation of the individual patient.

**Post treatment**
Monitor urine output and plasma glucose. Take blood for urea, creatinine and electrolytes, INR, and liver function tests. Use to determine whether patient is fit for discharge, in-patient care should be prolonged or advice sought from specialist liver centre.

Contact specialist liver centre if:
- INR post-ingestion >2 at 24 hours, >4 at 48 hours, >6 at 72 hours
- There are other indices of severe hepatotoxicity i.e. any of elevated creatinine, acidosis, renal failure, hypotension (mean arterial pressure <60mmHg), encephalopathy

**WHAT TO DO IF THE PATIENT REFUSES TREATMENT**
Under common law, treatment can generally only be given where the patient gives consent. Consent can be signalled by word, gesture or in writing.

**When the patient refuses treatment:**
1. **Assessment**
   - assess patient’s capacity to consent and mental illness state
   - get early psychiatric opinion if necessary
   - document assessment in the notes
   - ensure these processes are witnessed by a third party e.g. senior nurse
   - consider independent second medical opinion and/or psychiatric opinion
a) Does the patient have capacity to consent?
In order to give or refuse consent, a patient must have the capacity to reach such a decision, defined as being able to:
- comprehend and retain treatment information
- believe such information
- use the information and weigh it up to arrive at a choice
- communicate their decision

Capacity may be affected by:
- state of mind that led to overdose
- drug/poison taken by patient and consequent hypoxia, hypotension, hypoglycaemia
- stress, fatigue or pain
- psychiatric illness

b) Does the patient have a psychiatric illness?
If in doubt, obtain early psychiatric opinion
- daytime: liaison psychiatry (Bleep 509)
- out-of-hours: contact duty psychiatrist via switchboard

2. Treatment
a) When the patient is judged to lack capacity to consent
- if lack of capacity is judged transient then only give treatment essential to save life
- if lack of capacity is judged permanent then treatment can be given if it is considered to be in the patient’s best interest
If either of these situations arise it is important to continue to try to get consent without coercion and to discuss the situation with patient’s relatives as appropriate.

b) When the patient has psychiatric illness
The patient may be detainable under the Mental Health Act. If the overdose is considered to be a consequence of a mental disorder, then the patient can be treated medically for the overdose under the Mental Health Act – but only under the direction of the patient’s responsible medical officer – i.e. the psychiatrist taking care of the patient.

c) When the patient is unconscious
If the patient is unconscious the doctor should treat the patient according to clinical judgement of the patient’s best interest. It is good clinical practice to consult and involve relatives in decision-making, but relative’s consent has no legal standing.

GUIDELINES FOR TREATMENT OF METHOTREXATE TOXICITY
Pharmacist: Lynette Boardman

Toxicity may be suspected from symptoms such as oropharyngeal ulceration/mucositis, diarrhoea and vomiting, erythematous rash, or from signs of bone marrow suppression. Any dose over 10mg could give rise to toxicity depending on the patient's susceptibility.

ENSURE THAT NO FURTHER DOSES ARE TAKEN OR GIVEN
1. Establish the dose that was ingested or given:
   - how many tablets were taken or injections given?
   - which strength?
   - frequency? (weekly doses may have been taken more frequently)
   - how long since ingestion?
   - is there any other drug therapy which may affect methotrexate?
   The patient’s Methotrexate record book may have helpful data regarding recent dosage. Asymptomatic patients who have only ingested one extra weekly dose may not need hospital admission, but they need to see their primary care doctor or specialist within 48 hours. Give activated charcoal if large doses have been ingested i.e. more than 1mg/kg for an adult or child. (refer to section on ‘Drug overdose/acute poisoning’) Administer folinic acid (see below) as soon as possible.

2. Check urinalysis, liver and renal function, FBC and white cell differential

3. Consult the National Poisons Information Service (NPIS) on 0344 892 0111.
   Treatment recommendations vary with dose and whether exposure is acute or chronic but may include:

   **Folinic Acid:** Administer folinic acid (as calcium folinate) as soon as possible and repeat every 6 hours for 24 hours. Consult the National Poisons Information Service (NPIS) for the dose. Administer by IV injection over 3 to 5 minutes. If high doses of calcium folinate are needed, the maximum rate of administration is 160mg per minute. **Note:** folic acid is not an adequate substitute for folinic acid.

   **Voraxaze (Glucarpidase)** In cases of severe toxicity or renal failure, the NPIS may recommend the use of the enzyme Voraxaze (named patient product) to increase methotrexate elimination in addition to folinic acid. If Voraxaze is recommended, contact the pharmacy department or on call pharmacist (out of hours) to order it in.

   **Urinary alkalinisation** may also be recommended for severe overdosage. Monitor serum potassium and replace as necessary.

4. Seek local advice as appropriate:

   **Neutropenia:** If neutopenic seek advice from consultant haematologist, giving details any other drugs which may have raised methotrexate levels or had additional anti-folate action. Haematology will advise if treatment with G-CSF (filgrastim 30 million units/daily) is necessary. Seek advice from consultant haematologist if platelet and/or blood transfusion is necessary.

   **Infection:** Monitor for infection if neutropenic and treat according to the Trust management of neutropenic fever guidelines

   **Monitoring and re-introduction of methotrexate:** Check FBC and give oral folinic acid (as calcium folinate) if necessary, after discussion with the NPIS (see above). Remember that the nadir may be 6 to 12 days after ingestion of methotrexate. Re-check FBC and renal function before re-introducing methotrexate. Weekly checks may be needed in some cases. **Ensure that the patient completely understands dosage regimen for future.**
## GUIDE TO THERAPEUTIC DRUG MONITORING

Link consultant biochemist: Sarah Davie  
Pharmacist: Caroline Hurd

<table>
<thead>
<tr>
<th>Drug</th>
<th>Sample Time</th>
<th>Time to Steady State</th>
<th>Therapeutic Range (Mass Units)</th>
<th>Bottle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbamazepine</td>
<td>Immediately pre-dose</td>
<td>Initiation: 14-28 days 7 days after dose change</td>
<td>4 – 12mg/L</td>
<td>Yellow</td>
</tr>
<tr>
<td>Ciclosporin</td>
<td>Immediately pre-dose</td>
<td>2 -5 days</td>
<td>Variable (depends on indication)</td>
<td>Purple EDTA</td>
</tr>
<tr>
<td>Clozapine</td>
<td>Requests for clozapine are not handled by Biochemistry. Contact the pharmacy department of the initiating hospital and/or the patient’s psychiatry team for advice.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digoxin</td>
<td>At least 6 hours post dose</td>
<td>5-7 days (normal renal function, longer in renal impairment)</td>
<td>0.5 – 1.0 μg/L (however 0.5-2 μg/L may be appropriate for some patients)</td>
<td>Yellow</td>
</tr>
<tr>
<td>Lamotrigine</td>
<td>Immediately pre-dose</td>
<td>4-5 days</td>
<td>Up to 15mg/L</td>
<td>Yellow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Analysed at the National Society of Epilepsy via Biochemistry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lithium</td>
<td>12 hours post dose</td>
<td>Initiation: 4-7 days 7 days after dose change</td>
<td>0.4 – 1.0 mmol/l</td>
<td>Yellow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The National Patient Safety Agency (NPSA) has issued guidance on lithium monitoring. Check a lithium level has been taken in the previous 3 months. If not then check the level before prescribing.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phenobarbitone</td>
<td>Immediately pre-dose</td>
<td>14-21 days</td>
<td>10 to 40 mg/L</td>
<td>Yellow</td>
</tr>
<tr>
<td>Phenytoin</td>
<td>Trough: immediately pre-dose (PO and IV)</td>
<td>7 – 10 days</td>
<td>5- 20 mg/L (trough level)</td>
<td>Yellow</td>
</tr>
<tr>
<td>Primidone</td>
<td>Immediately pre-dose</td>
<td>2-4 days</td>
<td>Up to 11mg/L</td>
<td>Yellow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Analysed at the National Society of Epilepsy via Biochemistry (Sent twice weekly)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sodium Valproate</td>
<td>Trough: immediately pre-dose</td>
<td>2-4 days</td>
<td>50 to 100 mg/L</td>
<td>Yellow</td>
</tr>
<tr>
<td>Theophylline</td>
<td>IV: 6 hours post initiation/dose change  PO: Trough immediately pre dose</td>
<td>2-3 days</td>
<td>10 - 20 mg/L</td>
<td>Yellow</td>
</tr>
</tbody>
</table>

All samples are sent to Biochemistry. At present there is no evidence for the therapeutic monitoring of gabapentin, levetiracetam and topiramate in adults. For further information, contact Medicines Information (ext 2092) or Biochemistry (ext 2052). Out of hours advice: contact the on-call pharmacist and/or Biochemistry, bleep 540.

**Please complete these essential details when requesting drug levels:**
1) Dose
2) Time Sample Taken
3) Time of Last Dose
4) Relevant Clinical Details
PREGNANCY: GUIDELINES ON THE MANAGEMENT OF WOMEN IN THE ANTENATAL AND POSTNATAL PERIOD
Link consultant: Miss Elisabeth Peregrine

PREGNANT WOMEN < 18 WEEKS GESTATION

Less than 18 weeks gestation

Pregnancy related

Non-pregnancy related

Unstable
A&E to see and assess
Refer to Gynae SHO/SPR as appropriate

Stable
0800 – 1800: A&E triage to refer using Jasmine triage criteria
1800 - 0800: A&E to assess
Ring ext 2365/2369 to arrange Jasmine appointment/scan.
Give patient a copy of her A&E notes, if not on CRS

- If acute abdo pain or pelvic tenderness on VE, refer to Gynae SHO

A&E to see and assess
Ensure ectopic pregnancy is excluded in any women with GI or UTI symptoms
If requiring admission, refer to the appropriate Medical or Surgical Speciality
Inform the Gynae SHO (bleep 307) who will review the patient in A&E or ward

- Discuss patients with lower limb fractures with the O&G team

PREGNANT WOMEN ≥ 18 WEEKS GESTATION AND UP TO 6 WEEKS POSTNATAL

Pregnancy related

Non-pregnancy related

+ Pyrexia/SOB/HTN/headache

Refer to Obstetrics SPR (bleep 318)

IF SICK/UNSTABLE TO BE TAKEN TO RESUS AND FAST BLEEP OBS SPR

Discuss with Obstetrics SPR

A&E to see and assess
If requiring admission, refer to the appropriate Speciality, under Obstetrics guidance
Obstetrics will review the patient in A&E or ward

If SHO is not available, escalate to SpR and on-call Consultant respectively

<table>
<thead>
<tr>
<th>Gynae SHO bleep 307</th>
<th>Jasmine Unit 6224</th>
<th>Obs SHO bleep 313</th>
<th>Mat bleep holder 552</th>
<th>Maternity reception ext 2369</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gynae SpR bleep 331/318</td>
<td>Isabella ward 3134</td>
<td>Obs SpR bleep 318</td>
<td>Labour ward 2422</td>
<td>On call Obs/Gynae consultant – via switch</td>
</tr>
</tbody>
</table>
Alcohol withdrawal requires careful monitoring, treatment and on-going assessment. Significant rates of physical and psychological morbidity and mortality are associated with inadequate management. Treatment of alcohol withdrawal involves vitamin supplements, water and electrolyte control and the administration of sedative anticonvulsants (benzodiazepines). Delirium tremens, the most severe form of acute alcohol withdrawal, is a medical emergency.

**NICE guidance (CG 100): Alcohol-use disorders: diagnosis and management**

**Alcohol Withdrawal Syndrome**

The risk of withdrawal is not directly related to intake. Symptoms and signs are variable, usually within 24 - 48 hours of abstinence. Symptoms typically start at 6-8 hours, peak at 10-30 hours and subside by 40-50 hours. **Delirium tremens, alcohol-related seizures, and Wernicke’s encephalopathy can occur.**

**Symptoms and signs of Alcohol Withdrawal Syndrome include:**

<table>
<thead>
<tr>
<th>Behavioural</th>
<th>Depression</th>
<th>Aggression</th>
<th>Irritability</th>
<th>Fatigue</th>
<th>Usually present; patient may present as fearful</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Usually prominent and associated with insomnia</td>
</tr>
<tr>
<td>Cognitive</td>
<td>Poor concentration</td>
<td>Poor memory</td>
<td>Confabulation</td>
<td>Hallucinations</td>
<td>Confabulation – an apparent recollection of imaginary events (falsification of memory) with usually fluent speech and clear consciousness</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Usually visual or auditory</td>
</tr>
<tr>
<td>Physical</td>
<td>Tremor</td>
<td></td>
<td></td>
<td>Delusions</td>
<td>Delusions of jealousy may be more common</td>
</tr>
<tr>
<td></td>
<td>Sweating, Flushing</td>
<td></td>
<td></td>
<td>Other</td>
<td>Headache, dry mouth, anorexia, nausea, vomiting, diarrhoea, hyperacusis, tinnitus, itching, muscle cramps, pupil dilatation, hyperreflexia</td>
</tr>
</tbody>
</table>

**Delirium Tremens (DT) is a medical emergency**

DT occurs in about 5% of patients undergoing acute alcohol withdrawal but accounts for the highest morbidity and mortality. Untreated, DT is fatal in 15-20% of patients, often due to respiratory and cardiovascular collapse or cardiac arrhythmias. It is preventable, and appropriate management reduces mortality to 1%. Onset of DTs is 2-5 days (most commonly 2-3 days) after stopping alcohol.

Patients most at risk of DTs have the following features:

- High fever
- Tachycardia
- Dehydration
- Associated illness (e.g. co-morbid trauma or infection – up to 50% of cases)
- Biochemical evidence of liver damage (up to 90% of cases)
- General debility/poor physical health
- Delayed DT diagnosis
Characteristic symptoms of DTs:
- Severe tremor
- Clouding of consciousness
- Acute confusion/delirium and agitation, violent behaviour
- Delusions
- Tachycardia >100 bpm (with or without hypertension)
- Fever >38.3C (with or without excessive sweating)
- Severe, vivid visual, auditory, tactile hallucinations, evoking extreme fear

Risk factors of progression from mild to severe withdrawal and DT include:
- Fever, sweating, tachycardia
- High alcohol intake (>15 units/day in a person of average build)
- High level of anxiety
- Insomnia
- Other psychiatric disorders +/- concomitant use of psychotropic drugs
- Hypoglycaemia
- Hypomagnesaemia, hypocalcaemia, hypokalaemia (with respiratory alkalosis)
- Previous history of severe withdrawal, seizures, and/or DT

**Wernicke’s Encephalopathy (WE)**
Inappropriately managed WE is the primary contributory cause of death in 17% of affected patients and results in permanent brain damage in 85% of survivors. It is reversible in the early stages with rapid restoration of CNS B-vitamins (particularly thiamine), so early detection is essential. The classical triad of confusion, ataxia and ophthalmoplegia actually occurs in only 10% of patients. The diagnosis should be based on the presence of any one or more of the following (in the absence of another more probably explanation of these features):
- Acute confusion
- Decreased consciousness including unconsciousness or coma
- Memory disturbance
- Ataxia/unsteadiness
- Ophthalmoplegia or diplopia
- Nystagmus
- Unexplained hypotension with hypothermia

Treatment: Pabrinex IV 2 pairs of ampoules TDS for 5 days.

**Alcohol Withdrawal Seizures**
Seizures occur in approximately 10% of people withdrawing from alcohol, and are more likely in those with a previous history of alcohol withdrawal seizures or epilepsy. They are generalized tonic-clonic, often multiple (60%), and usually occur between 7 and 48 hours after cessation of drinking alcohol. Other abnormal movements such as transient myoclonus, choreiform movements or parkinsonism may also be seen.

Treatment:
- Prophylaxis: benzodiazepines are the recommended anticonvulsants in preventing alcohol withdrawal seizures. Prescribe 10 mg diazepam PR or IV diazepam 10 mg over 5 minutes PRN. In patients with a history of alcohol withdrawal seizures always prescribe chlordiazepoxide detoxification. 30% of fits are followed by delirium tremens. Seizures can be primary to alcohol withdrawal but also secondary to hypoglycaemia, hypomagnesaemia or hyponatraemia – check and correct electrolyte abnormalities
- Refer to the guidelines for status epilepticus if necessary.
- Do not offer phenytoin to treat or prevent alcohol withdrawal seizures.
ASSESSING THE LEVEL OF ALCOHOL DEPENDENCY

The Alcohol Use Disorders Identification Test (AUDIT) questionnaire is an appropriate means of identification of alcohol misusers in general hospitals. The minimum score (for non-drinkers) is zero and the maximum possible score is 40. A score of **8 or more** indicates a strong likelihood of hazardous or harmful alcohol consumption.

The CAGE questionnaire is a very brief assessment which will picks up the most severe alcohol misuse. Two or more positive answers suggest the likelihood of having an alcohol problem.

C – Have you ever thought you should **CUT DOWN** on your drinking?
A – Have you ever felt **ANNOYED** by others’ criticism of your drinking?
G – Have you ever felt **GUILTY** about your drinking?
E – Do you ever have a morning **EYE OPENER**?

PHARMACOTHERAPY

Use the following Modified CIWA (Clinical Institute Withdrawal Assessment of Alcohol) scale. Benzodiazepines are the mainstay of treatment.
### OBSERVATIONS

<table>
<thead>
<tr>
<th>Observation</th>
<th>Score 0</th>
<th>Score 1</th>
<th>Score 2</th>
<th>Score 3</th>
<th>Score 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>37.0-37.5°C</td>
<td>37.6-38.0°C</td>
<td>Greater than 38.0°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart rate</td>
<td>90-95</td>
<td>96-100</td>
<td>101-105</td>
<td>106-110</td>
<td>111-120</td>
</tr>
<tr>
<td>Respiration rate</td>
<td>20-24</td>
<td>Greater than 24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tremor (arms extended, fingers spread)</td>
<td>No tremor</td>
<td>Not visible—can be felt fingertip to fingertip</td>
<td>Moderate with arms extended</td>
<td>Severe even with arms not extended</td>
<td></td>
</tr>
<tr>
<td>Sweating</td>
<td>No sweat visible</td>
<td>Barely perceptible, palms moist</td>
<td>Beads of sweat visible</td>
<td>Drenching sweats</td>
<td></td>
</tr>
<tr>
<td>Agitation</td>
<td>Normal activity</td>
<td>Somewhat more than normal activity</td>
<td>Moderately fidgety and restless</td>
<td>Pacing, or thrashing about constantly</td>
<td></td>
</tr>
<tr>
<td>Quality of contact</td>
<td>In contact with examiner</td>
<td>Seems in contact, but is oblivious to environment</td>
<td>Periodically becomes detached</td>
<td>Makes no contact with examiner</td>
<td></td>
</tr>
<tr>
<td>Clouding of sensorium</td>
<td>Orientated</td>
<td>Disoriented for date by no more than two days</td>
<td>Disoriented for date</td>
<td>Disoriented for place (re-orientate if necessary)</td>
<td></td>
</tr>
<tr>
<td>Thought disturbances</td>
<td>No disturbance</td>
<td>Does not have much control over nature of own thoughts</td>
<td>Constantly troubled by unpleasant thoughts</td>
<td>Thoughts come too rapidly and in a disconnected fashion</td>
<td></td>
</tr>
<tr>
<td>Visual disturbances</td>
<td>Not present</td>
<td>Mild sensitivity (bothered by the lights)</td>
<td>Intermittent visual hallucinations (occasionally sees things you cannot)</td>
<td>Continuous visual hallucinations (seeing things constantly)</td>
<td></td>
</tr>
</tbody>
</table>

**Score:**
- >21 = SEVERE – start on 40mg qds chlordiazepoxide
- 10–21 = MODERATE – start on 30mg qds chlordiazepoxide
- < 9 = no treatment necessary. Monitor, consider PRN chlordiazepoxide

### Monitoring:
- Monitor 4-hourly NEWS routinely
- If Modified CIWA > 6, monitor NEWS 2-hrly
- If Modified CIWA > 9, monitor NEWS hourly
- Include blood glucose/BM and fluid balance
- Aim: Oral fluid intake 2.5 litres a day in patients without liver disease.
CHLORDIAZEPoxide

<table>
<thead>
<tr>
<th>No treatment (CIWA ≤ 9)</th>
<th>Moderate Dependency (CIWA 10-21)</th>
<th>Severe dependency (CIWA &gt;21)</th>
<th>Alternative (2nd choice) DIAZEPAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day</td>
<td>Dose</td>
<td>Dose</td>
<td>Dose</td>
</tr>
<tr>
<td>1</td>
<td>Chlordiazepoxide 10-20mg TDS PRN</td>
<td>30 mg QDS</td>
<td>40 mg QDS</td>
</tr>
<tr>
<td>2</td>
<td>Re-check CIWA 4-hrly for 24 hrs. If &gt;9</td>
<td>25 mg QDS</td>
<td>30 mg QDS</td>
</tr>
<tr>
<td>3</td>
<td>or if &gt; 50mg/24 hrs</td>
<td>20 mg QDS</td>
<td>25 mg QDS</td>
</tr>
<tr>
<td>4</td>
<td>of chlordiazepoxide is required, consider full detoxification</td>
<td>15 mg QDS</td>
<td>20 mg QDS</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>10 mg QDS</td>
<td>15 mg QDS</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>10 mg TDS</td>
<td>10 mg QDS</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>5 mg TDS</td>
<td>10 mg TDS</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>5 mg BD</td>
<td>5 mg TDS</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>5mg mane</td>
<td>5 mg BD</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>5 mg mane</td>
<td></td>
</tr>
</tbody>
</table>

The maximum total daily dose of chlordiazepoxide is 200 mg
Monitor the patient for respiratory depression, over-sedation, withdrawal

CHECKLIST FOR THE ADMITTING DOCTOR:
Use CRS powerplan for easier prescribing
1. Regular chlordiazepoxide prescribed (if needed, use Modified CIWA)
2. PRN chlordiazepoxide prescribed 10-20 mg TDS PRN
3. Pabrinex 2 pairs TDS IV for 5 days (if WE is present, continue treatment for 3 days after no further improvement is seen)
   Then AFTER Pabrinex, prescribe:
4. Vitamin B compound strong 2 tablets OD PO
5. Thiamine 100 mg TDS PO

NOTE:
- Chlordiazepoxide doses > 40 mg should only be prescribed in cases where severe withdrawal symptoms are expected. Use caution in cirrhotic patients as there is high risk of encephalopathy. The patient’s response to treatment should be closely monitored. Contact the Liaison Psychiatry team (bleep 509, ext 3509) if needed.
- Caution: consider using half the usual dose of benzodiazepines in elderly people, those with respiratory insufficiency, and those with known cirrhosis.
- The maximum total daily dose of chlordiazepoxide is 200 mg. Once detoxification has commenced, it should be continued as an inpatient basis. Monitor the patient for respiratory depression and over-sedation as well as withdrawal symptoms. The chlordiazepoxide dose may need titrating up or down according to response.
- If oral dosing is not possible, use IV diazepam 10 mg over 5 minutes (beware of respiratory depression especially with the last few milligrams) or lorazepam 1 mg IV when required. IM lorazepam is an alternative if IV route not possible.
- Haloperidol 5 mg oral or IM (0.5 – 2mg in the elderly) is the drug of choice to calm an agitated, behaviourally disturbed or psychotic patient undergoing withdrawal. **Before administering haloperidol, check and review ECG from the current admission.**
- Equivalent doses: chlordiazepoxide 30 mg = diazepam 10 mg = lorazepam 1 mg
• DO NOT discharge patients on a detoxification regimen. If they are going to continue drinking alcohol the patients do not have to stay in hospital to complete the full 6 to 10 day regimen.

• If intolerant to benzodiazepines, clomethiazole may be used as an alternative (see BNF for regimen). Fatalities have been reported if clomethiazole is taken in conjunction with alcohol. Do not discharge the patient on clomethiazole.

**VITAMINSUPPLEMENTATION**

Prophylactic IV/IM vitamins must be prescribed in **all** detoxifications. Parenteral administration of Pabrinex is required due to the poor oral absorption in most of these patients. Serious allergic reactions may occur with IV or IM Pabrinex during or shortly after administration. Give in 100ml sodium chloride 0.9% or glucose 5% over 30 minutes to minimise this. Facilities to treat potential anaphylaxis must be available. Always give Pabrinex (thiamine/vitamin B₁) **BEFORE** IV Glucose therapy, to avoid precipitating Wernicke’s encephalopathy.

<table>
<thead>
<tr>
<th>Parenteral regimen</th>
<th>Oral regimen to use if parenteral route unavailable (equivalent to Pabrinex)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prophylaxis of Wernicke’s</td>
<td></td>
</tr>
<tr>
<td>Pabrinex one pair of ampoules IV od for 5 days</td>
<td>• Thiamine 100 mg tds</td>
</tr>
<tr>
<td>followed by oral supplementation</td>
<td>• Vitamin B Co Strong ONE tds</td>
</tr>
<tr>
<td>• Thiamine 100 mg tds</td>
<td>• Ascorbic acid 500 mg od</td>
</tr>
<tr>
<td>• Vitamin B Co Strong TWO od while an inpatient*</td>
<td></td>
</tr>
</tbody>
</table>

*Treatment of Wernicke’s |

Pabrinex two pairs of ampoules IV tds for 5 days (continue for 3 days after no further improvement is seen) followed by oral supplementation

<table>
<thead>
<tr>
<th>Parenteral regimen</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Treatment of Wernicke’s</td>
<td></td>
</tr>
<tr>
<td>Pabrinex two pairs of ampoules IV tds for 5 days (continue for 3 days after no further improvement is seen) followed by oral supplementation</td>
<td>• Thiamine 100 mg tds</td>
</tr>
<tr>
<td>followed by oral supplementation</td>
<td>• Vitamin B Co Strong ONE tds</td>
</tr>
<tr>
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<td>• Ascorbic acid 500 mg od</td>
</tr>
<tr>
<td>• Vitamin B Co Strong TWO od while an inpatient*</td>
<td></td>
</tr>
</tbody>
</table>

*Patients with a chronic alcohol problem and whose diet may be deficient should be given oral thiamine indefinitely.

**PSYCHOLOGICAL TREATMENT**

Psychological treatment is typically long term. It is NOT provided by the liaison psychiatry team. It can be provided by statutory organisations, or the voluntary sector and groups such as Alcoholics Anonymous or Al Anon. Long-term care is not the responsibility of the ward team although referral to the appropriate service, if desired by the patient, should be part of the discharge plan. If you would like further information on local services please contact the liaison psychiatry team.

| Kingston Community Wellbeing Service | 020 8274 3051 |
| Richmond Community Drug and Alcohol Team | 020 8891 0161 |
| Merton and Sutton Community Drug Team | 07715012134 |
| Wandsworth Drugs and Alcohol Team | 020 8875 4400 |
| Surrey – Respond Community Drug and Alcohol Team | 01372 748350 |

Refer patient to [Alcohol@kingstonhospital.nhs.uk](mailto:Alcohol@kingstonhospital.nhs.uk) and a Clinical Nurse Specialist will be able to help with cessation and support. Details of local services and referral forms are on the intranet/forms/forms and templates/Alcohol and Drug services in the community [KHFT Referral routes for community based alcohol and drug treatment services.docx](mailto:KHFT%20Referral%20routes%20for%20community%20based%20alcohol%20and%20drug%20treatment%20services.docx)
AVOIDING BENZODIAZEPINE DEPENDENCE
Link consultant: Dr Ooshar Mistry/Dr Michelle Walke (Specialty Doctor)
Pharmacist: Roshni Thoppil

Benzodiazepines (BZ) are widely known to cause dependence and tolerance. Withdrawal symptoms can occur after 4 to 6 weeks of continuous use. At least one-third of long-term users experience problems on dose reduction or withdrawal. To avoid this, consider the following:
- Before prescribing a BZ always consider alternative therapies/ management.
- In certain clinical circumstances BZs may prove very useful, for example:
  - Short term anxiety disorders
  - Treatment of agitated behaviour
  - In status epilepticus and as an adjunct in epilepsy
  - Treatment of withdrawal symptoms (alcohol and opioid withdrawal)
  - As premedication in anaesthesia
- Before starting treatment with a BZ, discuss the advantages and disadvantages of this group of drugs with the patient. Establish a clear treatment plan.
- When considering treatment for patients with anxiety or insomnia, remember:
  1. A BZ should be prescribed for anxiety or insomnia as a last resort, only when the symptom is disabling, severe, or causing the patient unacceptable distress
  2. Treatment with BZs should be kept to a minimum, reviewed regularly and discontinued as soon as possible
  3. Withdrawal for long-term users should always be gradual
  4. Patients not previously prescribed a BZ should not normally be given an hypnotic for more than 7 days or an anxiolytic for more than 4 weeks
  5. BZs should not be given as hypnotics or anxiolytics to:
     - Elderly people
     - Pregnant or lactating women
     - Alcoholic patients, except to treat withdrawal, or
     - Patients who have been withdrawn from a BZ in the past
  6. No patients, except chronic users, should be discharged from hospital with more than 7 days supply of a BZ hypnotic
  7. Patients discovered to be BZ-dependent should be advised to discuss gradual withdrawal with their GP. Recommended withdrawal regimen is to reduce 1/8th or 1/10th of dose every 2 weeks or slower if needed.

We advise against lorazepam as an anxiolytic in most circumstances as it seems to have a high abuse potential. The exception is in ‘rapid tranquilisation’ (see section in next chapter).

DELIRIUM
Link Consultants: Dr. Dr Ooshar Mistry, Dr. Chooi Lee
Link pharmacist: Roshni Thoppil
Liaison Psychiatry team: extension 3509, bleep 509

Delirium is a clinical condition characterised by:
- Disturbed consciousness (reduced awareness of the external environment)
- Disturbed cognitive functioning (disorientation and short term memory loss)
- Acute onset and fluctuating course
- Being due to an underlying cause that is usually reversible
Other features include disturbance in perception (hallucinations, usually visual), disturbance in sleep and psychomotor disturbance (hyperactive or hypoactive)
Up to 30% of patients on the medical wards, and up to 50% of patients having surgery develop delirium. It is associated with poor outcomes and increased risk of:

- Death
- Functional decline and institutional long term care
- Dementia
- Longer length of stay in hospital
- Hospital acquired complications, including: infection, falls, pressure sores, dehydration, malnutrition

The prevention and treatment of delirium is possible if dealt with urgently.

Patients with hyperactive delirium can be restless, agitated and aggressive; patients with hypoactive delirium can be withdrawn, quiet and sleepy. Patients can present with a mixture of both. Hypoactive and mixed delirium are more difficult to recognise. It can be difficult to distinguish between delirium and dementia, as there is a considerable overlap. If clinical uncertainty exists over the diagnosis, treat for delirium.

RISK FACTOR ASSESSMENT AND INTERVENTION

The main risk factors are:

- Patients aged 65 or over
- Those with cognitive impairment (past or present) and/or a history of dementia
- Current hip fracture
- Severe illness

If any of the risk factors are present, then the patient is at risk of delirium.

All patients aged 65 years and over admitted to Kingston Hospital (electively or emergency) must have a validated delirium screening test – e.g. cognitive assessment method (CAM), 4AT, or SQuiD (Single Question in Delirium)

### Short Confusion Assessment Method (CAM)

1. Acute and fluctuating change in mental state and behaviour _AND_
2. Inattention _AND EITHER_
3. Disorganised/incoherent speech _OR_
4. Change in level of consciousness (hyperactive, hypoactive or mixed)

### 4AT: Screening instrument for cognitive impairment and delirium

1. Alertness: normal (0), mild sleepiness (0), clearly abnormal (4)
2. AMTS4 – age, DOB, place, current year
   - No mistakes (0), 1 mistake (1), 2 or more mistakes (2)
3. Attention ‘Please tell me the months of the year in backwards order, starting in December’
   - 7 months or more correct (0), starts but scores <7 months/refuses to start (1), untestable (2)
4. Acute change or fluctuating course: No (0), Yes (4)

**TOTAL 4AT score:**
- 0 (delirium/cognitive impairment unlikely (delirium is still possible if [4] information is incomplete – always strive to get collateral history as soon as possible)
- 1-2: possible cognitive impairment
- 4 or above: possible delirium + cognitive impairment

### Single Question in Delirium (SQuiD)

Do you think [name of patient] has been more confused lately?
PREVENTION

1. ‘At risk’ patients should be cared for by a team who are familiar to the person. Avoid moving the patient within or between wards or rooms unless absolutely necessary.
2. Provide tailored interventions according to the risk factors for each patient, e.g.
   - Clocks (working correctly)
   - Re-orientation
   - Regular visits from friends and family
   - Medication review
   - Address the following: constipation, dehydration, malnutrition, hypoxia, infection, avoid unnecessary catheterisation, control pain, medication review, correct sensory deficits (working hearing aids and spectacles), promote continence, and encourage mobilisation.
3. Use the ‘Patient Safety Checklist’ to ensure meticulous medical and nursing care.

MANAGEMENT

Make the diagnosis of delirium
Carry out a clinical assessment using a validated tool (see above) to confirm the diagnosis.

Assess thoroughly, investigate and treat any identified underlying cause
In patients over the age of 65, carry out a comprehensive assessment, including a collateral history from the patient’s GP, friends, family and carers, a thorough examination, blood tests (FBC, U&E, creatinine, LFT, calcium, glucose, CRP, vitamin B12 and folate, TSH), urine for MC&S, and chest X-ray. Consider a CT brain scan if there is a history of falls (with or without a history of head injury), and/or if no other reversible or treatable cause is evident. A review of the patient’s medication is essential. The Patient Safety Checklist is helpful in ensuring all possible precipitants/exacerbating factors are identified and addressed.

De-escalation, effective communication, reorientation and reassurance
Explain to the patient where he/she is, who he/she is and what your role is. Provide reassurance to the patient and consider asking his/her family and friends to help.

Restless, hallucinating and agitated patients are easily terrified or bewildered. Use a calm approach with the patient in a well-lit side ward or cubicle. The aim of initial treatment is to ensure the safety of the patient, clinical staff, other people and the environment. Before seeing the patient, read the clinical notes, obtain collateral information and consider current and past risks. Do not put yourself in danger. Basic precautions should always be observed:
   - see the patient in a quiet environment if possible, ideally away from other people and sources of stimulation; arrange this before you see the patient;
   - maintain a safe distance from the patient and ensure that there is access to alarms and escape routes if necessary;
   - remain calm, avoid sudden movements and try to remain confident;
   - explain your intentions clearly to the patient;
   - try to engage in conversation with the patient and try to reason with them;
• if the patient becomes violent or threatening do not become confrontational or compromise your safety and always be prepared to seek help.
• if medication for rapid tranquilisation is required, this should be available and ready before interviewing the patient. 
• The advice above also applies to aggressive, agitated individuals who are not presenting with an acute confusional state or a psychiatric disorder.

**SEDATION - PATIENTS AGED 65 OR OVER**

Keep the use of sedatives and major tranquilisers in the treatment of delirium to a minimum; the use of sedation needs to be proportional and reasonable. It should be considered only after verbal and non-verbal de-escalation has failed. The Delirium ABCD guide may prevent the need for sedation. Sedation may be necessary in the following circumstances:

• in order to carry out essential investigations or treatment
• to prevent the patient endangering himself/herself or others
• to relieve distress in a highly agitated or hallucinating patient

Use one drug only - haloperidol is currently recommended, starting at the lowest possible dose and increasing in increments (if necessary). For elderly patients aged ≥ 65, start with haloperidol 0.5 mg PO. Repeat the dose after 30 minutes if ineffective. If both oral doses are ineffective, or if oral medication is not possible, give haloperidol 0.5 mg IM.

Do not use antipsychotic drugs for people with conditions such as Dementia with Lewy Bodies or Parkinsons disease; if sedation is necessary, use a benzodiazepine such as lorazepam 0.5 to 1 mg PO, repeated after 30 minutes if the first oral dose is ineffective. If both oral doses are ineffective, or if oral medication is not possible, give lorazepam 0.5 to 1 mg IM. Olanzapine (see NICE guidance) can also be used, at the lowest possible dose, in patients without contra-indications.

**Close monitoring after sedation is essential:**

• Heart rate and respiratory rate every 5 minutes for one hour
• Temperature at 5,10,15 and 60 minutes (neuroleptic malignant syndrome)
• Blood pressure at 30 and 60 minutes
• Monitor for neurological reactions: in an acute dystonic or parkinsonian reaction, give procyclidine 5mg PO, IM or IV – maximum dose 20mg/day. A response to IV procyclidine will show in 5 minutes, IM in 20minutes.
• Treat respiratory depression (respiratory rate < 10 breaths/minute) after lorazepam with flumazenil 200 micrograms IV over 15 seconds. If there is insufficient recovery within 60 seconds, a further 100 micrograms can be injected and repeated at 60 second intervals to a maximum total dose of 1 mg (1000 micrograms) in 24 hours (i.e. initial dose of 200 mcg followed by 8 additional doses of 100 mcg). Monitor the respiration rate continuously until it returns to baseline level and for at least 60 minutes after the initial recovery – the effect of flumazenil may wear-off and the respiratory depression may return.

**Review all anti-psychotic medication at least every 24 hours**

One-to-one care of the patient is often required and should be provided while the dose of psychotropic medication is titrated upward in a controlled and safe manner.
If the delirium does not resolve:
Re-evaluate underlying causes
Follow-up and assess for possible dementia
Consider referral to a consultant Geriatrician

RAPID TRANQUILISATION – PATIENTS AGED 18-64 YEARS
For older patients, see the section above ‘Sedation in patients 65 and over’

PATHWAY FOR RAPID TRANQUILISATION (patients aged 18-64 years)
(Adapted from Maudsley Prescribing Guidelines 2012)

Note: Discuss with Liaison Psychiatry team or Duty Psychiatrist if concerned or need further advice
Effects of rapid tranquilisation must be observed for 60 minutes

Step 1 - De-escalation (see above) – ensure effective communication, re-orientation and reassurance. If there is no effect, go to step 2;

Step 2 – Offer ORAL treatment: lorazepam 1-2 mg, which can be repeated after 45-60 minutes. Alternatives in antipsychotic naïve patients include olanzapine (5-10mg), risperidone (1-2 mg), or haloperidol 5 mg (best used with promethazine 25 mg). Note that haloperidol can cause prolongation of the QT interval (avoid if possible with other anti-psychotics); perform and review a pre-treatment ECG. If no effect, go to step 3;

Step 3 – Consider IM treatment
Lorazepam 1-2 mg (consider having flumazenil available in case of respiratory depression – give as 200 micrograms iv over 15 seconds initially then 100 micrograms at 60 second intervals, maximum dose 1 mg);
OR
Promethazine 50 mg,
OR
Olanzapine 10 mg (DO NOT GIVE WITH IM BENZODIAZEPINE);
OR
Haloperidol 5 mg (last drug to be considered)
Repeat after 30-60 minutes if no effect.

Step 4 – CONSULT SENIOR PSYCHIATRY COLLEAGUE (at this stage IV treatment with diazepam 10 mg (administered over at least 5 minutes) may be considered; the dose can be repeated after 5-10 minutes up to 3 times. NB: have flumazenil available in case of respiratory depression.

Maximum doses:
Haloperidol 12 mg/day IM
Lorazepam 4 mg/day PO
Olanzapine 20 mg/day PO
Procyclidine 20 mg/day IV/IM;
Promethazine 100 mg/day PO/IM

If the patient tries to take his/her own discharge from the ward prior to being seen by a psychiatrist, consider whether the patient needs to be detained under Common Law (if he or she lacks capacity) or under Section 5.2 of the Mental Health Act. Section 5.2 allows detention by a doctor of an inpatient for up to 72 hours, while
awaiting a psychiatric assessment, if there is suspicion of an underlying mental disorder, which might deem the person to be at risk to himself/herself or to others.

**Liaison Psychiatry Team/Duty psychiatrist – bleep 509, ext. 3509**

If an oculogyric crisis, acute dystonic reaction or another extra-pyramidal side-effect develops with haloperidol, treat with procyclidine 5-10 mg IM or 5 mg IV, repeating after 20 minutes if necessary, up to a maximum dose of 20 mg (daily). As an alternative, benzatropine may be used (1-2 mg im or iv, maximum 6 mg daily). If the above measures fail, seek expert advice. NICE specifically recommends the use of haloperidol, olanzapine and/or lorazepam.

There are risks associated with medications used in rapid tranquillisation:
- Benzodiazepines – loss of consciousness, respiratory depression or arrest, cardiovascular collapse
- Anti-psychotics - Loss of consciousness, respiratory depression or arrest, cardiovascular collapse, seizures, akathisia, dystonia, dyskinesia, neuroleptic malignant syndrome, excessive sedation

**DEMENTIA**

Link consultant: Dr. Chooi Lee

Patients with dementia (formally diagnosed or suspected) suffer more complications, are likely to stay longer in hospital, and to be re-admitted. Risk of death doubles. Approximately 45% of patients in this Trust will be confused. The management of people with dementia or suspected dementia in this hospital is as follows:

**Early detection**

**The National Dementia and Delirium Standards**

It is mandatory to ask the following questions whenever a patient aged 75 or over is admitted to hospital:
- ‘Have you been more forgetful in the last 12 months so that it has significantly affected your life/function/activities?’ (dementia screening question)
- Perform a brief memory assessment, usually the Abbreviated Mental Test score (AMTS). If AMTS 8 or less, take collateral history and investigate.
- Perform a validated delirium screening test – e.g. Cognitive Assessment Method (CAM), Single Question in Delirium (SQiD) or Months of the year backwards (MOYB) – see the previous section on Delirium, above.

<table>
<thead>
<tr>
<th>Abbreviated Mental Test Score (AMTS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Date of birth</td>
</tr>
<tr>
<td>2. Age</td>
</tr>
<tr>
<td>3. Time (to the nearest half hour)</td>
</tr>
<tr>
<td>4. Current year</td>
</tr>
<tr>
<td>5. Place</td>
</tr>
</tbody>
</table>

**Dementia care - Forget-me-not care, including carers**

Patients (and their carers and families) who have a formal diagnosis of dementia must be cared for using the Forget Me Not dementia scheme, available on the intranet: [Dementia Forget Me Not Scheme](#)
Early diagnosis
Patients with AMTS < 9/10 – take a prompt collateral history. If suspicious of memory loss over 6 months, complete the dementia and delirium diagnostic assessment, which is available on the intranet, under ‘Forms’: KHFT Dementia and Delirium Diagnostic assessment

Refer all patients suspected of having dementia for a specialist diagnosis. This can be done in several ways: ask the GP to refer to the local memory clinic, refer to the Liaison Psychiatry team, or to a consultant geriatrician.

Behavioural and Psychological Symptoms of Dementia (BPSD)
Antipsychotics can be used to control non-cognitive symptoms of dementia such as agitation, aggression and psychosis. However, antipsychotic use in dementia greatly increases the risk of cerebrovascular events (ischaemic stroke and TIAs) and death. Stroke risk is increased 3-to-6 fold.

It is essential that antipsychotic use is strictly limited in this patient group.

All antipsychotic prescriptions (regular or prn) must adhere to the following:

1) Only use for severe symptoms which cause the patient significant distress, or in acute situations where the patient poses an immediate risk to themselves or others. De-escalation and non-pharmaceutical measures should be used as 1st line management in all patients.
2) Doctors must discuss and document the risks/benefits with the patient or next-of-kin wherever possible. If no discussion is possible, this must also be documented.
3) The indication for the prescription must be written on the drug chart.
4) Review - new prescriptions for antipsychotics must be reviewed every 24 hours. The decision to continue or stop antipsychotics must be documented daily. If patient with dementia is admitted on an antipsychotic, it should be reviewed on admission. Discuss complex patients with the Liaison Psychiatry team.

SELF HARM
Link consultant: Dr Ooshar Mestry/ Dr Michelle Walke

Definition: Intentional acts of self-poisoning or self-injury irrespective of the type of motivation or degree of suicidal intent.

Assessment and Management of risk:

- ALL patients who present following self harm must be referred to Liaison Psychiatry (bleep 509) either when they are in ED or following medical admission.
- Refer the patient when he/she is physically well enough and stable to be assessed (ie, not unconscious, intoxicated, level of consciousness fluctuating, etc).
- Conduct an assessment of level of risk of further self harm (please see table below). Ensure that you collect collateral and primary care information about the patient’s past psychiatric history and previous acts of self harm. Record the
patient’s level of risk on the notes. Decide the level of monitoring according to the level of risk:

- **Low risk**: bed within easy view of the nurses station
- **Moderate risk**: place on moderate supervision (refer to self-harm policy). Consider 1:1
- **High risk**: place on 1:1 observation at all times. Secure safe environment, remove objects that can be used to harm themselves

**Be aware: risk levels can change.** Carefully monitor the patient’s behaviour and listen to what he/she says. Re-assess the level of risk if there is any change in behaviour, and contact the Liaison Psychiatry team if there are any concerns. If the risk assessment is inconclusive or is impossible to perform (e.g. if the patient is unconscious), classify the risk at least as ‘Moderate’.

- Patients **DO NOT** have to be medically fit to be referred to the Liaison Psychiatry team; they can be seen at ANY time. If there are any concerns about risk please contact Liaison Psychiatry at any time for advice.

<table>
<thead>
<tr>
<th>Low Risk</th>
<th>Moderate Risk</th>
<th>High Risk</th>
</tr>
</thead>
</table>
| - None/ infrequent fleeting suicidal ideation  
- No current suicidal intent  
- No previous history of self harm  
- No psychosocial stressors | - Frequent suicidal ideation but with no suicidal plans  
- None/transient feelings of hopelessness  
- Fluctuating mental state  
- Comorbidities including mental health disorder or substance misuse  
- Previous acts of self harm  
- Unstable psychosocial situation but with no current crisis | - 65 years +  
- Fixed suicidal ideation with suicidal intent  
- Current suicidal plans considered/ clear plan in place.  
- Feelings of hopelessness  
- Self harm act included planning, avoidance of discovery, no help sought, dangerous method used, final acts  
- Comorbidities including mental health disorder or substance misuse  
- Previous acts of self harm  
- Unstable psychosocial situation but with a current crisis  
- Suicidal attempt while in hospital |

**People who wish to leave before assessment and/or treatment**

If a person wishes to leave before a psychosocial assessment, assess for mental capacity (refer to the section: ‘Drug overdose: what to do if the patient refuses treatment’) mental illness and record assessment in the notes. Discuss the case with Liaison Psychiatry.

If the person is asking to leave and is admitted on a ward (this does not include EDOU) and there is concern about their mental health then please consider using a Section 5(2) of the Mental Health Act (refer to the section ‘Delirium: rapid tranquillisation’).
ACUTE PULMONARY EMBOLISM  
(INPATIENTS/NON-AMBULATORY)  
Link consultants: Dr Farid Bazari, Dr. Anita Rhodes

This section relates to any patient admitted to hospital with a risk factor for pulmonary thromboembolism and unexplained tachypnoea or dyspnoea, especially when the clinical signs in keeping with this diagnosis are present and a more likely alternative diagnosis is not apparent.

An ambulatory pathway for PE (and DVT) is available (refer to the Haematology section ‘Pulmonary embolus – ambulatory pathway only’).

DIAGNOSIS

Assess the clinical probability of pulmonary embolism (PE)  
The patient needs to have clinical signs/symptoms associated with PE, including:  
- Tachypnoea (respiratory rate >20/min)  
- Pleuritic chest pain  
- Tachycardia  
- Haemoptysis  
- Pleural rub  
- Right ventricular heave/accentuated pulmonary component to second heart sound  
- Hypoxia  
ECG: may show right ventricular strain.  
CXR: helps to eliminate other possible causes of breathlessness; it is reviewed by a radiologist prior to the next stage of imaging.  
Arterial blood gases: useful to assess the degree of hypoxia (if any).

Two factors are then sought:  
(a) the absence of another reasonable clinical explanation  
(b) the presence of a major risk factor for venous thromboembolism (below)

Major risk factors for venous thromboembolism (VTE) include:  
- Previous proven venous thromboembolism  
- Clinical evidence of deep venous thrombosis  
- Recent surgery (abdominal, pelvic or lower limb)  
- Lower limb trauma or fracture  
- Immobilisation/reduced mobility  
- Recent (post partum) or current pregnancy  
- Malignancy  
- Thrombophilia

Calculating the clinical probability of P.E.  
Where (a) and (b) are both true, the probability of VTE is high.  
If only one is true the probability is intermediate.  
If neither is true, the probability is low.  
Perform formal risk stratification using the modified Wells score (see below).

Pregnant patients with a clinical suspicion of pulmonary emboli should be discussed with the on-call consultant obstetrician prior to radiology referral for dedicated imaging.
Wells Score – Clinical Pre-test Probability (PTP) for P.E.

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative diagnosis unlikely</td>
<td>3</td>
</tr>
<tr>
<td>Clinical symptoms/signs of DVT (swelling/pain)</td>
<td>3</td>
</tr>
<tr>
<td>HR &gt; 100 bpm</td>
<td>1.5</td>
</tr>
<tr>
<td>Immobilisation &gt;3 days or surgery within previous 4 weeks</td>
<td>1.5</td>
</tr>
<tr>
<td>Previous DVT/PE</td>
<td>1</td>
</tr>
<tr>
<td>Haemoptysis</td>
<td>1</td>
</tr>
<tr>
<td>Active malignancy (treatment within past 6 months/palliative)</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total score</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Probablity of PE using PTP/Wells score:**
- Low Score < 2: Check D-dimer
- Moderate Score 2 – 6: Check D-dimer
- High Score > 6: D-dimer NOT indicated. Request imaging.

**BLOOD D-DIMER ASSAY – only available in A&E/AAU/AEC**
Blood D-dimer assay should only be considered following assessment of clinical probability (see above). *D-dimer assay should not be performed in those with a high clinical probability of PE, only in low or intermediate groups*. In Kingston Hospital, a negative D-dimer test reliably excludes PE for patients with low or intermediate clinical probability; such patients do not usually require imaging for VTE. Beware false positives, as D-dimer assay can be positive in hospitalised patients, obstetrics, peripheral vascular disease, malignancy, infection, after recent surgery, inflammatory diseases including infections, as well as increasing age.

**Imaging**
An imaging pro forma (available on the intranet, under ‘forms’) needs to be completed and returned to CT. Also request the scan on CRS. Patients under 50 years of age who have no history of asthma or significant cardiopulmonary disease and a normal chest X-ray will be investigated with a perfusion scan (Q scan). Due to shortages of Technicium (thereby reducing the availability of ‘Q’ scanning) and the higher prevalence of IHD and COPD patients over the age of 50 years, CTPA (computed tomography pulmonary angiography) is the initial lung imaging modality of choice. Imaging should ideally be performed within 24 hours of presentation of symptoms. (See flow chart).
PULMONARY EMBOLISM FLOWCHART

Clinical Probability Score (and CXR)

Low/Intermediate  
D-dimer

Negative  
Consider alternative diagnosis

Positive  
No asthma or cardiopulmonary disease with normal CXR

Yes  
Perfusion scan

High Probability  
CTPA

Positive  
Pulmonary Embolism

Low/Intermediate Probability  
CTPA

Negative  
Consider alternative diagnosis

No  
Perfusion scan

High Probability  
CTPA

Positive  
Pulmonary Embolism

Low/Intermediate Probability  
CTPA

Negative  
Consider alternative diagnosis

No  
Perfusion scan

High Probability  
CTPA

Positive  
Pulmonary Embolism

Low/Intermediate Probability  
CTPA

Negative  
Consider alternative diagnosis
TREATMENT OF SUSPECTED NON-MASSIVE P.E.

Thrombolysis should not be used as first line treatment in non-massive PE. Patients will require oxygen therapy if hypoxic and analgesia if in pain (paracetamol is often sufficient). While awaiting confirmation of PE, the patient should be given dalteparin (fragmin) subcutaneously at a dose of 200 units/kg od (see the dosing table below for the exact dosing regimen). The single dose should not exceed 18,000 units.

<table>
<thead>
<tr>
<th>ADULTS</th>
<th>Weight</th>
<th>Dalteparin dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single use, pre-filled, disposable syringes should be used</td>
<td>Under 46 kg</td>
<td>7,500 units daily (once daily)</td>
</tr>
<tr>
<td></td>
<td>46-56 kg</td>
<td>10,000 units (once daily)</td>
</tr>
<tr>
<td></td>
<td>57-68 kg</td>
<td>12,500 units (once daily)</td>
</tr>
<tr>
<td></td>
<td>69-82 kg</td>
<td>15,000 units (once daily)</td>
</tr>
<tr>
<td></td>
<td>83-110 kg</td>
<td>18,000 units (once daily)</td>
</tr>
<tr>
<td></td>
<td>111-150 kg</td>
<td>Dose according to body weight, split to 100 units/kg bd (use pre-filled syringes to the nearest amount)</td>
</tr>
<tr>
<td></td>
<td>&gt;150 kg</td>
<td>Discuss with Haematologist</td>
</tr>
</tbody>
</table>

Renal failure
- CrCl <30 ml/min requires a) switch to unfractionated heparin infusion or b) dosage reduction in dalteparin of 30-50% and monitoring with Anti Xa chromogenic assay. Take samples 3-4 hours after SC administration for peak Anti-Xa level.
- Split to twice daily dosing to avoid excessive peaks in anticoagulation.
- Therapeutic range for a twice daily regimen is Anti-Xa level 0.4-1.1 U/ml.
- If accumulation of LMWH is suspected, additional measurements, including a trough level on a sample taken 24 hours after the last dose, may be informative.

<table>
<thead>
<tr>
<th>PREGNANCY</th>
<th>Weight</th>
<th>Dalteparin Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use booking or early pregnancy weight</td>
<td>&lt;50 kg</td>
<td>5,000 units twice daily</td>
</tr>
<tr>
<td>Single use, pre-filled, disposable syringes should be used</td>
<td>50-69 kg</td>
<td>7,500 units OM and 5,000 units ON</td>
</tr>
<tr>
<td></td>
<td>70-89 kg</td>
<td>7,500 units twice daily</td>
</tr>
<tr>
<td></td>
<td>90-109 kg</td>
<td>10,000 units twice daily</td>
</tr>
<tr>
<td></td>
<td>110-125 kg</td>
<td>12,500 units twice daily</td>
</tr>
<tr>
<td></td>
<td>&gt;125 kg</td>
<td>Discuss with Haematologist</td>
</tr>
</tbody>
</table>

Pregnancy- inject dalteparin into thigh, not abdomen. Monitoring with anti-Xa is only required if at extremes of body weight or if renal impairment (discuss with haematologist)

If PE is confirmed, start warfarin, aim for INR in range 2-3; this should then be continued for at least 3 months if the risk factor is a transient one (e.g. post-operative with no other risk factors), or at least 6 months, if an on-going risk factor is present. Advice on the duration of anti-coagulation therapy can be found at the end of the section on DVT, and can also be obtained from the haematology department or respiratory physicians. Once stable on warfarin, refer to anti-coagulation clinic for further management of warfarin.
TREATMENT OF SUSPECTED MASSIVE P.E.

A massive PE is one that is severe enough to cause circulatory collapse, causing hypotension, syncope or cardiac arrest.

**If cardiac arrest is imminent,** or during cardiopulmonary resuscitation if massive PE is strongly suspected, thrombolysis is the first line of treatment for massive PE and may be instituted on clinical grounds alone; an immediate intravenous bolus of 50mg alteplase (rt-PA/tissue plasminogen activator) is recommended. (This is an unlicensed dose but recommended in the British Thoracic Society guidelines).

**If cardiac arrest is not imminent:** wait for the diagnosis to be confirmed before starting thrombolysis with alteplase (rt-PA). Do not give the immediate IV bolus of 50 mg alteplase.

Patients with suspected massive PE when cardiac arrest is not considered imminent require immediate investigation. Either a CTPA or echocardiogram (whichever is available) should be performed. Echocardiography will reliably diagnose clinically massive PE, but allows a firm diagnosis in only a minority of others. A high venous filling pressure is required to maintain cardiac output; insert a central line (internal jugular approach) and maintain the CVP at 15-20 mmHg. A patient with a massive PE should be managed in ITU.

Whilst waiting for confirmation of massive PE; an intravenous bolus dose of 5000 units (5mls) unfractionated heparin (UFH) using heparin 1000 units per ml, followed by a continuous UFH infusion, should be given. Target APTR is 2.0-3.0. If the APTR drops below 2.0, adjust the rate of infusion accordingly (see section on heparin infusion guidelines) and give a further intravenous bolus of 5000 units heparin. Ensure there are no absolute contraindications to thrombolytic therapy. Alteplase is given at a dose of 10mg IV over 1-2 minutes followed by a 90mg infusion over 2 hours and is followed by heparin by continuous infusion.

**Thrombolysis should not be used as first line treatment in non-massive PE.**

Where there are absolute contraindications to thrombolysis and where it has failed and the patient is critically ill, large emboli can be successfully fragmented using mechanical techniques. The alternative is surgical pulmonary embolectomy. Discuss the case with the cardiothoracic surgical registrar on call at St. George’s Hospital.

**IVC Filters**

These are mainly used where anticoagulation is contra-indicated or unsuccessful in preventing recurrence of PE from continuing DVT. Discuss with one of the interventional radiologists regarding suitability and recommended duration of filter placement.
In the UK approximately 1500 people die each year from acute asthma. Failure to recognise and manage acute severe asthma appropriately are contributory factors.

<table>
<thead>
<tr>
<th>At admission - Record the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Peak flow (PEF)</strong></td>
</tr>
<tr>
<td>- Best / predicted .....</td>
</tr>
<tr>
<td>- Admission....</td>
</tr>
<tr>
<td><strong>Oxygen saturations</strong></td>
</tr>
<tr>
<td>- Sp02 .....</td>
</tr>
<tr>
<td>Maintain sats 94-98%</td>
</tr>
<tr>
<td>Measure ABG if Sp02 &lt; 92% on RA or life-threatening features</td>
</tr>
<tr>
<td><strong>Admission pulse .... bpm</strong></td>
</tr>
<tr>
<td><strong>Admission heart rate ..... bpm</strong></td>
</tr>
<tr>
<td><strong>Admission blood pressure ..... mmHg</strong></td>
</tr>
<tr>
<td><strong>Admission RR .... bpm</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MODERATE ACUTE ASTHMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Increasing symptoms</td>
</tr>
<tr>
<td>• PEF &gt;50-75%</td>
</tr>
<tr>
<td>• No features of acute severe asthma</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ACUTE SEVERE ASTHMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any one of:</td>
</tr>
<tr>
<td>• PEF 33-50% best or predicted</td>
</tr>
<tr>
<td>• RR ≥25bpm</td>
</tr>
<tr>
<td>• HR ≥110bpm</td>
</tr>
<tr>
<td>• Inability to complete sentences in one breath</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LIFE-THREATENING ASTHMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>In a patient with severe asthma and any one of:</td>
</tr>
<tr>
<td>• PEF &lt; 33% best or predicted</td>
</tr>
<tr>
<td>• Sp02 &lt; 92%</td>
</tr>
<tr>
<td>• Pa02 &lt; 8kPa</td>
</tr>
<tr>
<td>• Silent chest</td>
</tr>
<tr>
<td>• Cyanosis</td>
</tr>
<tr>
<td>• Poor respiratory effort</td>
</tr>
<tr>
<td>• Arrhythmia</td>
</tr>
<tr>
<td>• Exhaustion</td>
</tr>
<tr>
<td>• Hypotension</td>
</tr>
<tr>
<td>• &lt; GCS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NEAR-FATAL ASTHMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Raised PaCO2 and /or requiring mechanical ventilation with raised inflation pressures.</td>
</tr>
</tbody>
</table>

**Caution:**
Patients with severe or life threatening attacks may not be distressed and may not have all these abnormalities. The presence of any should alert the doctor.

**TREATMENT**

*Use the ASTHMA PRESCRIBING POWER PLAN under the request section of CRS to help with prescribing for acute asthma*

- Oxygen: maintain stats between 94-98%
  (ABG’s if Sp02 < 92% on RA or life-threatening features)

- Steroid therapy – 40mg Prednisolone within 1 hr

- Nebulisers – deliver with oxygen.
  B2 agonists – Salbutamol 2.5-5mg
  Ipratropium bromide 4-6 hrly

- Additional therapies
  IV magnesium 1.2-2g over 20minutes – if poor response from above ➔ escalate to a senior

- Record - Pre and post bronchodilator peak flows
- Assess inhaler technique
- Record smoking history and encourage smoking cessation
- Administer regular inhalers
Admit patients with any features of a severe attack persisting after initial treatment.

Patients whose PEF is >75% best or predicted one hour after initial treatment may be discharged from ED, unless there are other reasons why the admission may be appropriate.

**CRITERIA FOR ADMISSION**
- Still significant symptoms
- Concerns re-compliance
- Living alone/socially isolated
- Psychological problems
- Learning difficulties / physical disability
- Previous near fatal / difficult asthma
- Night presentation
- Pregnancy
- Recent course of prednisolone (adequate dose)

**Admit patients with any feature of a life threatening or near fatal attack**
- Requiring ventilatory support
- With acute severe life-threatening asthma who is failing to respond to therapy as evidenced by:
  - Deteriorating PEF
  - Persisting or worsening hypoxia
  - Hypercapnia
  - ABG analysis showing ↓pH or ↑H
  - Exhaustion, feeble respiration
  - Drowsiness, confusion, altered GCS
  - Respiratory arrest

**Record**
- Compliance with medications
- Previous near fatal asthma
- Recent use of inhaler medication and its effect.
- Night-time symptoms
- No of ED attendances in the last year
- No of exacerbations in the last year.

**SUBSEQUENT MANAGEMENT**

**If the patient is improving continue:**
- 40-60% oxygen
- Prednisolone 40-50 mg daily or IV hydrocortisone 100 mg 6 hourly
- Nebulised β2 agonist and ipratropium 4-6 hourly

**If patient is not improving after 15-30 minutes:**
- Continue oxygen and steroids
- Give nebulised β2 agonist more frequently e.g. salbutamol 2.5 mg administered repeatedly/continuously
- Continue ipratropium 500 micrograms 4-6 hourly until patient is improving

**If the patient is still not improving:**
- Discuss the case with senior clinician and ICU team
- Add IV magnesium sulphate 1.2-2g infusion over 20 minutes (*unless already given*)
- Senior clinician may consider use of IV β2 agonist or IV aminophylline or progression to IPPV

**MONITORING**
- Repeat measurement of peak flow 15-30 minutes after starting treatment
- Oximetry: maintain SpO2 >92%
- Repeat blood gas measurement within 2 hours of starting treatment if:
  - initial PaO2 <8kPa (60 mmHg) unless subsequent SpO2 > 92%
  - PaCO2 normal or raised
  - patient deteriorates
- **Chart peak expiratory flow (PEF) before and after giving β2 agonists and at least 4 times daily throughout hospital stay**
PHARMACOTHERAPY

Oxygen therapy
Patients with acute severe asthma are hypoxaemic and this should be corrected urgently using high concentrations of inspired oxygen (usually 40-60%) via a high flow mask (flow rate 6L/min) to maintain O₂ saturation of at least 92%. Unlike patients with COPD there is little danger of precipitating hypercapnia. If hypercapnia develops it indicates near fatal asthma and the need for emergency anaesthetic intervention.

Bronchodilators
Give nebulised salbutamol 5 mg via oxygen driven nebuliser (flow rate 6-8L/min). Repeated doses at 15-30 minute intervals or continuous nebulisation at 5-10 mg/hour should be given if there is an inadequate response to initial treatment. (Repeated activations of an inhaled β₂-agonist via an appropriate large volume spacer device can be as effective as wet nebulisation in acute asthma with no life threatening features). Combining nebulised ipratropium bromide with a nebulised β₂-agonist has been shown to produce significantly greater bronchodilation than a β₂-agonist alone, leading to a faster recovery and shorter duration of admission in patients with features of severe or life threatening asthma.

Steroid therapy
Systemic steroids reduce mortality, relapses, subsequent hospital admissions and requirement for β₂-agonist therapy. The earlier they are given in acute attacks the better the outcome. Tablets are as effective as injected steroids, provided tablets can be swallowed and retained. Give prednisolone 40-50 mg daily or parenteral hydrocortisone 100 mg 6 hourly. Continue prednisolone 40-50 mg mane for at least 5 days or until recovery. Steroid tablets can be stopped abruptly and doses do not need tapering unless the patient is on maintenance steroid therapy or requiring steroids for longer than 3 weeks or on doses of greater than 40 mg daily (see BNF for further guidance).

Intravenous magnesiu
A single dose of magnesium sulphate 1.2-2 g intravenously over 20 minutes has been shown to be safe and effective in severe asthma. Consider using a single dose for patients with severe asthma who have not had a good response to initial bronchodilator therapy, or in those with life threatening features.

Intravenous aminophylline
Full Aminophylline guidelines are available on PIMS, and a prescribing powerplan is accessible via CRS (‘requests’ – type in ‘aminophylline’).
IV aminophylline is unlikely to result in additional bronchodilation and can cause serious side effects including palpitations, arrhythmias and vomiting. It can be useful in some patients with near fatal or life threatening asthma. Consult with senior medical staff. Loading dose is 5 mg/kg* given over 20 minutes, or over 30 minutes if the dose is >500 mg (omit if on maintenance oral therapy), followed by infusion 500 micrograms/kg/hour (or 300 micrograms/kg/hour in the elderly). Prescribe as 500 mg in 500 ml sodium chloride 0.9% or glucose 5%. Theophylline levels should be monitored every 24 hours (see section on Therapeutic drug monitoring).
*If the patient is obese i.e. >20% of ideal body weight, calculate the dose using Ideal Body Weight (IBW):
IBW male = 50+(2.3 x number of inches in height > 5 ft or 0.9 kg per cm > 152 cm)
IBW female =45+(2.3 x number of inches in height > 5 ft or 0.9 kg per cm > 152 cm)

**Intravenous fluids**
Some patients with severe asthma require hydration and correction of electrolyte imbalance. Hypokalaemia can be caused by β2-agonist and/or steroid treatment and must be corrected.

**Antibiotics**
When an infection precipitates asthma, it is likely to be viral in origin. The role of bacterial infection in asthma has been overestimated and the routine prescription of antibiotics is not indicated for acute asthma.

**Heliox**
The use of helium/oxygen mixture in acute asthma cannot be recommended on the basis of present evidence.

**Non-invasive ventilation**
Non-invasive ventilation (NIV) is now well established in the management of respiratory failure caused by restrictive conditions and exacerbations of COPD. Hypercapnic respiratory failure developing during an acute asthma exacerbation is regarded as an indication for urgent admission to the ITU. It is unlikely that NIV would ever replace intubation in these very unstable patients and at present this treatment cannot be recommended outside randomised controlled trials.

**DISCHARGE PLANNING**
There is no single physiological parameter that defines absolutely the timing of discharge. Refer to the full Trust Asthma Guidelines, on PIMS

**When discharged from hospital, patients should have:**
- Been on discharge medication for 24 hours; ensure they are on an inhaled corticosteroids (ICS), if not already prescribed
- Have had their **inhaled technique** checked and recorded
- PEF > 75% of best or predicted PEF and PEF diurnal variability < 25%, unless discharge is agreed with a respiratory physician. Although diurnal variability of PEFR is not always present during an exacerbation, evidence suggests that patients discharged with PEFR<75% best or predicted and with diurnal variability >25% are at greatest risk of early relapse and readmission
- Given a peak flow meter and chart to take home and complete recordings.
- Oral steroids, continued until the patient is fully better (minimum 5 days)
- Education, provided in the form of a written symptom and/or PEF-based action plan. If they do not already have one, please speak to the respiratory team.

**Additionally, these steps are essential:**
- Complete the Asthma Discharge Bundle (also available in CRS, pre-configured section). Give a copy to the patient and send to the GP
- **The patient should be told to book an appointment with their GP or practice asthma nurse within two working days** for ongoing review and given advice on what to do in case of deterioration.
- Patients admitted with life threatening asthma should remain under the supervision of the respiratory team and appropriate follow up in the respiratory clinic made on discharge.
• Advice and information about smoking cessation should be supplied where necessary.

Patients with severe asthma (indicated by the need for hospital admission) and adverse behavioural or psychosocial features are at risk of further severe or fatal attacks:
• Determine reason(s) for exacerbation and admission
• Send details of admission, discharge and potential best PEF to the patient’s GP.

CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)
Link consultant: Dr. Emma Holden

An exacerbation of COPD is defined as an acute sustained worsening of the patient’s symptoms from the usual stable state that is beyond normal day-to-day variations. Exacerbations resulting in hospital admission are significant events in the natural history of COPD. The re-admission rate may be as high as 34%.

Causes
The cause of an exacerbation may be unidentifiable in up to 30% of exacerbations. Important aetiological agents include: Viruses (rhinovirus, influenza, para influenza, coronavirus, adenovirus, RSV), bacteria (C. pneumoniae, H. influenzae, S. pneumoniae, M. catarrhalis, Staph. aureus, P. aeruginosa) and common pollutants (nitrogen dioxide, particulates, sulphur dioxide, ozone).

FEATURES
Commonly reported symptoms are:
• cold and sore throat
• increased dyspnoea, cough, wheeze
• increased sputum production
• sputum purulence
• acute confusion
• chest tightness
• reduced exercise tolerance
• fluid retention
• increased fatigue

Some exacerbations may be managed at home but the following signs are features of a severe exacerbation:
• marked dyspnoea and tachypnoea
• purse lip breathing
• use of accessory muscles at rest (sternomastoid and abdominal)
• acute confusion
• new onset cyanosis
• new onset peripheral oedema
• marked reduction in activities of daily living

The presence of co-morbidities, the provision of long term oxygen at home and the patient’s social circumstances will influence a decision to admit a patient.

INVESTIGATIONS
Assessment should include monitoring of pulse oximetry, respiratory and heart rate, and blood pressure. Immediate investigations consist of:
Arterial blood gases (ABG) – document the inspired oxygen concentration (FiO₂), CXR, ECG, Blood for U&Es, FBC, theophylline level if patient on this therapy, blood cultures if pyrexial, sputum for MC&S
MANAGEMENT
Use the COPD Prescribing power plan on CRS (‘requests’ – type in ‘COPD’)

- Oxygen therapy to maintain oxygen saturations by oximetry (SpO₂) at 88% - 92%, and/or PaO₂ 8kPa on blood gas measurement. As a guide, use 24-40% oxygen and titrate
- Use a Venturi mask. Variable performance masks are unsuitable and because of difficulties maintaining adequate oxygenation do not use nasal cannulae during the acute phase of illness
- Nebulised salbutamol 2.5mg and ipratropium 500micrograms qds. Flow rate 6-8L/min (air driven if hypercapnic / acidotic)
- Prednisolone 30mg daily for 7-14 days (IV 100-200mg hydrocortisone if patient unable to take orally)
- Antibiotics should only be prescribed if one or more of the following are present: increased sputum volume or purulence, consolidation on CXR, and/or clinical signs of pneumonia

Assess response to initial treatment and measure ABGs within 1 hour of initiating or changing FiO₂ or if patient becomes drowsy.

POOR RESPONSE TO TREATMENT-consult with senior medical staff

Theophylline/Aminophylline
Full Aminophylline guidelines are available on PIMS, and a prescribing powerplan is accessible via CRS (‘requests’ – type in ‘aminophylline’).
As well as its apparent bronchodilating action, theophylline also appears to increase respiratory drive. Intravenous aminophylline should only be used as an adjunct to treatment if there is an inadequate response to nebulised bronchodilators. Care should be taken because of interactions with other drugs and potential for toxicity if the patient has been on an oral preparation. Loading dose is 5mg/kg* over 20 minutes, over 30 minutes if the dose is > 500 mg (omit if on maintenance oral therapy) followed by infusion of 500 microgram/kg/hour (or 300 micrograms/kg/hour in the elderly). Prescribe as 500mg in 500ml sodium chloride 0.9% or 5% glucose. Monitor Theophylline levels every 24 hours (refer to the pharmacology section: ‘Monitoring therapeutic drug levels’).

*If the patient is obese i.e. >20% ideal body weight, calculate the dose using Ideal Body Weight (IBW):
IBW male = 50 + (2.3 x number of inches in height > 5 ft or 0.9 kg per cm > 152 cm
IBW female = 45+(2.3 x number of inches in height > 5 ft or 0.9 kg per cm >152 cm

Non-invasive ventilation (NIV)
- Full NIV protocol available in the Respiratory intranet page
- Bleep the NIV Practitioner on 499, available Monday – Friday 0830-1630, Respiratory SpR Blp 402/422, Outreach or ASP/ANP out of hours.
- If, despite 1hr of maximal medical therapy and controlled oxygen, hypercapnia and acidosis either persists or develops, the use of NIV should be re-considered
- Blood gases should be measured within 1 hour of initiating treatment or changing settings. Aim for PaO₂ 7.5kPa, SpO₂ 88-92%. Successful treatment is reflected by an improvement in pH, respiratory rate and effort within 4 hours of initiating NIV
• NIV should be delivered by staff that have been trained in its application, and are experienced in its use and aware of its limitations i.e. A&E, AAU, Hamble ward. Outside these areas outreach should be involved
• When patients are started on NIV there should be a clear plan regarding ceilings of care and what to do in the event of deterioration, this should be agreed and documented in the medical notes.

GUIDE TO USE OF BIPAP
(Do not use for Type 1 respiratory failure)

- Known COPD
  - Acidotic? PH < 7.35 and respiratory distress

- Is acidosis respiratory in origin?
  - No: Treat cause
  - Yes: 
    - Pa CO₂ > 6.5
    - Recent high flow oxygen?
      - No: Maximal drug therapy
      - Yes: 
        - Not acidotic/ condition improving
        - Yes: Consider starting BiPAP
          - Transfer to AAU or Hamble ward
          - Notify respiratory team Bleep 402/422 or one of the respiratory consultants via switch board
          - Make a decision regarding intubation or resuscitation status before starting BiPAP machine
          - Do not use for type 1 respiratory failure

- Reduce FiO₂ to 28% via Venturi mask, provided PaO₂ > 7.5 kPa (sats 88-92%)
- Recheck ABG after 30 minutes
  - Still acidotic?
    - Yes: Consider starting BiPAP
    - No: Treat cause

- If acidosis is respiratory in origin:
  - Recent high flow oxygen?
    - No: Maximal drug therapy
    - Yes: Not acidotic/ condition improving

The following also serves as a guide:

**Mode:** Spontaneous / Timed (ST)
*Check the mode is ST - therefore providing a back up rate to avoid hypoventilation.*

<table>
<thead>
<tr>
<th>BPM (Breaths per minute)</th>
<th>12</th>
<th>Delivers 12 BPM in event of periods of apnoea</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPAP (Inspiratory Positive Airway Pressure)</td>
<td>10-12 but aim to increase to 16-20 ASAP</td>
<td>IPAP increases tidal volume and minute ventilation thus reducing Pa CO₂ and increasing pH</td>
</tr>
<tr>
<td>EPAP (Expiratory Positive Airway pressure)</td>
<td>4 (maximum 6)</td>
<td>Improves oxygenation and helps to vent CO₂ from mask</td>
</tr>
</tbody>
</table>

- Mode ST (spontaneous timed)
- Back-up rate 12 bpm
- Initial settings: IPAP 10 EPAP 4 but increase IPAP to 16-20 as soon as possible to blow off CO₂
- Titrate EPAP (4-6)/ O₂ to achieve Pa O₂ > 7.5 (sats 85-90%)
- Check ABG within 1 hour.
- Consider discontinuing if no improvement after 4 hours. Review again at 24 hours
- Allow breaks for drinks, physio, nebulisers, but encourage maximum use for 12-24 hours
Prescribe NIV on the NIV prescription chart where additional guidance is available, the prescription chart can be found on the intranet under ‘forms’ – ‘NIV prescription form’ KHFT Non Invasive Prescription Form

Exclusion criteria for BiPAP:
- Type 1 respiratory failure
- Inability to maintain own airway patency
- Hypotension
- Arrhythmia
- Undrained pneumothorax
- Excess secretions
- Vomiting
- Recent facial surgery

Invasive ventilation
Although NIV is the initial treatment of choice for respiratory failure some patients do not respond adequately to NIV and require intubation and ventilation. The decision on which patients will benefit from intubation is difficult and involves balancing health status with an estimate of expectation of survival. Factors that are likely to influence this decision include prior functional status, BMI, requirement for oxygen when stable, co-morbidities and previous ITU admissions. Neither age nor FEV$_1$ should be used in isolation when assessing suitability.

DISCHARGE PLANNING
- Assess symptoms and functional capacity regularly. Monitor respiratory rate, heart rate and pulse oximetry
- Inhaled therapy may be started once symptoms have improved and the patient is not requiring additional nebulised therapy
- An assessment of inhaler technique must be made as 30-60% of elderly patients have difficulty operating the metered dose inhaler (MDI). Bronchodilators given via hand held inhalers are as effective as nebulised therapy in stable COPD
- Spirometry should be measured in all patients before discharge. This assists with determining both disease severity and appropriate inhaled treatment
- ABG on room air should be performed at the time of discharge
- Spirometry and ABG’s at discharge should be documented in the discharge summary
- The need for LTOT should be determined in a disease stable state. If the stable discharge PaO$_2$ < 7.3 kPa on room air contact respiratory nurse / team for advice.
- Complete the COPD Discharge Bundle (available on CRS, pre-completed section). Give a copy to the patient and send to the GP
- Advice and information about smoking cessation should be supplied where necessary.

Community Respiratory Team
Each Borough has its own Respiratory Nurses and Physiotherapists who will provide support and care for COPD patients at home. They must be contacted at least 24 hours prior to discharge and a clear follow up plan needs to be documented to prevent recurrent admissions. See Respiratory Intranet page for details.

Follow up arrangements
The respiratory nurse specialist is happy to review patients admitted with exacerbations of COPD in her outpatient clinic 4-6 weeks following discharge. This is especially useful if therapies such as home oxygen are thought to be necessary.

Specialist Respiratory nurse: ext 2082 or bleep 083
OXYGEN THERAPY
Link consultant: Dr. Emma Holden

The Kingston Hospital Oxygen Policy is found in PIMS as well as the Respiratory Department Intranet page along with information on assessing for and prescribing long term oxygen (LTOT) and ambulatory oxygen.

1. **Oxygen is a drug and therefore requires prescribing in all but emergency situations. Please use the CRS Oxygen prescribing bundle.**
2. In the emergency situation, an oxygen prescription is not required. Oxygen should be given to the patient immediately without a formal prescription or drug order but documented later in the patient’s record.
3. In an emergency (severe hypoxia – oxygen saturations < 90%), use 100% oxygen (15L/min). Failure to correct hypoxaemia (PaO₂ < 8kpa) for fear of causing hypoventilation and CO₂ retention (hypercapnia) is unacceptable in clinical practice. Hypoxia kills quickly (within minutes) whereas CO₂ narcosis (caused by hypercapnia) kills slowly (over hours).
4. Prescribe oxygen according to a target saturation range. The system of prescribing target saturation aims to achieve a specified outcome, rather than specifying the oxygen delivery method alone.
5. Prescribe oxygen to achieve a target saturation of 94-98% for most acutely unwell patients or 88-92% for those at risk of hypercapnic respiratory failure. Observe oxygen saturations for at least 5 minutes after starting oxygen therapy.
6. Increase the oxygen therapy if the saturation is below the desired range and decrease it if the saturation is above the desired range (See below).

<table>
<thead>
<tr>
<th>Delivery device</th>
<th>Type of patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen masks and nasal cannulae</td>
<td>Patients with otherwise normal vital signs: e.g. post-operative patients / those with slightly low oxygen saturations / long term treatment with oxygen at home</td>
</tr>
<tr>
<td>Simple face masks and masks with reservoir bags</td>
<td>Higher concentrations of oxygen are required and controlled oxygen is not necessary: e.g. severe asthma, acute left ventricular failure, pneumonia, trauma, or severe sepsis. <strong>(Masks should always be set to a minimum of 5 L/min O₂ because significant re-breathing of CO₂ can occur when exhaled air is not adequately flushed from the mask)</strong></td>
</tr>
<tr>
<td>Venturi masks</td>
<td>Controlled treatment with oxygen required in people with chronic respiratory failure, e.g. COPD</td>
</tr>
</tbody>
</table>
Table 1 - Critical Illnesses Requiring High Levels of Supplemental Oxygen - Sp02 < 90%

- Cardiac arrest
- Shock
- Sepsis
- Anaphylaxis
- Major head injury
- Carbon monoxide poisoning

Patients with COPD or risk factors for hypercapnia should be treated as for all critically unwell patients.

Once stabilised patients history of COPD risk of hypercapnia - Should receive controlled oxygen - Target Sats 88-92%.
Table 2 – Serious Illness with Hypoxia – SpO2 < 94%

Hypoxia

- Asthma
- Pulmonary embolism
- Pneumothorax
- Heart failure
- Pleural effusions
- Sickle cell crisis
- Severe anaemia

Serious illness with type 1 respiratory failure (PO2 < 8, PCO2 normal or low)

Oxygen

Nasal Cannulae 2-6L/min
Simple Face Mask 5-10L/min

Target Oxygen Saturations 94-98%

PCO2 < 6
See conditions requiring controlled oxygen

PCO2 > 6
See alternate algorithm

ABG at 60 mins

Yes

Pt. stabilised

Change to Reservoir Mask 15L/min

Continue current O2 Treatment underling cause

Persistent hypoxia or respiratory acidosis
Consider invasive/no n-invasive ventilation

Titrarte O2 down when clinically improving Target sats 94-98%
HUMIDIFIED CIRCUITS

Consider humidified oxygen if >35% FiO2 or more than 5 L/min (flow rate) is required for more than 2 hours. Prolonged non-humidified oxygen use at high concentration (>60% FiO2 for >48 hours) may lead to difficulty with secretion clearance, oxygen toxicity, re-absorption atelectasis, damage to the alveolar membrane and lung collapse.

<table>
<thead>
<tr>
<th>O2 delivered</th>
<th>28%</th>
<th>35%</th>
<th>40%</th>
<th>60%</th>
</tr>
</thead>
<tbody>
<tr>
<td>O2 Flow rate</td>
<td>5L/min</td>
<td>6L/min</td>
<td>9L/min</td>
<td>11L/min</td>
</tr>
</tbody>
</table>
DOMICILARY OXYGEN

The hospital Guidelines for Adult Domiciliary Oxygen Therapy (also known as long term oxygen therapy, LTOT, or Ambulatory oxygen therapy) are on PIMS, on the intranet. Guidelines for the assessment and prescription of domiciliary oxygen are available on the Respiratory Department Intranet page.

- All patients started on domiciliary oxygen MUST have a HOOF (Home Oxygen Order Form), Home oxygen consent form (HOCF) and Initial Home Oxygen Risk Mitigation Form (IHORMF) completed and filed in the patients notes and faxed to the oxygen company before oxygen can be installed.
- Patients MUST NOT smoke.
- They MUST also be referred to the respiratory nurse on discharge and the HOOF form faxed through to the chest clinic:
  
  Chest Clinic-Home Oxygen Assessment Services (HOSAAR)  
  Kingston Foundation Trust Hospital  
  Phone – 020 8934 3347  
  Fax – 020 8934 3244

Short burst oxygen – Short burst oxygen therapy refers to the intermittent use of supplemental oxygen at home, usually for periods of 10-20 minutes at a time to relieve breathlessness. There is, however, no good evidence available for the prescription of short burst oxygen therapy. If anything, recent evidence shows it has the ability to make breathlessness worse in a non hypoxaemic patients. It should therefore only be considered for Palliative use in patients nearing end of life.

CHEST DRAIN INSERTION
Link consultant: Dr Sally O’Connor

For full guidance on pleural procedures, chest drain checklists and patient information sheets please refer to the Respiratory Department Intranet page.

The National Patient Safety Agency (NPSA) alert in 2008 on chest drain insertion and management recommends that:
- chest drains are only inserted by adequately supervised competent staff;
- ultrasound guidance is strongly advised when inserting a drain for fluid;
- clinical guidelines are followed and staff made aware of the risks;
- patients give written consent before the procedure, wherever possible; and
- local incident data relating to chest drains is reviewed and staff encouraged to report incidents related to chest insertion and management

Indications for chest drain insertion
A. Emergency
1. Pneumothorax:
   a. Large pneumothorax
   b. Clinically unstable patient
   c. Tension pneumothorax after needle decompression
   d. Recurrent or persistent pneumothorax after aspiration
   e. Secondary to chest trauma
   f. Large secondary pneumothorax in patient >50 yrs
2. Haemopneumothorax
3. Oesophageal rupture with gastric leak into pleural space

B. Non-emergency – firstly, confirm the need for chest drain insertion with the respiratory team or out-of hours (OOH) on call medical consultant. Drains should not be inserted outside ‘normal’ working hours except in an emergency.
   1. Pleural effusion in stable patient
   2. Pneumonia-related effusion or empyema
   3. Chylothorax

**Drain Insertion**
Insertion of a drain in a non-emergency procedure is a consultant-led decision. It is the consultant’s responsibility to identify adequately trained personnel to perform the procedure. If there is doubt about the indication then the team should liaise with the respiratory team for further advice. Chest drains should not be inserted outside ‘normal’ working hours, except in an emergency.

**Consent**
Written formal consent must be obtained prior to the procedure, and filed in the medical notes. Ensure that you provide a Chest drain insertion patient information leaflet to the patient with the opportunity to raise any concerns (available on the Respiratory Intranet page).

All drains should be inserted in a sterile environment to minimise the risk of infection. Sterile drapes and gowns are mandatory. Skin sterilisation with two applications of alcohol-based skin prep is recommended. – See the chest drain check list available on the Respiratory Intranet page (‘Pleural’ section).

**Image guidance**
This must be performed for all but the most urgent drains. In cases of pleural effusion, real time ultrasound should be used to localise the position of the drain. The marking of a site for subsequent aspiration is not recommended except for large pleural effusions.

In cases of pneumothorax, if there is suspicion on the chest X-ray that there may be lung tethering to the pleura, or of bullous disease, then further assessment of the thorax with cross sectional imaging may need to be obtained prior to insertion.

**Drain insertion**
In the majority of cases, a small-bore drain inserted by the Seldinger technique will be appropriate. Do not insert chest drains via a posterior approach; there is a significantly higher risk of bleeding. During drain insertion, aspiration of air or fluid confirms the operator has gained access to the pleural space and that it is safe to proceed. **If fluid or air is not aspirated, do not proceed with the procedure. Seek further radiological help.** All drainage holes need to be in the cavity for the drain to work effectively. Chest drains should be secured with 1/0 silk suture anchored to the skin and the drain with a suitable non-slip knot technique. Avoid using purse-string sutures.

**The drainage system**
Once the drain is adequately inserted it should be connected to an appropriate drainage system, i.e. in most cases, with an underwater seal.
Post insertion instructions – After care guidance is available on the Respiratory Department Intranet page (‘Pleural’)

- The drain should be covered with clear dressing so the wound site can be easily inspected daily.
- The drain should be connected to a single way drainage unit such as an under water seal.
- Ensure the drain is swinging
- In cases of pleural effusion, only 1.5 litres should be drained in one sitting to minimise the risk of re-expansion pulmonary oedema.
- Regular post-chest drain insertion observations should be performed and recorded on CRS – advice is available on the Respiratory Department Intranet page (‘Pleural’).

- Perform and review the post insertion chest X-ray to assess the position of the drain.
- In cases of pneumothorax, NEVER clamp a chest drain.
- Ensure adequate analgesia is given to the patient.
- Ensure the procedure is documented in detail on CRS
- The Kingston Hospital chest drain recording chart should be used to document the daily and total volume drained, and other relevant parameters.

Suction should only be prescribed by a Respiratory physician; patients on suction must be transferred to Hamble ward.

Location:
Patients with chest drains should be managed on Hamble ward ideally, or AAU, where the nursing staff are trained and experienced in the care of chest drains. Please liaise with the Respiratory team/Matron/Advanced Site Practitioner as to the need to transfer the patient with a chest drain to Hamble ward – this will be decided on a case-by-case basis.

Pleural Fluid samples
Refer to the next section (below) – ‘Guidelines on the investigation of pleural fluid’.
GUIDELINES ON THE INVESTIGATION OF PLEURAL FLUID
Link consultant: Dr. Sally O’Connor

Patients who are admitted with a pleural effusion may require a diagnostic pleural tap. British Thoracic Society 2010 pleural procedures guidelines strongly recommend real time thoracic ultrasound for pleural procedures including diagnostic aspiration. The marking of a site for subsequent (future) aspiration is not recommended except for large effusions.

The diagnostic tests listed below are essential:
There is short-cut CRS folder for pleural requests:
CRS requests ➔ Folder: Favourites ➔ Medical procedures ➔ Pleural tap or drain

**pH:** pleural fluid should be drawn up into an ABG syringe and can either be tested in the blood gas analyser to produce a result or sent to the laboratory.

**Biochemistry:** One universal container should be sent to biochemistry along with the form. Request analysis for: protein, glucose and LDH. **Send a serum sample for a paired LDH and protein** (to enable Light’s criteria calculation)

**Microbiology:** Two universal containers should be sent to microbiology along with the request form. Request analysis for: MC+S and AFB.

**Cytology:** Four universal containers should be sent to cytology along with the cytology form to look for malignant cells and perform molecular analysis. This should be a fresh specimen and taken promptly to cytology.

**SPONTANEOUS PNEUMOTHORAX**
Link consultant: Dr Sally O’Connor

The sudden entry of air into pleural space and the subsequent collapse of the underlying lung presents with pain or shortness of breath (or both) or very rarely with cardiorespiratory arrest (as occurs in a tension pneumothorax). In most instances the air enters through a spontaneous leak in the pleura and no precipitating factor is found; alternatively air entry may follow trauma or surgery.

**MANAGEMENT.** For most patients there is no immediate threat. Once a pneumothorax is suspected, X-ray will confirm the diagnosis. Assess the degree of any collapse:
- small – a rim of air around the lung
- moderate – collapse halfway to the heart border
- complete – airless lung separated from the diaphragm

Treatment varies according to the symptoms, the degree of the collapse, and whether there is underlying lung disease or bleeding.
**Tension pneumothorax**: requires immediate aspiration of the entrapped air followed by intercostal tube drainage. This is a clinical diagnosis and an emergency; a chest X-ray should not be taken until after the chest drain is inserted. Cardiac arrest can occur, so be prepared to start cardiopulmonary resuscitation immediately. A wide bore needle may be inserted, under local anaesthetic, in the 2nd intercostal space, anterior axillary line, while the chest drain is being prepared.

**History of trauma**: admit any patient in whom the pneumothorax might be the result of trauma (e.g. road traffic accident, assault). Check for bleeding. In patients with a suspected bleed, monitor the heart rate, blood pressure, and FBC. Repeat the X-ray to check whether bleeding has stopped. If it has not, seek immediate advice of the Respiratory team and/or the Thoracic team at St. George’s hospital.

**Healthy young adults**: admit the patient to hospital if there is shortness of breath on slow walking, > 50% pneumothorax, or if a significant fluid level is found (>10% of hemithorax). In those with shortness of breath or complete pneumothorax, aspirate the air through a wide bore needle introduced under local anaesthesia. If aspiration with a needle fails, an intercostal drain may have to be introduced (seek advice).

There is no need to admit an otherwise healthy young adult if:
- there is no shortness of breath at rest or when walking slowly,
- pain is mild or diminishing,
- collapse is small or moderate (less than 50%),
- fluid on the chest X-ray is only sufficient to blunt the costophrenic angle.

Before a patient leaves the hospital, explain the cause of the symptoms, arrange for outpatient review in 7-10 days, and advise the patient to return promptly to hospital if symptoms worsen.

**Patients with underlying lung disease**. All patients with underlying lung disease should be admitted to hospital for observation or immediate aspiration depending on the degree of collapse and the level of symptoms. Management should follow the scheme in the flow diagram below.

The chest drain should be inserted in the ‘safe triangle’ bounded by the apex of the axilla, the nipple (i.e. 4th intercostal space in the mid clavicular line) and the base of the scapula. For pneumothorax, insert the drain pointing upwards. Seek advice from a respiratory specialist registrar or consultant if:
- the lung fails to expand
- the drain continues to bubble
- the patient develops surgical emphysema
- pleurodesis is being considered
In cases of pneumothorax, NEVER clamp a chest drain

At the time of discharge, ask for a chest clinic appointment within 7-10 days of discharge (document this clearly on the discharge summary and ensure this is faxed to and received by the Respiratory patient pathway co-ordinator (PPC). The patient, who should be told to report back to hospital immediately if symptoms deteriorate, must be advised not to travel by air for a minimum of 2 weeks after the pneumothorax is confirmed to have resolved.

ACUTE KIDNEY INJURY
Link consultants: Dr. Debasish Banerjee and Dr. Tuan Ismail
Pharmacist: India Girdlestone

Acute kidney injury (AKI), characterised by a sudden rise in blood creatinine due to fall in glomerular filtration rate (GFR), is common (in 15-20% in-patients). Causes include hypovolaemia (e.g. surgery, haemorrhage, burns), sepsis, or nephrotoxic insult (eg drugs, iv contrast media, myoglobinaemia or haemo-globinaemia). Other less common causes of AKI are obstruction, acute interstitial nephritis (due to drugs or infection), and glomerulonephritis (such as due to lupus).

Stages of AKI: There are 3 stages of AKI with increasing severity

<table>
<thead>
<tr>
<th>Stage</th>
<th>Creatinine rise</th>
<th>urine output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.5-2 fold</td>
<td>≤ 0.5ml/kg/hr &gt; 6 h</td>
</tr>
<tr>
<td>2</td>
<td>2-3 fold</td>
<td>≤ 0.5ml/kg/hr &gt; 12 h</td>
</tr>
<tr>
<td>3</td>
<td>&gt;3 fold</td>
<td>≤ 0.3ml/kg/hr &gt; 24 h</td>
</tr>
</tbody>
</table>

MANAGEMENT (see figure 1, below)

1. Fluid management: Assess fluid status with monitoring of pulse, BP, JVP and urine output. CVP monitoring is useful only in ITU and HDU. Correct hypovolaemia using 0.9% sodium chloride, ideally in boluses of 250 ml and continuous hourly monitoring of fluid status. If urine output remains low after 2 litres of intravenous fluid rehydration, seek expert advice. If the patient remains hypotensive (SBP<100 mm Hg) after fluid therapy, seek ITU advice. Once the patient is adequately volume resuscitated, maintain adequate fluid intake. Aim: fluid intake = urine output + 30 ml/hr.
2. Treat sepsis with appropriate antibiotics.
3. Stop all nephrotoxic drugs like ACE inhibitors, Angiotension receptor blockers, NSAIDS, aminoglycosides, metformin.

Figure 1: Steps in the diagnosis and management of AKI

DIAGNOSIS: Creatinine rise (26µmol/L) or >1.5 times from baseline (>x3- SEVERE AKI)
Check Pulse, BP, Temperature, Respiratory rate, Hourly urine output (U/O)
Maintain airway, breathing and circulation, administer oxygen and contact ITU if necessary

REHYDRATE if volume depleted using 0.9% sodium chloride 250 ml boluses up to 2 L
Monitor Pulse/BP/Temperature/Respiration and hourly urine (urinary catheter if necessary)

INVESTIGATE: Urine for protein, blood, leucocyte, microscopy&culture, electrolytes
Blood: U&E, FBC, LFT, Arterial Blood Gas, Calcium, Renal immune and Myeloma screen
Radiology: Ultrasound scan of Kidneys, Ureters and Bladder

STOP Nephrotoxic medications e.g. NSAIDS, ACEi, ARB. ADJUST drug doses
SEPSIS: If sepsis: Start antibiotics, avoid gentamicin

REFER to the Renal team if uncontrolled hyperkalaemia (>6.0), acidosis (pH<7.2), fluid overload +/- anuria, significant haematuria, proteinuria, low Hb, or AKI 3

4. Treat hyperkalaemia (K\(^+\) greater than 6 mmol/L) – refer to the section on the management of hyperkalaemia.
5. Order an urgent ultrasound scan if no other obvious cause is found. Relieve obstruction (if present) using a catheter and refer for Urology advice. Order ANA, ANCA, anti-GBM antibodies, complements, serum electrophoresis, urine BJP - if haematuria and proteinuria present. Order LDH, bilirubin, retics, CK if necessary.
6. Diuretics should be considered to treat fluid overload.

If the patient is dehydrated and urine sodium is <10mmol/L or fractional excretion of sodium* <1%, then the patient is probably still volume depleted. Think of prerenal failure and administer adequate fluids.

\[ *FeNa = \text{Fraction of plasma sodium excreted in the urine} = \left( \frac{\text{urine sodium divided by plasma sodium}}{\text{urine creatinine divided by plasma creatinine}} \right) \times 100 \]

8. Urine output must be measured meticulously – aim for hourly measurements. Insertion of a urethral catheter is usually necessary to achieve this.
9. Renal biopsy to be considered if there are atypical clinical features or features suggesting multisystem disease.
Indications for dialysis or haemofiltration:
• Life-threatening or intractable pulmonary oedema
• Severe hyperkalaemia not responding to medical therapy
• Severe (pH < 7.2) or worsening acidosis

Prevention: AKI can often be prevented. So, for example, take special care to avoid volume depletion in high-risk patients (eg those with CKD, diabetes, heart failure or elderly), and those subjected to overnight fast, surgery or investigations involving iv contrast. Hypovolaemia due to blood or fluid loss should be avoidable or rapidly reversible. Be very cautious when using drugs such as aminoglycosides, vancomycin and NSAIDs that might cause AKI.

For patients due to receive radiocontrast.
Implement the following to reduce the risk of AKI due to contrast nephropathy:

Prevention of AKI due to radiocontrast nephropathy:
• Identify high risk patients with CKD, Diabetes, Age > 69, Heart failure.
• Use IV 0.9% sodium chloride 1ml/kg/hr, 3-12 hours before and 6-12 hours after each procedure.
• Aim to maintain urine output at 150ml/hr
• Sodium bicarbonate IV 1.26% can also be used (3 ml/kg/hr for 1 hour before, and 6 hours after).
• Stop potential nephrotoxic agents eg NSAIDS, ACE inhibitors, Angiotensin receptor blockers, metformin and diuretics.

Discharge and Follow-up
All patients with AKI who have eGR < 30ml/min/1.73m² on discharge should be referred to the outpatient renal team for follow-up

Specialist advice:
• Kingston In-reach Support Services (KISS). Refer by completing and emailing the nephrology specialist referral form to KISS@kingstonhospital.nhs.uk. The speciality referral form is available on the intranet: KHFT Referral Form to Kingston Renal Services 2014
• To make a referral for an urgent renal outpatient appointment, fax the request to the renal team on 0208 934 3276
• Dr. Ismail, consultant nephrologist, is based on the Acute Assessment Unit.
• Dr. Banerjee, are contactable via the secretary on ext 2014.
• Out of hours, or if both consultants are unavailable, bleep the Renal Registrar at St. George’s hospital (0208 6721255 Bleep 6415).
• Further information on AKI: http://www.londonaki.net
ASSESSING METABOLIC ACIDOSIS – THE ANION GAP
Link consultant: Dr. Tuan Ismail

Metabolic acidosis, which may be fatal, will sometimes present acutely in the A&E department. The patient will be hyperventilating and, unusually for a ‘breathless’ patient, will be comfortable lying flat. The condition is characterised biochemically by a fall in pH to less than 7.37 in association with a raised plasma concentration of H⁺ (> 43nmol/L) and a low plasma HCO₃⁻.

Mechanisms:
1) a net gain of acid (increase in endogenous production or exogenous administration) e.g. diabetic ketoacidosis, aspirin poisoning
2) a net loss of alkali eg. loss from intestine (diarrhoea) or renal tract (renal tubular acidosis)
3) a failure of renal acid excretion in patients with normal production of acids eg. chronic renal failure, renal tubular acidosis

Calculations
In health the total for the positively or negatively charged electrolytes is around 150mmol/L. When the 4 major plasma electrolytes (sodium, potassium, chloride and bicarbonate) are considered the sum of [Na⁺] + [K⁺] is greater than [C1⁻] + [HCO₃⁻] by 8-17mmol/L. This difference is described as the ‘anion gap’, with the difference mainly ascribable to unmeasured anions. Other ‘minor’ anions (sulphate, phosphate, organic compounds) and cations (magnesium, calcium, paraproteins) can be measured and both contribute a further 6mmol/L to the equation.

If metabolic acidosis is primarily the result of a loss of HCO₃⁻ there will be an equivalent rise in [C1⁻] and the anion gap will remain normal, i.e. there are no unmeasured anions. If metabolic acidosis is accompanied by the presence of unmeasured anions, the gap will be increased.

Causes of Metabolic Acidosis
Normal anion gap:
- Loss of HCO₃⁻, as in diarrhoea, proximal renal tubular acidosis
- Decreased renal acid excretion e.g. distal renal tubular acidosis

Increased anion gap:  
<table>
<thead>
<tr>
<th>Condition</th>
<th>Unmeasured Anions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lactic acidosis</td>
<td>Lactate, phosphate, urate</td>
</tr>
<tr>
<td>Ketoacidosis</td>
<td>Ketone bodies (acetone, acetoacetate, β–hydroxybutyrate)</td>
</tr>
<tr>
<td>Diabetic</td>
<td>Acetoacetate, β–hydroxybutyrate</td>
</tr>
<tr>
<td>Starvation</td>
<td></td>
</tr>
<tr>
<td>Inborn enzyme defects</td>
<td></td>
</tr>
<tr>
<td>Intoxication</td>
<td></td>
</tr>
<tr>
<td>Methanol</td>
<td>Formate</td>
</tr>
<tr>
<td>Ethylene glycol</td>
<td>Glycolate, oxalate</td>
</tr>
<tr>
<td>Alcohol</td>
<td>β – hydroxybutyrate, lactate, acetoacetate</td>
</tr>
<tr>
<td>Salicylates</td>
<td>Ketones, lactate, salicylate</td>
</tr>
<tr>
<td>Paraldehyde</td>
<td>Acetate</td>
</tr>
<tr>
<td>Renal failure</td>
<td>Sulphate, phosphate</td>
</tr>
<tr>
<td>Acetate</td>
<td>Acetate</td>
</tr>
<tr>
<td>Haemodialysis</td>
<td></td>
</tr>
</tbody>
</table>
It is important to realise that the ability to respond to the worsening acidosis by hyperventilation and elimination of CO₂ depends on normal lungs. Patients with lung disease are likely to become exhausted and develop severe acidosis relatively quickly.

**Treatment**
The treatment of metabolic acidosis varies with the underlying disorder. The therapeutic goal is to raise the systemic pH to about 7.20, a level at which arrhythmias are less likely and cardiac contractility is restored. Do not attempt to fully correct the pH as continuing hyperventilation will make the patient alkalotic and may precipitate tetany.

- In patients with renal failure who are acidotic and volume deplete, give sodium bicarbonate 1.26% (regime depending on degree of volume depletion). In contrast, patients with renal failure, acidosis and fluid overload should be referred to the on-call Renal team since they might need dialysis.
- For treatment of patients with diabetic ketoacidosis refer to section on diabetic ketoacidosis/hyperosmolar states.
- In patients with lactic acidosis it is important to establish the reason for lactate accumulation (e.g. cardiovascular compromise, ischaemic bowel) and to initiate resuscitation accordingly.
- Patients with normal anion gap metabolic acidosis secondary to profound diarrhoea or renal tubular acidosis should be treated with sodium bicarbonate 1.26%.

When treating (reducing) the anion gap remember:
- Co-existing respiratory disease may lead to an inappropriately severe acidaemia and attention must be directed to the respiratory tract. The patient may even need ventilation.
- In a patient with a metabolic acidosis associated with a normal anion gap, measurement of urine pH should help distinguish between renal and non-renal causes. If the cause is renal the urine pH will be ≥5.4.

**ACUTE PAINFUL SWOLLEN JOINT(S)**
Link consultant: Dr Hugh Jones

A patient with a painful, swollen and (often) stiff joint needs prompt treatment both to relieve discomfort and to prevent permanent damage. Management principally turns on whether symptoms are due to bacteria (septic arthritis), trauma, crystal deposition (gout), blood (haemarthrosis), or are part of a more generalised process such as rheumatoid arthritis. By the end of a careful history and examination it should be possible to make a “working” diagnosis although this will still need confirmation by appropriate investigations.

**HISTORY AND EXAMINATION**
Ask about time course of symptoms (gout can develop fully over hours, rheumatoid over weeks), assess whether more than one joint is involved (in gout, septic arthritis or haemorrhage, the involvement of one joint only is the rule; in a rheumatoid process oligo- or poly-arthritis is more likely), take drug history (thiazides may precipitate gout, arthritis is a recognised part of some drug allergies), ask about recent trauma, check for possible infective source, and look for extra-articular clues such as:
• urethritis (e.g. in sexually acquired reactive arthritis)
• rash (e.g. in psoriatic arthritis or vasculitis)
• nodules (e.g. in RA)
• pyrexia (e.g. in sepsis or vasculitis)
• pallor (e.g. in anaemia of chronic disease)
• hepatosplenomegaly (e.g. in autoimmune rheumatic disease)
• pericarditis/pleurisy (e.g. in SLE)
• bruising (local trauma, clotting defect)
• diarrhoea (e.g. in inflammatory bowel disease)

INVESTIGATIONS
Immediate. If an effusion is present, aspirate the joint where possible and send sample for urgent analysis. Macroscopic appearance coupled with microscopy, gram stain and culture will help confirm (or exclude) infection. Polarised light microscopy should be used to detect crystals of uric acid or pyrophosphate. The exclusion of infection will permit local steroid injection. If aspirate looks infected, seek possible bacterial source by taking appropriate culture samples (e.g. blood, MSU, urethral swab).

Within 24 hours. Take blood for full blood count (to detect increase/decrease in haemoglobin, white cell and platelet numbers), ESR (this may be elevated in an acute phase response, e.g. inflammation in autoimmune rheumatic disease), and uric acid (this is usually elevated in gout). If a viral cause is suspected, screen for viral antibodies (include parvovirus).

Later. Screen for anti-nuclear antibody, ANCA and rheumatoid factor if you suspect an autoimmune rheumatic disease.

TREATMENT
The joint(s) should be immobilised when inflamed; start rehabilitation as soon as symptoms have resolved. If diagnosis unclear or if septic arthritis is diagnosed, seek advice from the rheumatology team (Dr. Jones, Dr. Jawed or the specialist registrar).

Analgesia
• Paracetamol 0.5-1g 4-6 hourly (max 4 g/24 hours)
• Codeine phosphate 30-60mg 4 hourly (max 240 mg/24 hours)
  (Codeine is especially useful where infection is suspected as it does not affect temperature and so allows the response to an antibiotic to be assessed)
• Non-Steroidal anti-inflammatory drugs
  - Ibuprofen 400mg 6-8 hourly (max 2.4 g/24 hours)
  - Indomethacin 50mg 8 hourly (6 hourly for acute gout)
• Colchicine (acute gout) 500 micrograms 2-4 times/day until symptoms relieved
  (Colchicine is useful when NSAID is not tolerated or does not work. Refer to BNF for dosage guidance. Total dose/course = 6 mg; not to be repeated within 3 days).

Note: Allopurinol and probenecid should not be started during an acute attack of gout but should not be stopped if already being taken following a previous attack.

Antibiotics
Refer to the hospital Antibiotic Guidelines. Switch to specific treatment once synovial fluid culture results are known. Do not start an antibiotic until bacterial culture samples have been taken. Do not give the antibiotic by injection into the joint.

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Corticosteroids
Intra-articular corticosteroids are indicated for significant non-infectious joint inflammation that has not responded to a NSAID within 24 hours. The following drugs can be used:
- methylprednisolone acetate (40-80mg) or
- hydrocortisone acetate (25mg)
Lidocaine (Lignocaine) 1% can be added for additional pain relief. Methylprednisolone and lidocaine are available in combined injections.

ACUTE PAIN CONTROL
Link clinical nurse specialist: Margaret Uchendu
Pharmacist: Nita Sanghera

Acute pain, whether due to a medical or surgical condition, should be relieved as soon as possible. Simultaneously investigate and treat the underlying cause – it is rare for analgesia to mask a diagnosis. Pain assessment is vital for safe and effective pain relief. Pain may be classified as mild, mild-to-moderate, moderate-to-severe or severe and treated accordingly. The use of combinations of analgesic drugs and techniques usually improves the quality of pain relief and may enable the use of lower doses of individual drugs thus minimising the risk of unwanted effects. Local anaesthetic techniques may help, and can decrease opioid requirements. In general it is more realistic to strive for comfort rather than complete abolition of pain. For advice on the management of acute pain contact the Acute Pain Team (bleep 627 or ext. 2076) or the on-call anaesthetist out of hours and at weekends. For the management of pain associated with end-stage disease, contact the palliative care team. For specific conditions such as acute MI, arthritis and sickle cell crisis, refer to the relevant sections in this book.

THE W.H.O ‘ANALGESIC LADDER’
Mild pain paracetamol + NSAID/adjuvant
Moderate pain paracetamol + oral weak opioid + NSAID/adjuvant,
paracetamol + NSAID + codeine or
paracetamol + NSAID + dihydrocodeine or
paracetamol + NSAID + oral tramadol or
paracetamol + NSAID + oral opioid
Severe pain parenteral opioid (IV/IM/SC) + NSAID

TREATMENT DETAILS

STEP 1 MILD PAIN: Simple analgesics Non-opioid +/- adjuvant

Paracetamol: Give by mouth or as suppository. The dose is 1g 4-6 hourly (maximum 4g/24 hours). IV paracetamol is ONLY indicated where oral or rectal administration is not tolerated or not appropriate. The intravenous dose is:
- Adults 50 kg and over: 1g 4-6 hours, maximum dose 4 g/24 hours
- Adults < 50 kg: 15 mg/kg every 4-6 hours, maximum dose 60 mg/kg/24 hours
Non-Steroidal Anti Inflammatory Drugs (NSAIDs): The MHRA (2009) warned of increased cardiovascular risk in users of NSAIDs, in particular high-dose diclofenac, celecoxib and high-dose ibuprofen > 1200 mg/day. No increased cardiovascular risk was shown for naproxen. Use the lowest effective dose and the shortest duration of treatment necessary to control symptoms. Use with great caution in elderly patients and use proton-pump inhibitor cover if possible.

Contraindications: bleeding disorders, peptic ulceration, renal dysfunction, liver dysfunction, allergy to NSAIDs (care in asthma), congestive cardiac failure and patients taking warfarin.

1st line NSAID: Ibuprofen - give orally 200-400mg 6-8 hourly
2nd line NSAID: Naproxen – give orally 250 mg 6-8 hrly

**STEP 2 MODERATE PAIN:** Compound Analgesics
Weak opioid +/- non-opioid +/- adjuvant

These drugs can be given in conjunction with NSAIDs. The co-analgesic drugs (paracetamol and codeine combinations) should be avoided; Co-dydramol and Co-codamol 8/500, will give sub-optimal doses of codeine. It is better to prescribe a weak opioid and paracetamol separately. Consider prescribing laxatives (e.g. laxido) when prescribing codeine, tramadol and opioids to prevent constipation.

**Only one of the following drugs should be prescribed at any one time, e.g.** Codeine and Tramadol should not be prescribed together. Proceed to Step 3 if pain is not controlled.

**Weak Opioids – Oral**

Dihydrocodeine: 30mg - 60 mg 4-6 hourly (maximum 240mg/24 hours)
Codeine Phosphate: 30mg - 60 mg 4-6 hourly (maximum 240mg/24 hours)
Tramadol: 50-100mg 4-6 hourly (maximum 400mg/24 hours)

Avoid tramadol in epilepsy as it lowers the fit threshold
Use tramadol with caution, especially in elderly patients
Tramadol interacts significantly with warfarin
100 mg tramadol is equivalent to 10-20mg Morphine

**STEP 3 SEVERE PAIN**
Strong opioid +/- non-opioid +/- adjuvant

**Strong opioids – Oral**

Morphine sulphate solution (Oramorph®): 5-10mg every 4 hours
If patient cannot tolerate morphine then oxycodone can be given.
Oxycodone immediate release (Oxynorm®) 5mg every 4 hours

**NOTE: Doses for Morphine and Oxycodone are not equivalent**
5mg oral morphine is equivalent to 2.5mg oral oxycodone

The National Patient Safety Agency (NPSA) has issued guidance when the following opioids are prescribed: buprenorphine, diamorphine, dipipanone, fentanyl, hydromorphone, meptazinol, methadone, morphine, oxycodone, papaveretum and
pethidine. When these medicines are prescribed in anything other than acute emergencies:

- Confirm any recent opioid dose, formulation, dose frequency and any other analgesic medicines prescribed for the patient
- When a dose is increased intentionally, ensure that the calculated dose is safe for the patient (e.g. for oral morphine or oxycodone, do not increase the dose by more than 50% of the previous dose)
- Ensure you (i.e. the prescriber) are familiar with the formulation of the opioid and its usual starting dose, frequency of administration, standard dosing increments, symptoms of overdose and common side effects.

**Opioids – Parenteral**

Morphine is the preferred opioid. It may be given IM, SC or IV (as a bolus, continuous infusion, or as patient-controlled analgesia - PCA). **NOTE that the IV and IM dose of morphine is NOT equivalent. DO NOT prescribe IV/IM morphine at the same dose.**

Pethidine may be used in patients with renal or biliary colic or when morphine has produced severe generalised pruritis. Pethidine should not be used in patients taking MAOI drugs or given in large doses to patients with epilepsy as it has an epileptogenic metabolite. If the patient is hypotensive or has signs of shock, treat these before starting an opioid as it may reduce blood pressure further. **Repeated pethidine injections should be avoided as they are short-acting and in large doses can cause the patient to fit.**

Severe acute pain often requires morphine to be given by injection to give adequate control. Either IV or IM administration are effective. Use the dosage regimens given in the following tables:

<table>
<thead>
<tr>
<th>IV morphine</th>
<th>IM morphine</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td><strong>Dose</strong></td>
</tr>
<tr>
<td></td>
<td>Pain severe</td>
</tr>
<tr>
<td>&lt; 70</td>
<td>2mg</td>
</tr>
<tr>
<td>&gt; 70</td>
<td>1mg</td>
</tr>
<tr>
<td></td>
<td>Less severe</td>
</tr>
</tbody>
</table>

Assess the patient 60min after IM and 5min after IV injections.
Assuming there is no evidence of opiate overdose (see section below for diagnosis and treatment), then if:

- **pain relieved:** repeat same dose up to 3-4 hourly PRN after IM injection, and up to 1-2 hourly PRN after IV injection. Check for symptoms and signs of overdose after each injection (as below).
- **pain persists:** for IM administration immediately repeat injection but at a higher dose within the range; for IV administration immediately repeat same or higher dose in range. Check for symptoms and signs of overdose after each injection (as below), and the effectiveness of the analgesia.

**PCA:** Patient Controlled Analgesia allows titration of the opioid to the patient’s need with a higher degree of safety than a continuous infusion. Contact the Acute Pain Team for help with this regimen.
IV Infusion: HDU/ITU only. Infusions (morphine 1-5 mg/hour IV) should only be given where there is close supervision with adequate patient monitoring. O₂ should be administered continuously and O₂ saturation monitored. Monitor the patient closely. A subcutaneous infusion may be used in patients without IV access.

**SIDE EFFECT OF OPIOIDS**

**Nausea and Vomiting**
All patients receiving opioids should be prescribed an anti-emetic as required (prn). The incidence of nausea and vomiting is high with IV PCA morphine (57% and 38% respectively)

Patients who score three or four out of the following four risk factors should have anti-emetics prescribed regularly post-operatively. Ondansetron 4 mg IV/PO/IM is the first line agent (refer to the next section: ‘Post-operative nausea and vomiting’:

1. Female
2. History of previous post-operative nausea and vomiting
3. Having opioids post-operatively
4. Non-smoker

**Pruritus** (itching)
The incidence of pruritus with IV PCA morphine has been found to be as high as 32%. Use antihistamines such as chlorphenamine (Piriton) to alleviate these symptoms. If not effective, consider switching or stopping opioids.

**Delirium, hallucinations and nightmares**
The incidence of delirium is high, especially in elderly patients. Hallucinations and nightmares with IV PCA morphine occurs in up to 46% and is very distressing for patients. Switch or stop opioids if these occur.

**Constipation**
Prescribe laxatives when prescribing codeine, tramadol, or opioids.

**Respiratory Depression**
If the opioid causes features of overdose such as drowsiness or respiratory depression (respiratory rate of less than 8 per minute) then:

1. Stop the opioid
2. Administer oxygen by face mask
3. **For post-operative respiratory depression:**
   - Give naloxone IV 100 – 200 micrograms (1.5 – 3 micrograms/kg). If the response is inadequate, give further doses of 100 micrograms every two minutes.
4. Consider giving doxapram (1-1.5 mg/kg IV bolus, over at least 30 seconds, repeated if necessary after intervals of 1 hour). This is a respiratory stimulant and does not reverse analgesia

Both naloxone and doxapram are shorter-acting than morphine so observe the patient to ensure that the signs of overdose do not recur. If respiratory depression is suspected due to opiate depression, consult the anaesthetic team, especially if the patient is requiring post-operative pain relief.

The full hospital policy for the management of **Acute (and Chronic) Pain** is available on PIMS on the Intranet.
MANAGEMENT OF POST-OPERATIVE NAUSEA AND VOMITING
Link consultant: Dr. Bernadette Ratnayake, Pharmacist: Nita Sanghera

Risk Stratification: major risk factors
- Female
- Age <50 years
- Non-Smoker
- History of PONV and/or motion sickness
- Postoperative opiates likely
- Duration of surgery >30min & type of surgery (e.g. laparoscopic, major gynae, ENT, breast and strabismus)

Strategies for High Risk Patients:
Ensure adequate hydration
Avoid hypotension
Ensure adequate oxygenation

For Anaesthetists:
Consider regional anaesthesia or TIVA
Void nitrous oxide/volatiles
Opiate sparing multi-modal analgesia

On the wards:

<table>
<thead>
<tr>
<th>Low Risk</th>
<th>Intermediate Risk</th>
<th>High Risk</th>
</tr>
</thead>
<tbody>
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<td>2-3 factors</td>
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<td>1st PRN Ondansetron 4mg IV/PO/IM 8° 2nd PRN Cyclizine 50mg IV/IM/PO 8°</td>
<td>1st Regular Ondansetron 4mg IV/IM/PO 8° 2nd PRN Cyclizine 50 mg IV/PO/IM 8° 3rd PRN Prochlorperazine 12.5mg IM 8°</td>
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APPENDIX 1

A PRACTICAL APPROACH TO ETHICAL PROBLEMS IN CLINICAL PRACTICE

Link consultant: Dr. Lulu Kreeger

Ethical issues concerning patients are amongst the most difficult that doctors have to address. When faced with a moral dilemma, it is important to pause, think it through, and if possible talk it over with colleagues. Remember, decision making is a process that can change with time and circumstance. This should be conveyed to the patient and family, and acknowledged within the team, in order to avoid conflict.

The importance of excellent communication skills cannot be over emphasised and healthcare professionals should be aware of the power of their interactions and how these are remembered and interpreted by patients and family.

It is helpful to have a framework for your thoughts, to clarify the key points and bring out what the nature of the problem is. Two frameworks are widely used: the Jonsen Procedure and the Four Principles.

JONSEN PROCEDURE

Medical Indications:
- Have you established a diagnosis? What additional clinical information do you need? How are you going to obtain any required information? What management options do you have? What prognoses are possible (best case, worst case and likely case). How will your selection of management affect these?

Patient Preferences:

1. Is the patient competent?
   - The first step is the ‘Diagnostic test’ – does that patient have an impairment or disturbance that limits capacity?
   - This is followed by the ‘Functional test’ – is the patient able to understand, retain, believe and think over the relevant information, and choose in the light of this? He/she also needs to be able to communicate his/her decision. The Mental Capacity Act emphasises the presumption of capacity. In addition, do not take compliance with actions as evidence of competent consent.

2. If yes, what does the patient want? How can this be achieved in the light of the available management options?

3. Best interests: If no, is this a temporary state? Can treatment wait until competence returns? If not, what is in their best interests? (See section on Best Interests – the statutory checklist – below). Is there an advance decision to refuse treatment? Has anyone been identified as having a Lasting Power of Attorney for healthcare decisions? Otherwise, what do the relatives say – does this inform your view of what the patient would have wanted and therefore what is in the patient’s best interests? If you suspect a psychiatric problem, call for assistance in assessing competence. (Liaison Psychiatry Team on ext. 3509).
Quality of life:
- Will treatment add to this patient’s quality of life? In case of cardiopulmonary arrest, is this patient to be resuscitated? How can this patient’s quality of life best be improved medically?

Contextual factors:
- Are there other factors (legal, religious, cultural, dependency on carer / other support, available resources) that affect management options suitable for this patient?

FOUR PRINCIPLES

These four moral rules of thumb define which actions are morally preferable. They normally need to be balanced with each other. The law and professional guidance may constrain some of the options that may be suggested.
- **Autonomy:** Respect this patient’s ability to make decisions for him / herself and their ability to become autonomous, if they are currently not autonomous. If autonomy will never return, respect the patient’s human dignity. Sometimes, we not only have to take into account the patient’s autonomy, but also that of family and ourselves.
- **Beneficence:** Promote good. Do what you can to improve this patient’s condition.
- **Non-maleficence:** Minimise harm where possible e.g. avoid unnecessary risks, investigations, burdensome side effects, breaches of confidentiality.
- **Justice:** Keep within the law. Does it affect all interested parties fairly (principally the patient him or herself)? Is it a fair use of scarce resources? Is your judgement coloured by prejudice or personal emotions toward the patient or the proposed treatment? Does this action respect this patient’s rights? Remember justification using the “Justice” principle, may conflict with the patients own agenda.

Work through the Jonsen procedure to define your clinical options. Test these against the four principles to arrive at your decision. Where necessary, seek advice. Discuss your decisions with your colleagues in the multi-disciplinary team if possible. Do not take decisions that you are not competent or authorised to make. Do not underestimate yourself!

BEST INTERESTS – the ‘statutory checklist’

Where a patient lacks capacity to consent to treatment decisions, we need to make decisions for them based on their best interests. Best interests’ decisions go beyond purely medical best interests, with an aim to reflect what this individual would have decided. In deciding best interests, first define your treatment decision. The more serious the potential outcome of the decision for the patient, the more important it is to document the process below clearly.
- **Non-discrimination** – do not make assumptions on basis of age, sex, etc
- Consider **all relevant circumstances** e.g. pros and cons of all the treatment options. Anything done for, or on behalf of, a person without capacity should be the least restrictive option of their basic rights and freedoms
- Can the decision-making be **delayed until capacity returns**?
- **Involve the patient** as fully as possible
- Consider the person’s **past and present wishes and feelings** (e.g. advance decisions to refuse treatment) and **beliefs and values** likely to bear on the decision (e.g. cultural and religious)
- **Consult** wherever ‘practicable and appropriate’ with:
  - Anyone previously named as someone to be consulted
• Carers, close relatives or friends or anyone else interested in the patient’s welfare
• Any attorney appointed under a lasting Power of Attorney (LPA)
• Any deputy appointed by the Court of Protection
• Any Independent Mental Capacity Advocate (IMCA). An IMCA is appointed if the patient is ‘unbefriended’ and the decision is for serious medical treatment or long term change of accommodation (an IMCA can be accessed through the hospital PALS department).

Common Dilemmas
• Confidentiality – See GMC 2017 guidance
• Consent – See GMC consent guidance, also the Department of Health guidelines on consent: DOH guidelines for consent for examination or treatment
• BMA Consent Toolkit- search on the BMA website (www.bma.org.uk), DoH 12 Key points on consent. The Kingston Hospital consent forms also help to guide you in this process.
• Patients who lack capacity – See Mental Capacity Act 2005 (MCA).
• Children – See BMA Consent, rights and choices in health care for children and young people.

Useful resources
• Your seniors, peers and fellow professionals
• Trust legal and clinical risk team (via Switchboard).
• Your defence or protection society. Helpful advice on the law is available in the MDU series of booklets.
• The BMA Ethics Support line
• The General Medical Council (important professional guidelines are summarised in the GMC booklets “Duties of a doctor”)
• The British Medical Association (contact numbers and guidelines)
APPENDIX 2

ENTERAL/PARENTERAL FEEDING

Link consultants: Dr. Markus Gess/Dr. May-Lay See
Nutrition team: Adam Mead, Parenteral Nutrition Dietician, bleep 475
Roshni Thoppil, Parenteral Nutrition Pharmacist, bleep 291
Annmarie Nunwa, Nutrition Nurse Specialist

Management guidelines for patients receiving Parenteral Nutrition are on PIMS.

Malnutrition – overt or covert – delays recovery and increases the risk of clinical complications. Any patient identified as being malnourished or at risk of becoming so, by virtue of disease or complications, should be referred to the ward dietician. Oral or enteral feeding are the preferred choices of nutritional support. Parenteral nutrition (PN) is available if the gut is not accessible but can often be avoided by careful planning. There are a wide range of enteral feeds and methods of gaining access to the gastrointestinal tract which can be used in most clinical states. Oral or tube feeding is superior to PN in maintaining gut function and reducing complications and costs. There is no minimum length of time for the duration of PN.

- To refer a patient for PN, or to discuss a patient’s possible need for this therapy, contact the Nutrition Team on bleep 475 or 291. The team undertakes clinical and nutritional assessments of all patients receiving or referred for PN every weekday morning, starting at 9 a.m. in ITU.
- The team will visit patients referred after 9.30 a.m. on the following morning, although it may be possible to make an initial assessment on the day of referral.
- On a Friday, referrals must be received by 9.30 a.m. for PN to commence over the weekend. Parenteral nutrition cannot be ordered after this time.
- The Pharmacy department places the PN order with an off-site manufacturing unit by 10 a.m., Monday to Friday and daily biochemical results must be available by then. Mark the request on CRS as ‘URGENT TPN’.
- Malnutrition is the culmination of a gradual process and is not considered an ‘emergency’. PN commenced out of normal working hours may increase the risks of complications, including sepsis and metabolic disturbances; PN is therefore not available out of hours or at weekends.
- All patients receiving PN have a summary of the guidelines, including those for problem solving, together with the Care Pathway, in a blue folder by the bedside.
- Please consult the PN formulation recorded in the Pathway before prescribing additional intravenous fluids.
- Guidelines for Adult Enteral Feeding are also available on the intranet, on the Patient Information Management System (PIMS)
APPENDIX 3

SMOKING CESSATION AND HEALTH PROMOTION
Link: Ellie Knight
Link pharmacist: Gill Eyers

SMOKERS – Withdrawal management

- **ASK** – about whether the patient has thought about/is willing to stop smoking in hospital or on discharge
- **ADVISE** - if the patient is not willing to stop, raise awareness of the risks of smoking, let him/her know that treatment and support is available should he/she change his/her mind, remind the patient of the hospital smoke-free policy. If willing to stop, assess risk of NRT and prescribe it as appropriate
- **ACT** – prescribe NRT (see risk assessment and advice, below) and refer for post-discharge support.

Nicotine Withdrawal:
Smokers may be offered Nicotine Replacement Therapy (NRT) for either temporary or permanent abstinence. Full guidelines on the intranet/PIMS:
[KHFT Adult Nicotine Withdrawal Guidelines 2015](#)

**Use NRT with caution in the following (check with consultant or pharmacist):**
Recent cardiac event/unstable cardiac condition Diabetes mellitus
Hyperthyroidism Peripheral vascular disease
Hypertension Ischaemic heart disease
Renal or hepatic impairment History of peptic ulcer
Pregnancy or breast feeding

**Dose:**
- High dependency (>10 cigarettes/day and/or within 30 minutes of waking) - 21 mg patch over 24 hours. If inadequate, use a combination of patch and inhalator. If allergic to plasters, use inhalator 15 mg prn (maximum daily dose 6 cartridges). If the 24 hour patch causes insomnia, change to either the 25 mg patch over 16 hours, or take off the 24 hour patch at night (and dispose of it)
- Lower dependency - 15 mg patch over 16 hours or inhalator 15 mg prn (maximum daily dose 6 cartridges)

<table>
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<tr>
<th>Patch 16 hour</th>
<th>Nicorette Invisi 25 mg / 15 mg / 10 mg over 16 hours</th>
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</thead>
<tbody>
<tr>
<td>Patch 24 hour</td>
<td>Niquitin CQ 21mg / 14 mg / 7 mg over 24 hours</td>
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</table>

**Post-discharge support** Refer smokers for cessation support after their discharge from hospital. Complete and send the Health Promotion Referral form (found in the ‘Forms’ tab of the intranet home page) [KHFT Health Promotion Referral Form.doc](#)

**EXERCISE, ALCOHOL, AND WEIGHT MANAGEMENT**
Refer patients to programmes in the community for help with alcohol, exercise and/or weight management using the form available on the intranet (‘Forms’ – ‘Health promotion referral form’) [KHFT Health Promotion Referral Form.doc](#)
APPENDIX 4

FIRST STEPS IN THE EVENT OF A MAJOR INCIDENT
Link consultant: Dr Chooi Lee

Kingston Hospital is one of a series of pre-selected hospitals, which must be ready, at any time, to cope with a major incident whether the casualties are victims of an accident, hostile act or natural disaster. When a major incident has been declared, specified members of staff will be immediately contacted by bleep or air-call pager.

The Major Incident Plan 2016 and the Summary Information for Staff can be found on the intranet Patient Information Management Service (PIMS). Enter ‘Major Incident’ into the search box. There will be a set of instructions (‘Action cards’) for each staff group. Follow the instructions on the action card that is relevant to your staff group.
## BLEEP & TELEPHONE NUMBERS

### F1 Medicine
- **Dr. Bazari/O’Connor**: 405
- **Dr. Bazari/O’Connor**: 425
- **Dr. Gess**: 430
- **Dr. See**: 436
- **Dr. Hogh/Nockels**: 419
- **Dr. G-Larrainzar/Morrison**: 410/462
- **Dr. Kumar/O’Mahoney**: 468
- **Dr. Gerry**: 466/460

### F2/STs Medicine
- **Dr. Bazari/O’Connor**: 403
- **Dr. Bazari/O’Connor**: 423
- **Dr. Culling**: 415
- **Dr. Vasudeva**: 411
- **Dr. Gess**: 431
- **Dr. See**: 434
- **Dr. Hogh/Nockels**: 416
- **Dr. G-Larrainzar/Morrison**: 464
- **Dr. Kumar/O’Mahoney**: 470
- **Dr. Gerry**: 465
- **Haematology**: 542

### SpRs Medicine
- **Dr. Bazari/Holden**: 402
- **Dr. Chinegwundoh/O’Connor**: 422
- **Dr. Culling**: 412
- **Dr. Vasudeva**: 413
- **Dr. Gess**: 433
- **Dr. See**: 432
- **Dr. Hogh/Nockels**: 414
- **Dr. Kumar/O’Mahoney**: 463
- **Dr. Gerry**: 469
- **Dr. G-Larrainzar/Morrison**: 406
- **Rheumatology**: 406
- **Endocrinology**: 424
- **Dermatology**: 060
- **Acute Medicine**: 427

### F1 Surgery
- **Mr. Deguara/Willson**: 900/960/953
- **Mr. Jarrett**: 951
- **Mr. Bloom**: 990
- **Mr. Fawcett**: 930
- **Urology consultants**: 950/933/944

### F2/STs Surgery
- **Bloom/Fawcett**: 921
- **Deguara/Willson**: 932/912
- **Cummins/Davies**: 952
- **Ray/Jones**: 931

### SPRs Surgery
- **Bloom/Fawcett**: 904/942/940
- **Deguara/Willson**: 924/902
- **Cummins/Davies**: 901
- **Ray/Jones**: 925/941

### F1 Orthopaedics/Orthogeriatrics
- 601/602/603/628

### F2/STs Orthopaedics
- **Mr. Middleton**: 620
- **Mr. Ramesh**: 608
- **Mr. Railton**: 622
- **Mr. Davey/Curtis**: 613
- **Mr. Proctor**: 614
- **Mr. Ward**: 617
- **Mr. Curtis/Heilpern**: 605
- **Mr. Hampton**: 611

### Others
- **Advanced Site Practitioner**: 504
- **Infection control sister**: 667
- **Advanced Nurse Practitioner**: 654
- **Outreach Team**: 868/869
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