



GUIDELINES FOR THE MANAGEMENT OF COMMON MEDICAL EMERGENCIES AND FOR THE USE OF ANTIMICROBIAL DRUGS

August 2010 - 19th Edition

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GENERAL POINTS

- The doses given in these guidelines are for adults unless otherwise stated.
- If the patient is pregnant, discuss management with the duty obstetric registrar as soon as time permits.
- A patient admitted as a medical emergency who has been a medical in-patient in the last year should, in general, be returned on the next working day to the care of the consultant of the previous admission.
- If the patient is currently attending other medical outpatients, the relevant consultant should be informed.
- When medical problems arise the arrangements for seeking advice are as follows. During the working day, or when on in-take, 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 intaking registrar/senior registrar and then to the patient's own consultant. If the patient's consultant cannot be contacted, refer next to his or her registrar/senior registrar and finally to the in-taking consultant.
- Please ensure that **all** entries in patient's notes are written, dated and countersigned legibly and that the results of investigations are filed promptly and correctly.

ALLERGY OR REACTION?

You should be aware that a patient can be wearing an arm band or their notes can be marked indicating that they are allergic to a substance when in fact they only have an adverse reaction to that substance. In the case of a reaction, it can be better to give the substance and treat the reaction, if the patient's condition requires a particular treatment.

Advice on this can be sought from the Registrars/Consultants.

GUIDELINES FOR THE MANAGEMENT OF COMMON MEDICAL EMERGENCIES AND FOR THE USE OF ANTIMICROBIAL DRUGS

The aim of these notes is to advise junior staff on how to deal with some common medical emergencies and problems of medical management.

Please send any comments, reviews and / or suggestions
to:

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ACUTE CORONARY SYNDROMES (ACS)

- Patients presenting with Acute Coronary Syndrome
- ST elevation myocardial infarction (STEMI),
- Acute myocardial infarction without ST elevation (Non STEMI)
- Unstable angina.

Patients arriving in the Accident and Emergency Department with suspected ACS must be assessed immediately by a member of nursing staff and medical staff. An ECG must be recorded immediately and intravenous access achieved. If uncertain about a patient's suitability for thrombolysis arrange a review by the chest pain assessment nurse (call CCU 5121) or urgent senior review.

Patient presenting with symptoms of CARDIAC SOUNDING CHEST PAIN

12 lead ECG within 5 mins O₂ 300mg. aspirin SL GTN
 Cannulate Analgesia – IV dia/morphine
 ACS blood screen Random Blood glucose

CONTACT CHEST PAIN ASSESSMENT NURSE FOR REVIEW (CCU 5121 or bleep 343)

ST↑/ NEW LBBB – STEMI

- Clopidogrel 300mg (<80yrs)
- Thrombolyse in A&E/CCU
- If >3hrs from pain onset consider Tnf for primary PCI
- Consider IV Beta blocker if HR/BP ↑
- Admit to CCU
- If BG > 11 mmol/l commence IV sliding scale insulin regime
- CXR
- MINAP form

ST/T ↓- NSTEMI/ Unstable angina

- Clopidogrel 300mg (consider risk/CI in very elderly)
- LMWH – enoxaparin
- Admit to MAU/Pet/Charlton/CCU
- Consider IV nitrates
- ECG if more pain
- If BG > 11 mmol/l commence IV sliding scale insulin regime
- CXR
- MINAP form

Normal ECG

- Risk assessment
- Admit to MAU
- ECG at 1 hr & if more pain
- LMWH - enoxaparin

• ECG 90 mins post thrombolysis
 • ST segments down >50% and patient pain free

Yes

No

• Continue care as ICP

• D/W cardiology team
 • ? Rescue PCI

• Repeat ECG at 12hrs
 • Risk assessment at 12 hours post onset of symptoms
 • Troponin measurement

High risk
ECG change or trop ↑

Low risk
No ECG change or trop rise

• Repeat ECG at 24hrs
 • clopidogrel
 • enoxaparin >= 48hrs
 • Beta blockade
 • Refer to Cardiology Team
 • In-patient Angio

• Mobilise
 • ETT
 • Consider other causes for chest pain
 • Discharge

Definitions: **STEMI** – ST ↑ > 1 mm or in two contiguous leads or new LBBB
 NSTEMI – ST ↓ / T wave ↓ - Troponin +ve
 Unstable angina ST ↓ / T wave ↓, or normal ECG with high risk, Troponin -ve

ACUTE ST ELEVATION MYOCARDIAL INFARCTION (STEMI)

ALL patients >3 hours must be considered for transfer for primary PCI – contact Southampton.

Indications for Thrombolysis - All patients with acute myocardial infarction presenting up to 12 hours from onset of symptoms with appropriate ECG change. Serial ECGs should be recorded in cases of doubt. Some patients with intermittent symptoms may require thrombolysis up to 24 hours from onset of first symptoms.

Thrombolysis is normally administered in CCU (or A&E) in order to achieve target door to needle time of 30mins.

Some patients will be admitted directly to CCU having received out of hospital thrombolysis.

Qualifying ECG change:

1. ST segment elevation, at least 1mm in 2 or more contiguous leads.
2. LBBB (new or presumably new)

Record “posterior leads” in presence of ST segment depression in anterior leads V1-V3 where there is no sign of ST segment elevation on the standard ECG.

Do not thrombolyse patients with normal ECGs or those with ST segment depression alone.

Thrombolytic agents

Streptokinase (SK) 1.5 Mega Units in 100ml of saline over 60 minutes - for inferior MI only + anterior MI patients over 75 years old.

Tenecteplase (TNK); Single bolus injection depending on patient’s weight. – Dosing:

Patients body Weight (kg)	TNK dose in units	TNK dose in mg
<60kg	6,000	30
60-<70kg	7,000	35
70-<80kg	8,000	40
80-<90kg	9,000	45
90kg	10,000	50

5000units heparin bolus pre-TNK, then give IV Heparin infusion for 6 hours followed by enoxaparin 1mg/1kg BD s/c 48 hours

1. Patients (<75 yrs) with anterior myocardial infarction presenting within 12 hours of onset of pain.
2. Patients who have ever received streptokinase.
3. Patients with good history for allergic reaction to streptokinase or recent streptococcal infection.
4. Or profound hypotension B/P <90 mmHg systolic on admission.

Contraindications to Thrombolysis:

- Previous subarachnoid haemorrhage or CVA in past year.
- Known bleeding disorder.
- Surgery, major trauma or head injury within past month.
- Known or suspected active peptic ulceration (a history now quiescent is not a contraindication).
- Possible dissection of the aorta.
- Abdominal aneurysm or other potential source of clot e.g. enlarged fibrillating atrium.
- Prolonged traumatic chest compression.
- Possible pregnancy.
- Anticoagulant therapy. INR >3 or lower if elderly
- Hypertension; Systolic BP > 180mmHg. Diastolic >100mmHg
- Recently inserted central venous or arterial line. NB recent arteriography.

Few of these contraindications are absolute - the potential benefit/risk should be assessed in each case and these guidelines interpreted accordingly.

TREATMENT OF ACUTE MYOCARDIAL INFARCTION

Important Points:

- Management of suspected myocardial infarction involves EMERGENCY assessment and treatment. Delay increases mortality and both short and long-term morbidity.
- Triage is the key to prompt administration of thrombolysis. This involves nursing staff in A & E/CCU, acute medical team and casualty officers. If a member of the medical team is not available to see patient with chest pain immediately, the patient should be seen by the casualty officer/ Chest Pain nurse CCU.

Common Problems:

1. Hypertension that might delay thrombolysis often responds to pain relief. If ineffective use I.V. nitrate or beta-blocker
2. Transient hypotension occurring during streptokinase infusion often resolves on pausing the infusion +/- fluid administration (especially in inferior infarction). Aim to restart the infusion at a 50% normal rate. Persistent hypotension (BP<90) requires urgent assessment (see Cardiac Failure)
3. Diabetes. Blood sugar >11 mmol/l patients should be started on insulin sliding scale. (Stop oral hypoglycaemics)
4. Recurrent pain is common. Try to assess if angina or pericarditic. If angina try GTN first but if not successful consider I.V. nitrates.
5. If patient requires central venous access use femoral route if thrombolytic given.

6. Tachyarrhythmias - commonest are VT and VF, and atrial fibrillation/flutter.

Pulseless VT/VF requires immediate CPR and defibrillation ASAP.

For VT - Treatment will depend on whether patient haemodynamically compromised or stable.

If compromised the patient may require urgent cardioversion as in tachycardia algorithm on page 10. Followed by amiodarone 300mg over 20 - 60 minutes (into a large antecubital vein) and then continuous infusion - this must be given via a central line.

If Stable VT - amiodarone 300mg over 1 hour should be given followed by continuous infusion. Any patient with VT should have potassium and magnesium checked and both given if found to be below normal range.

Atrial fibrillation/flutter - if patient compromised with adverse signs may need urgent cardioversion. (Must be anticoagulated) If stable should be given amiodarone 300mg over 60 minutes, or beta blocker. Digoxin should not be used in the post infarct patient because of its positive inotropic effects.

7. Bradyarrhythmias- common in Inferior MI

Sinus bradycardia 1st degree AV block, plus 2nd degree type I (Wenckebach) do not usually require emergency treatment if asymptomatic.

If symptomatic give atropine 500mcg IV (up to 3mg) in repeated dosages. If persistent bradycardic, temporary pacing should be undertaken.

2nd degree AV block Mobitz type II, and complete heart block are common in inferior MI, if asymptomatic require close monitoring but no pacing (thrombolysis plus restoration of perfusion will usually resolve AV block) If symptomatic however temporary pacing will be required. Complete AV block in Anterior MI however should always be temporarily paced regardless of absence or presence of symptoms.

8. Heart Failure-Post Infarction

Almost all patients with myocardial infarction have a transient elevation of central venous pressure, which will persist for up to 3-4 days. This probably reflects veno-constriction and is not a reliable guide to cardiac function. A raised central venous pressure in the first day or so should not, by itself, be taken as an indication for diuretics.

Radiological changes of pulmonary venous congestion and a few basal crepitations are common after myocardial infarction.

Diuretics

The use of diuretics is not indicated unless there is clear evidence of pulmonary oedema in symptomatic patients. Intravenous infusion of glyceryl trinitrate may be used in an attempt to limit infarct size and such treatment results in a fall in pulmonary venous pressure.

Indications for invasive haemodynamic monitoring

In patients who become hypotensive or who develop evidence of pulmonary oedema and hypoxaemia not responding to diuretics and oxygen therapy, and in those patients with more severe mechanical problems such as acute mitral incompetence or ventricular septal defect, it is essential to monitor the patient's progress carefully by the insertion of an arterial line for continuous measurement of arterial pressure. In these patients a urinary catheter to provide accurate measurement of urinary output is also generally recommended. In such patients with more serious haemodynamic deterioration, inotropic support may be necessary to improve cardiac output and lower pulmonary venous pressure. In this situation dobutamine infusion should be instituted. If the patient is haemodynamically stable and urinary output low, small doses of dopamine may result in a satisfactory diuresis.

Patients developing a mechanical complication of myocardial infarction (e.g. VSD or acute severe MR) need urgent assessment and consideration of referral to a surgical centre, as mortality is high with medical treatment alone.

Rehabilitation

Inform heart failure nurse of heart failure admissions –Extension 5103.

9. Failed Thrombolysis

Patients failing to respond to thrombolysis should be reviewed by a senior member of the team. For recurrent pain with ST elevation or failed resolution of ST elevation <50% at 90 mins transfer for PCI. Patients who are candidates for urgent transfer should be discussed with a tertiary centre for possible rescue angioplasty.

NON-STEMI AND UNSTABLE ANGINA

These patients do not benefit from thrombolysis. They should receive pain relief and oxygen as for STEMI. Standard treatment would include Aspirin, low molecular weight heparin, beta blocker and clopidogrel.

Patients with a diagnosis of Non STEMI or unstable angina should normally receive at least 48hrs of enoxaparin (Clexane®). Enoxaparin (Clexane®) should normally be discontinued if patient has been pain free for 48 hours.

Patients who show high risk features e.g. dynamic ECG changes with pain, elevated troponin, heart failure, should be considered for in patient angiography and intervention and must be discussed with the cardiology team.

All confirmed acute coronary syndrome patients should normally be on MAU, CCU, Petworth or Charlton.

Subsequent Management of all ACS Patients

Anticoagulation No routine use of heparin in MI **except:**

- a. In large Q wave anterior MI
- b. MI with atrial fibrillation
- c. Following TNK.
- d. Recurrent angina

Where treatment is required, start 6hrs after SK at 24,000u/24hr. After TNK, start IV heparin immediately.

Enoxaparin (Clexane®) 1mg/kg bd should replace IV. heparin after 6 hours.

Warfarin for large anterior infarcts. The duration for warfarin therapy is reviewed at 3 months. Patients with persisting AF will also require warfarin.

Prophylactic tinzaparin should be used in all patients until they are mobilised

IV nitrates	Not used routinely for patients with MI. Use for continuing pain or heart failure. Start glyceryl trinitrate 50mg to 50ml NaCl 0.9% at a rate of 0.6ml/hour increasing to 15ml/hour if necessary. Stop if systolic BP < 90mmHg, especially in inferior infarcts.
Antiplatelet agents	Continue aspirin 75mg od long term Continue clopidogrel 75mg od for 12 months for NSTEMI or 4 weeks for STEMI
Beta-Blockers	Start atenolol 25-50mg OD (or metoprolol 12.5-50mg B.D.) within 48hrs post MI in all patients except those with continuing heart failure and those with other contraindications. Routine use for at least 12 months.
Ace-Inhibitors	Use in patients with myocardial infarction starting 24hrs post. Remember to up titrate doses and do not send patients home on 'test doses'.
Hyperglycaemia	Start SRH DIGAMI (Diabetes and Insulin Glucose Infusion in Acute Myocardial Infarction) Please see separate document available on CCU.

Troponin, Cardiac Enzymes and Acute Coronary Syndromes

Patients with STEMI should always be considered for treatment with thrombolysis and measurement of a troponin level is not needed beforehand.

In patients presenting with symptoms consistent with unstable angina, a negative troponin does not mean that the patient is safe to discharge and this is not an appropriate indication for requesting an urgent troponin.

All patients presenting with symptoms consistent with Myocardial Infarction and positive troponin will be classified as Non- STEMI.

In addition not all patients with a raised troponin level have suffered a myocardial infarction. Arrhythmias, hypotension, pericarditis and pulmonary embolism are also associated with troponin elevation. If there is doubt about the diagnosis arrange senior review. Troponin should be measured 12 hours post symptom onset only.

Lipids	Should be measured within 24hrs of admission. Reinforce dietary advice. Start Statin in all patients with confirmed coronary artery disease (e.g. simvastatin 40mg, caution with warfarin, temporarily stop if on macrolide antibiotic).
Exercise	A pre-discharge exercise test may be considered for selected patients, but not routinely.
Tests	Patients with enzyme, ECG and Echocardiogram evidence of completed infarction will have an exercise test 6 weeks post discharge.
Coronary Angiography	Coronary angiography should be considered for all patients presenting with a NSTEMI as an inpatient transfer (Southampton or Brighton). The need for invasive investigation of patients with a STEMI should be assessed depending upon symptomatic state and evidence of provokable ischaemia.
Cardiac Rehabilitation	Members of Cardiac Rehab. Team should see the patient within 48 hours of admission. Rehabilitation should start on admission with reassurance and explanation to allay anxiety. Patients should be offered leaflets describing their progress their during hospital stay, and an invitation to join the rehabilitation programme available in Chichester and Bognor. Patients should also be given risk factor monitoring cards.

Discharge Discussion about discharge should start as soon as the patient is free of complications; this is helpful for morale. **Patients with ST elevation myocardial infarction without complications should be discharged from hospital on the 5th day.**
Ensure that the patient, nurses and doctors are clear about the final diagnosis e.g. MI or UAP.

Later discharge is needed for patients with significant LV failure, late arrhythmias, serious conduction disturbances, and recurrent ischaemic pain. For those living alone a social worker should be involved as early as possible.

Discharge ECG **All patients with coronary artery disease should be given a copy of their most recent ECG to take home.** This will be undertaken by the cardiac technician if an 'ECG x 3' request is made on the appropriate cardiology form. One copy of the ECG will be filed in the notes, one copy in an alphabetical file in Charlton Ward and the third copy to be given to the patient.

On discharge, the patient should have:

1. Discharge ECG.
2. Discharge letter for GP.
3. OPD appointment.
4. Cardiac rehabilitation appointment.
5. Card with thrombolysis details
6. One month's supply of drugs **including GTN**
7. Cardiac rehabilitation card

Daily ward rounds are carried out by Dr Reid, Dr Murphy or Dr Wong on the coronary care unit with the junior medical staff at 8.15. Cardiology patients will be under the care of the Cardiology teams and discussion on immediate and later management of these patients is undertaken on these rounds. It is important that the F1 doctors with patients on CCU and members of the on-take teams are present to present and discuss their patients. It is welcomed that junior Medical Staff attend the CCU ward rounds if possible for educational purposes.

Ensure that all investigations are requested on your patients at or before the CCU ward round. Also ensure that the results are reviewed by 2.00 p.m. the same day. A 5.00 p.m. ward round on the CCU will be carried out by the cardiac registrar.

DISORDERS OF CARDIAC RHYTHM

Bradyarrhythmia

The most important factor influencing treatment is the presence or absence of symptoms. See algorithm on next page.

a) Sinus Bradycardia.

Asymptomatic - no treatment.

Symptomatic - give atropine 500mcg IV (recurrent dosage to 3mg may be attempted). If the bradycardia is persistent or recurrent, temporary cardiac pacing should be undertaken. The underlying cause should be determined and treated and any responsible medications stopped.

b) Atrioventricular Block.

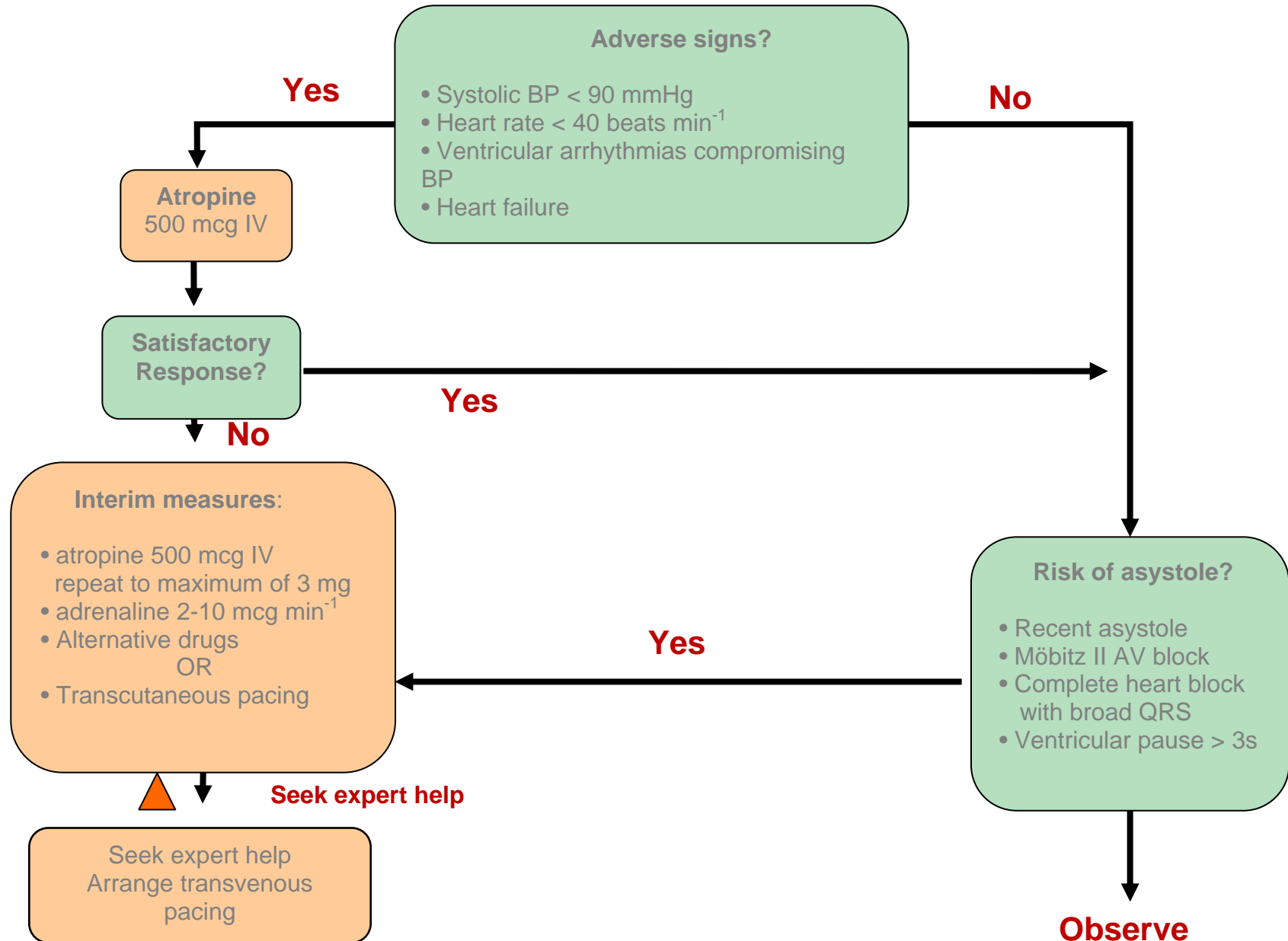
First and second degree AV block found incidentally do not usually require emergency treatment - may require further investigation.

Mobitz type II and CHB **if symptomatic** will require temporary pacing until the underlying cause is determined and/or permanent pacemaker implanted. Treatment such as isoprenaline infusion or external pacing may be required.

Patients presenting with asymptomatic persistent complete AV block will require permanent pacing as a planned procedure.

BRADYCARDIA ALGORITHM

(includes rates inappropriately slow for haemodynamic state)



Bradyarrhythmias



1st Degree Heart block



2nd Degree heart block – Mobitz type I - Wenckebach



2nd Degree Heart block – Mobitz type II – 2:1



3rd Degree / complete heart block

TACHYARRHYTHMIA

The presence or absence of adverse signs will determine treatment pathway.
See algorithm on next page.

a) Supraventricular Tachycardia.

The commonest types are:

- a. atrial fibrillation
- b. atrial flutter and atrial tachycardia
- c. junctional tachycardia.

Diagnosis: from 12 lead ECG. May be acute paroxysmal or chronic tachycardia.

Treatment: Acute AF – IV amiodarone 300mg through large arm vein, may use Betablocker or diltiazem if patient not compromised to control ventricular rate.

Do not use IV adenosine in AF or atrial Flutter if known (See AF Guideline)

Acute SVT –

- Use of vagal manoeuvres / carotid sinus massage
- Adenosine (6-12mg IV) -- Avoid adenosine in Asthma
- Adenosine may cardiovert those with accessory pathway such as in Wolff Parkinson White syndrome
- Beta blocker (e.g. atenolol, metoprolol)
- Flecainide - in patients with structurally normal hearts and no coronary or conduction disease.
- Drug treatment is not appropriate if patient is markedly hypotensive (BP less than 90mmHg) or poor perfusion. In these circumstances DC cardioversion (under sedation) is treatment of choice.

Chronic AF (to control ventricular rate - use beta blocker, calcium-channel blocker, digoxin).

SVT prevention sotalolol 40-80mg bd. In resistant cases use amiodarone (Avoid flecainide in ischaemic heart disease).

b) Ventricular Tachycardia.

This is a common arrhythmia in ischaemia or acute myocardial infarction. It may present with few or no symptoms (haemodynamically stable tachycardia) or lead to profound collapse or arrest (haemodynamically unstable tachycardia). **Do not be misled into thinking that stability excludes a diagnosis of VT!**

Features of VT:

- a. >3 ventricular complexes @ rate 150, or >5 @rate 120, Broad QRS complexes (more than 0.14 seconds)
- b. Indeterminate axis (or extreme left/right axis deviation)
- c. AV dissociation with capture and/or fusion beats.

Treatment:

Determine that patient has a pulse present – if not proceed to immediate CPR and defibrillation. If pulse present assess for adverse signs (as in algorithm). If adverse signs present and patient peri-arrest proceed immediately to DC cardioversion.

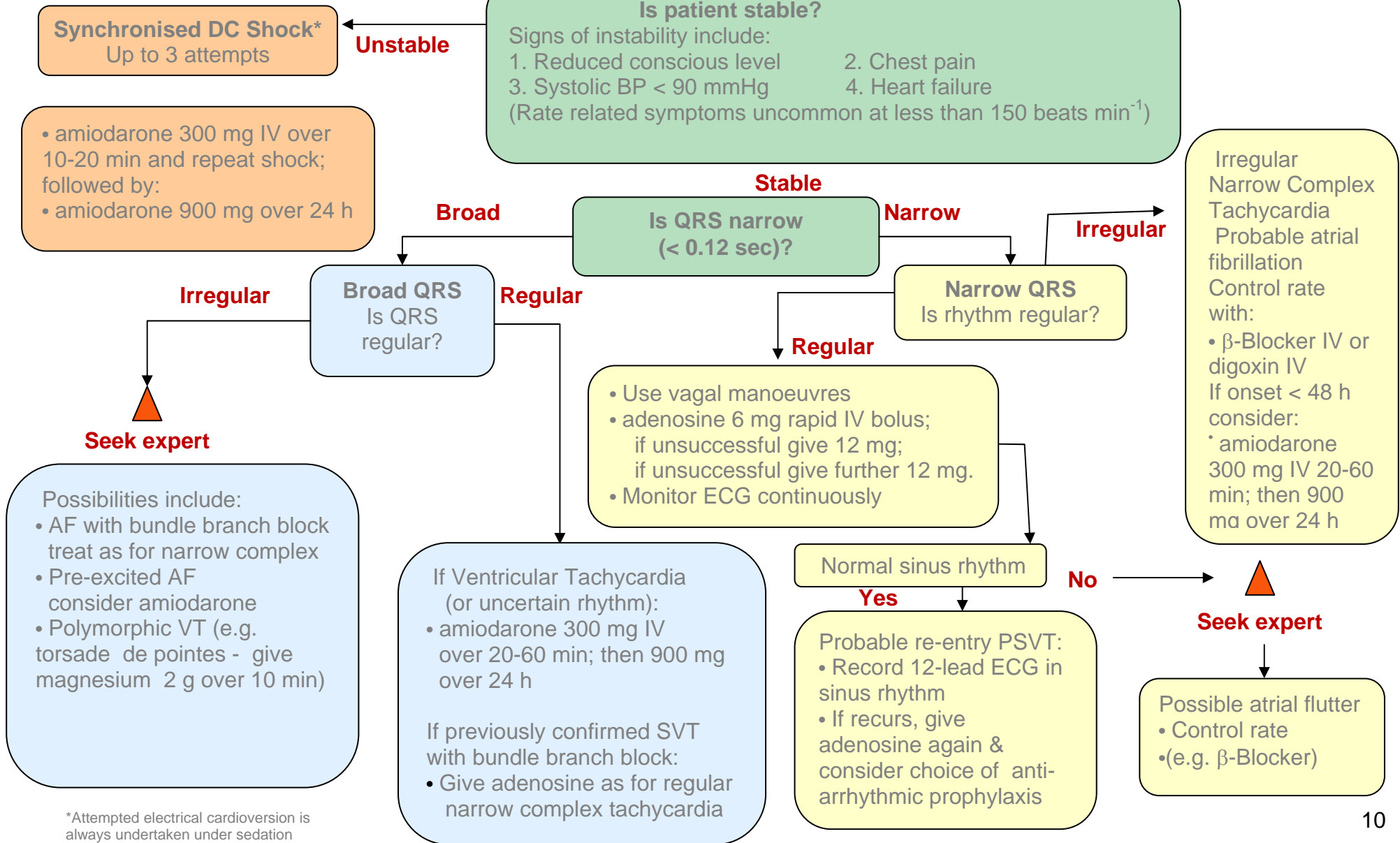
Stable patient treatment-amiodarone 300mg IV bolus via antecubital vein or centrally over 30 mins – 1 hour. Continue central or oral loading. Ensure normokalaemia between 4-5mmol/l

Alternative drug treatment: procainamide.

Polymorphic VT- in patients with long QT on normal ECG, may require temporary pacing and/ or isoprenaline infusion – discuss with cardiologist urgently. Further cardiological assessment is mandatory in all cases of VT not associated with acute ischaemia or infarction.

Tachycardia Algorithm (with pulse)

- Support ABCs: give oxygen; cannulate a vein
- Monitor ECG, BP, SpO₂
- Record 12-lead if possible, if not record rhythm strip
- Identify and treat reversible causes (e.g. electrolyte abnormalities)



Synchronised DC Shock*
Up to 3 attempts

- amiodarone 300 mg IV over 10-20 min and repeat shock; followed by:
- amiodarone 900 mg over 24 h

Is patient stable?
Signs of instability include:
1. Reduced conscious level 2. Chest pain
3. Systolic BP < 90 mmHg 4. Heart failure
(Rate related symptoms uncommon at less than 150 beats min⁻¹)

Is QRS narrow (< 0.12 sec)?

Broad QRS
Is QRS regular?

Narrow QRS
Is rhythm regular?

Irregular Narrow Complex Tachycardia
Probable atrial fibrillation
Control rate with:
• β-Blocker IV or digoxin IV
If onset < 48 h consider:
• amiodarone 300 mg IV 20-60 min; then 900 mg over 24 h

Seek expert

Possibilities include:
• AF with bundle branch block treat as for narrow complex
• Pre-excited AF consider amiodarone
• Polymorphic VT (e.g. torsade de pointes - give magnesium 2 g over 10 min)

Regular

If Ventricular Tachycardia (or uncertain rhythm):
• amiodarone 300 mg IV over 20-60 min; then 900 mg over 24 h

If previously confirmed SVT with bundle branch block:
• Give adenosine as for regular narrow complex tachycardia

- Use vagal manoeuvres
- adenosine 6 mg rapid IV bolus; if unsuccessful give 12 mg; if unsuccessful give further 12 mg.
- Monitor ECG continuously

Normal sinus rhythm

Yes

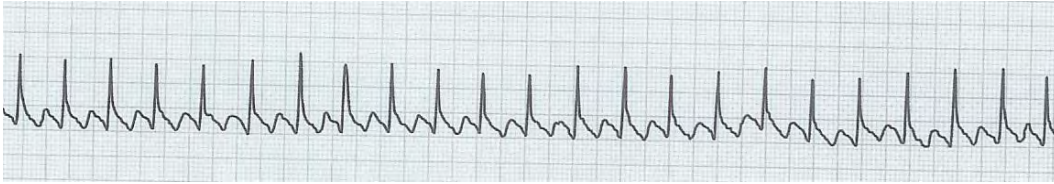
Probable re-entry PSVT:
• Record 12-lead ECG in sinus rhythm
• If recurs, give adenosine again & consider choice of anti-arrhythmic prophylaxis

Seek expert

Possible atrial flutter
• Control rate
• (e.g. β-Blocker)

*Attempted electrical cardioversion is always undertaken under sedation or general anaesthesia

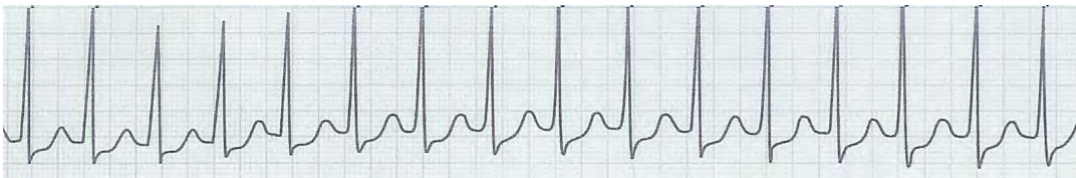
Tachyarrhythmias



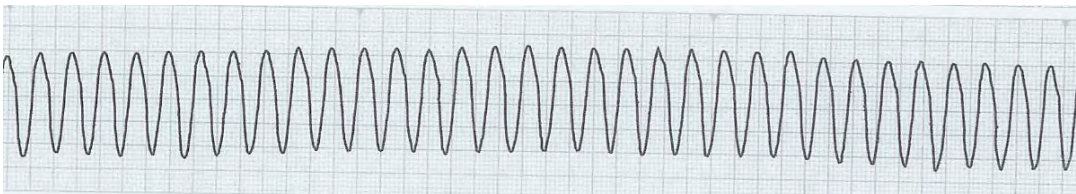
Atrial Flutter 2:1 conduction



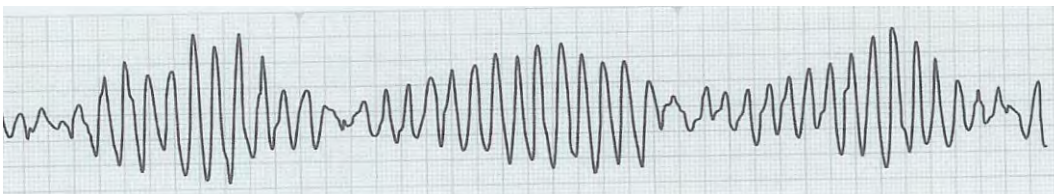
Atrial Fibrillation



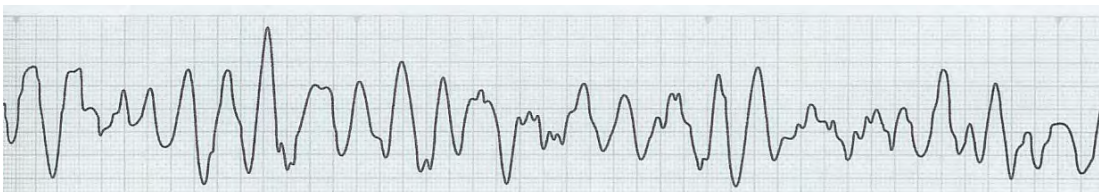
Supra ventricular tachycardia



Ventricular tachycardia



Polymorphic /torsades VT



Ventricular fibrillation

CARDIAC PACING

Temporary Pacing

Temporary cardiac pacing is performed in the 'pacing room' on CCU.

The x-ray screening can be performed by one of the medical team providing one member of the team has completed a 'Radiation Core of Knowledge' course. Otherwise a radiographer must be present.

Use full aseptic precautions for temporary wire insertion. All patients should have an x-ray following the procedure.

Check temporary wire threshold daily. If sepsis develops check blood cultures, remove infected system and insert new temporary wire if still required.

Permanent pacemaker implantation and follow-up

Please inform the Cardiac team and Cardiac Department as soon as possible, about patients for permanent pacing whom are on the wards. This enables us to plan the number of outpatients to bring in.

Pre-pacemaker check

- 1) Patient consented.
- 2) Green venflon in contralateral arm.
- 3) 1g I.V. flucloxacillin premedication. (if penicillin allergic use teicoplanin 400mg)
- 4) Shaved and cleaned skin over implant area.

Post pacemaker check

- 1) Wound (if haematoma develops check if anticoagulants may be responsible and apply firm pressure dressing).
- 2) Temperature.
- 3) Chest X-ray.
- 4) Pacemaker function check – next day.
- 5) Review medications (these may require altering).

If a patient has a suspected pacing fault, please contact Cardiac Department and we will arrange to see them as soon as possible.

CARDIAC DEPT - EXT 3531

LOCATED ON FIRST FLOOR OF OUTPATIENTS

We undertake the following investigations:

ECG's

Ward ECG's are undertaken in the mornings.

A technician will collect the requests from a box on each ward every morning and record the ECG. With the exception of Petworth and Ashling where a Monday, Wednesday and Friday service operates.

If a patient needs an ECG urgently and the technician has already left the ward, you can bleep them on 117 and if they are still out on the wards they will return. If not, then ring the department and if the patient is mobile then they can come up in a chair.

Exercise ECG's

Please specify on the request form the type of test required.

Modified tests are usually performed on younger patient's post-MI and prior to discharge. All suitable patients should have a 6-week post-MI full exercise test in order for them to participate on the Cardiac Rehabilitation Exercise Programme.

The cardiac technicians routinely supervise exercise tests but there must be a doctor in attendance in "high risk" cases.

24 Hour ECG recordings

We have 6 recorders, which go out three times a week. Because of pressure on outpatient investigations we do not provide 24-hour ECG recordings for inpatients. If this is required patients can be transferred to Charlton ward for telemetry.

Echoes

Please complete the form as fully as possible as this helps us to prioritise the service and also enables us to give a more informative report.

Priority is given to those tests which will alter patient management.

CARDIAC ARREST

Cardiac output must be restored within minutes if the patient is to have any chance of good neurological survival.

As soon as cardio-respiratory arrest is recognised, and there are no contra-indications to proceeding (see page 22; When to attempt Cardio-pulmonary Resuscitation), commence CPR and call the cardiac arrest team (**dial 2222**), ensuring the location is stated, never dial 'O' for a medical emergency. Call immediately for a defibrillator and monitor and establish cardiac rhythm on the cardiac monitor (all wards possess a defibrillator).

There are two cardiac arrest algorithms: -

1. Ventricular fibrillation (VF) and pulseless ventricular tachycardia (VT).
2. Non VT / VF (this groups together asystole and pulseless electrical activity (PEA)).

Follow the algorithm for advanced life support opposite, moving down the list at each unsuccessful manoeuvre.

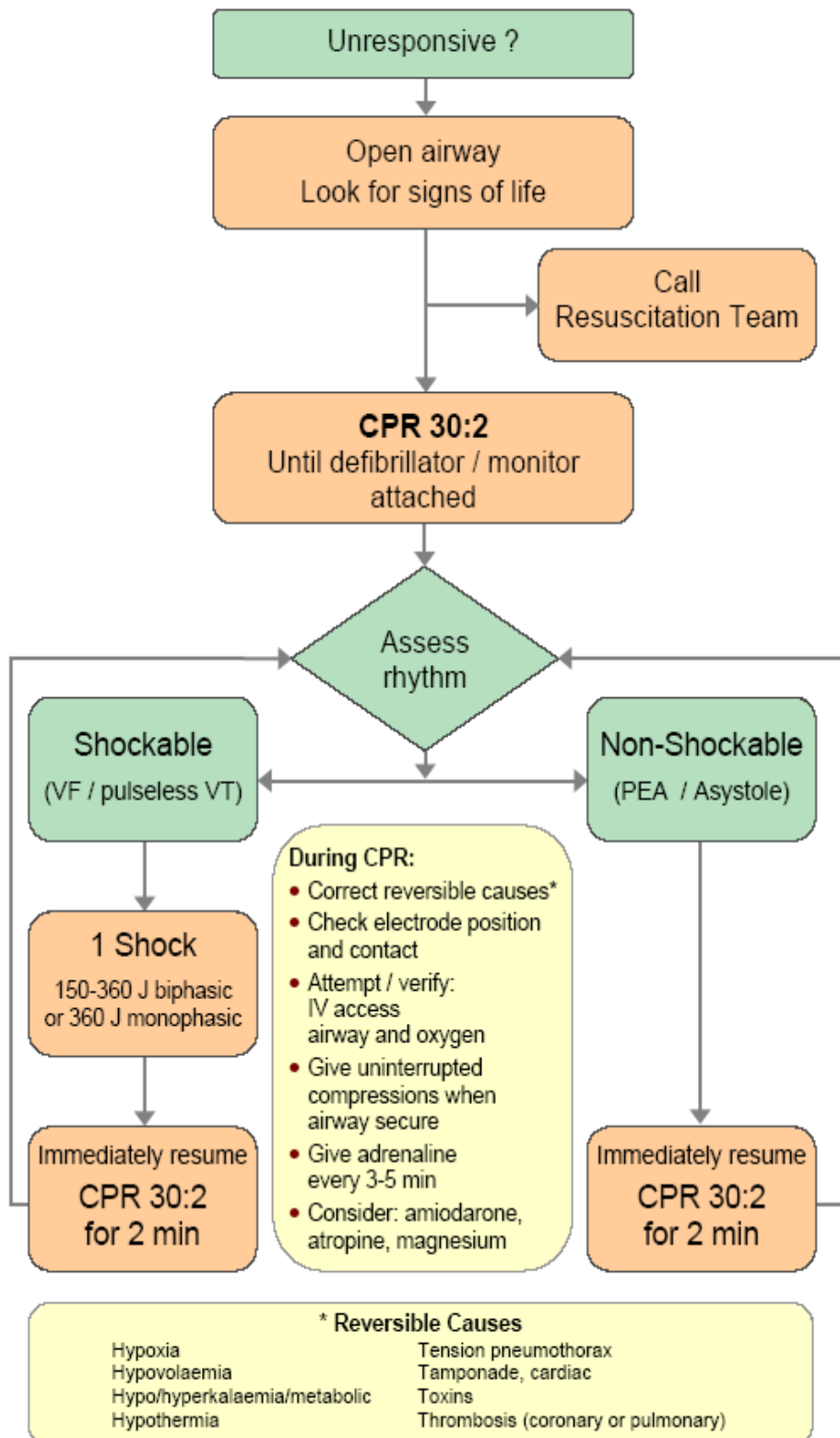
- Chest compression and ventilation should not be stopped during cardiac arrest except for checking for signs of a circulation (including rhythm recognition), defibrillation, the resuscitation attempt is abandoned on the instructions of the team leader or return of spontaneous ventilation and circulation.
- For patients in VF / pulseless VT a defibrillatory counter shock should be applied at the earliest possible moment.
- After each cardiac arrest an audit form should be completed and sent to the resuscitation officer. This is your opportunity to state the good points and the bad points and any inadequacies in the system.
- All doctors who are expected to form part of the cardiac arrest team must see the Resuscitation Officer on commencement of their appointment. This is to familiarise them with equipment and protocols used at St Richard's.

A copy of the European Resuscitation Council Guidelines for Resuscitation is available in the Dunhill Library, or available on the Internet at www.resus.org.uk

Further resuscitation training is available at anytime from the Resuscitation Office, bleep 053.

IN THE EVENT OF A PATIENT HAVING A CARDIAC ARREST IN THE MRI SCANNER THE PATIENT MUST BE REMOVED FROM THE SCANNING ROOM BEFORE ASSISTED RESUSCITATION CAN BEGIN
NO ASSISTED RESUSCITATION MUST TAKE PLACE IN THE SCANNING ROOM

Adult Advanced Life Support Algorithm



RESUSCITATION

When a patient suffers a cardiac arrest in hospital their chances of survival should be optimal if cardiopulmonary resuscitation is considered appropriate. The guidelines set out by the Working Party of the European Resuscitation Council state:

“Survival from cardiac arrest is the greatest when the event is witnessed; when a bystander starts resuscitation; when the heart arrests in ventricular fibrillation; when defibrillation is carried out at an early stage.”

Resuscitation Guidelines to be followed within this Trust will be found on the Resuscitation Council (UK) web page www.resus.org.uk

Resuscitation algorithms;

[Adult Advanced Life Support](#), page: 14/16

[In-hospital Resuscitation](#), page: 17

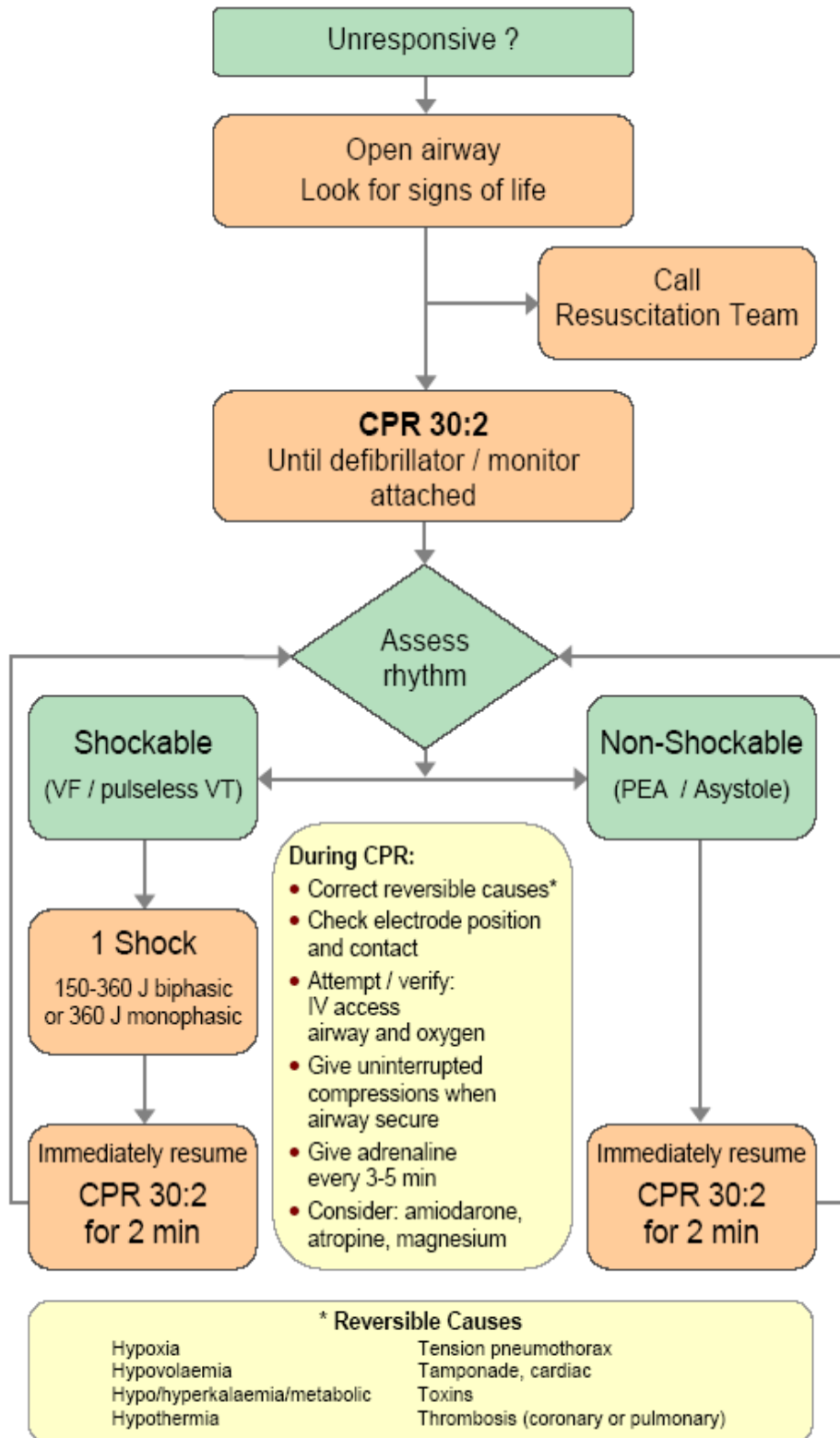
[Newborn Life Support](#), page: 18

[Paediatric Basic Life Support](#), page: 19

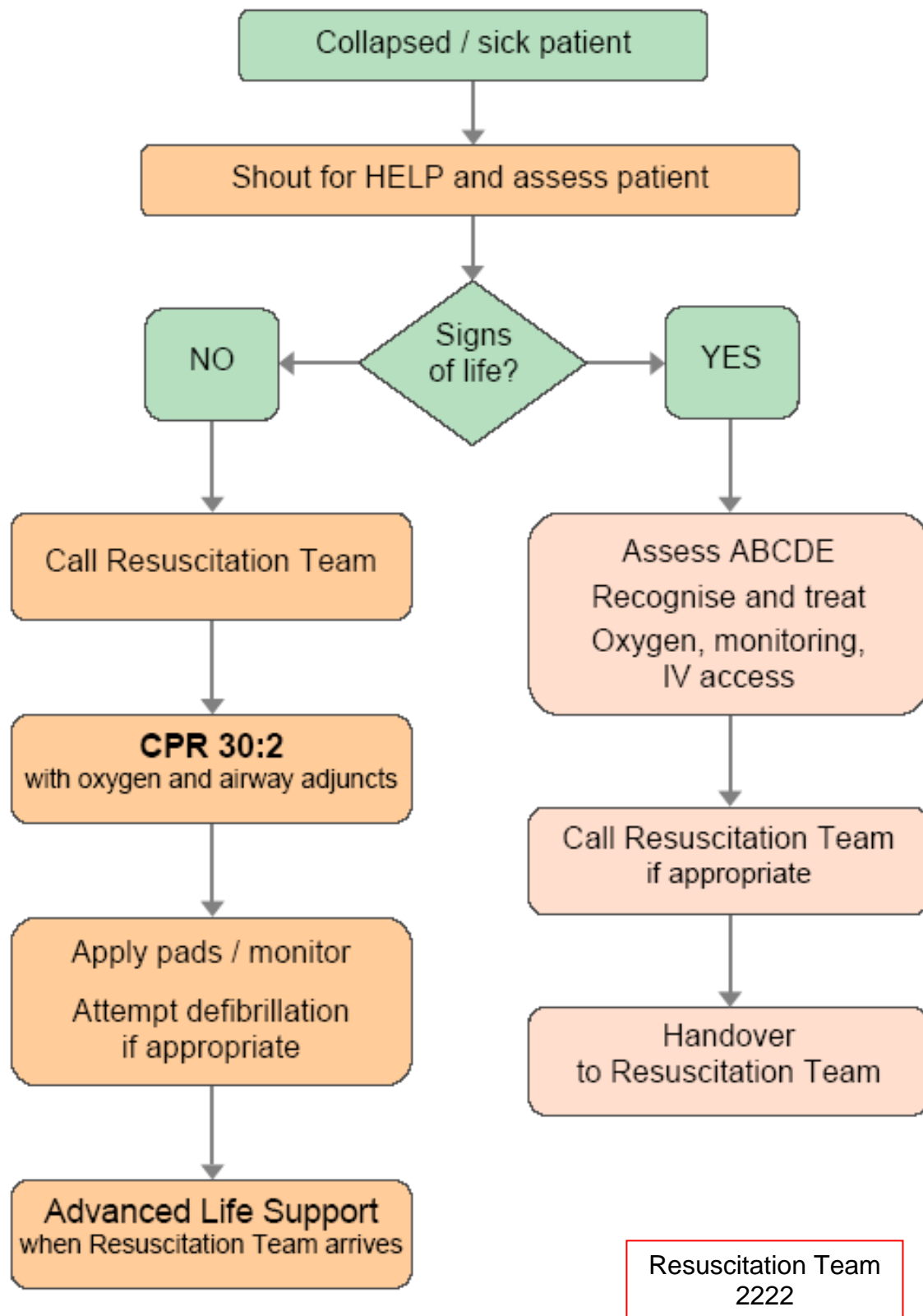
[Paediatric Advanced Life Support](#), page: 20

[Anaphylaxis](#), page: 21/54

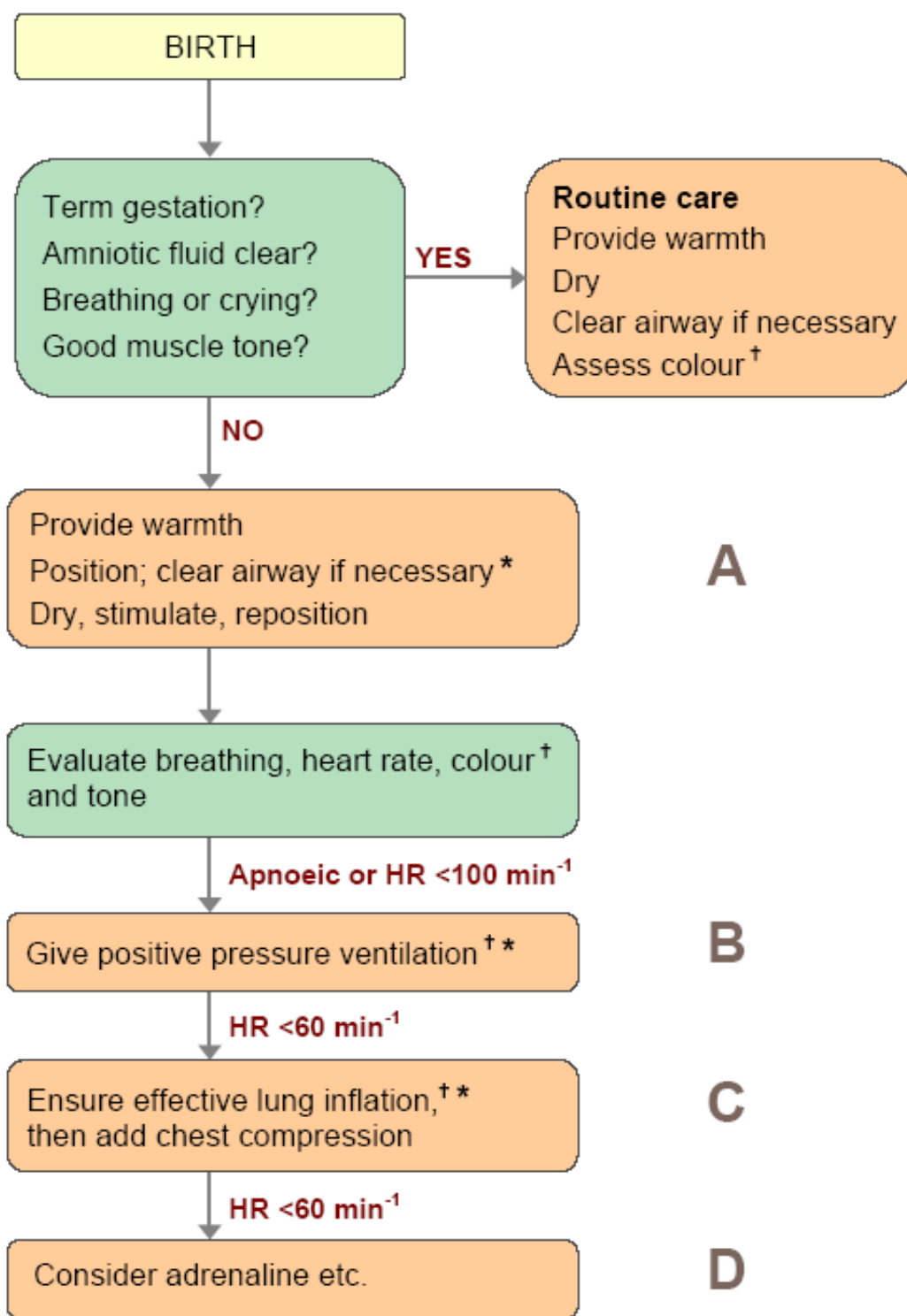
Adult Advanced Life Support Algorithm



In-hospital resuscitation



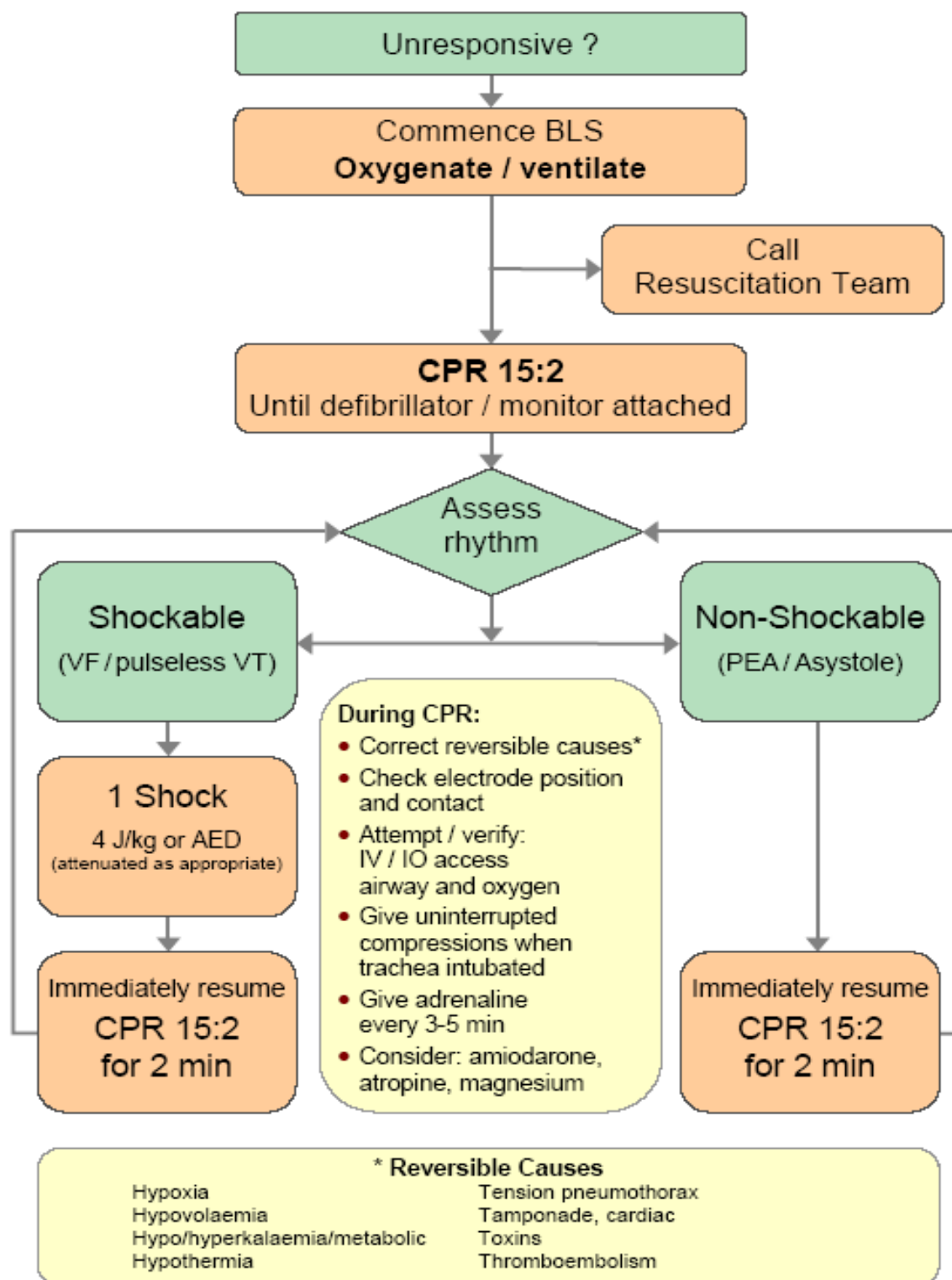
Newborn Life Support



* Tracheal intubation may be considered at several steps

† Consider supplemental oxygen at any stage if cyanosis persists

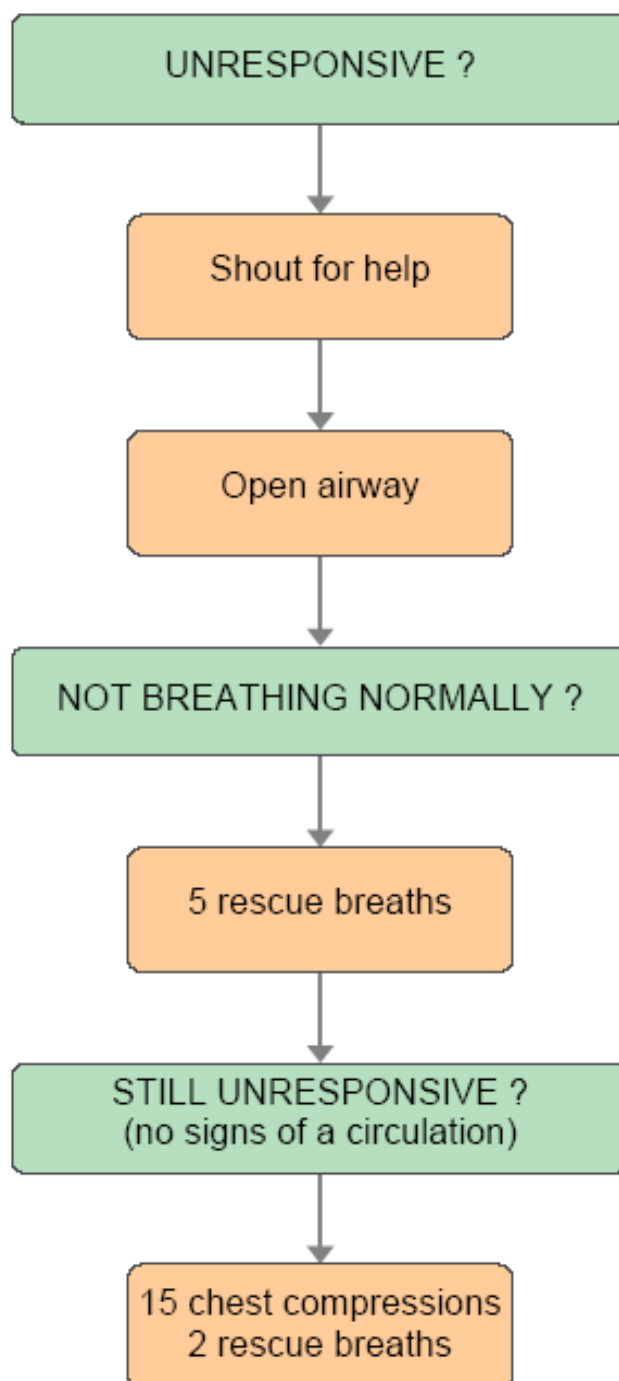
Paediatric Advanced Life Support



Resuscitation Team
2222

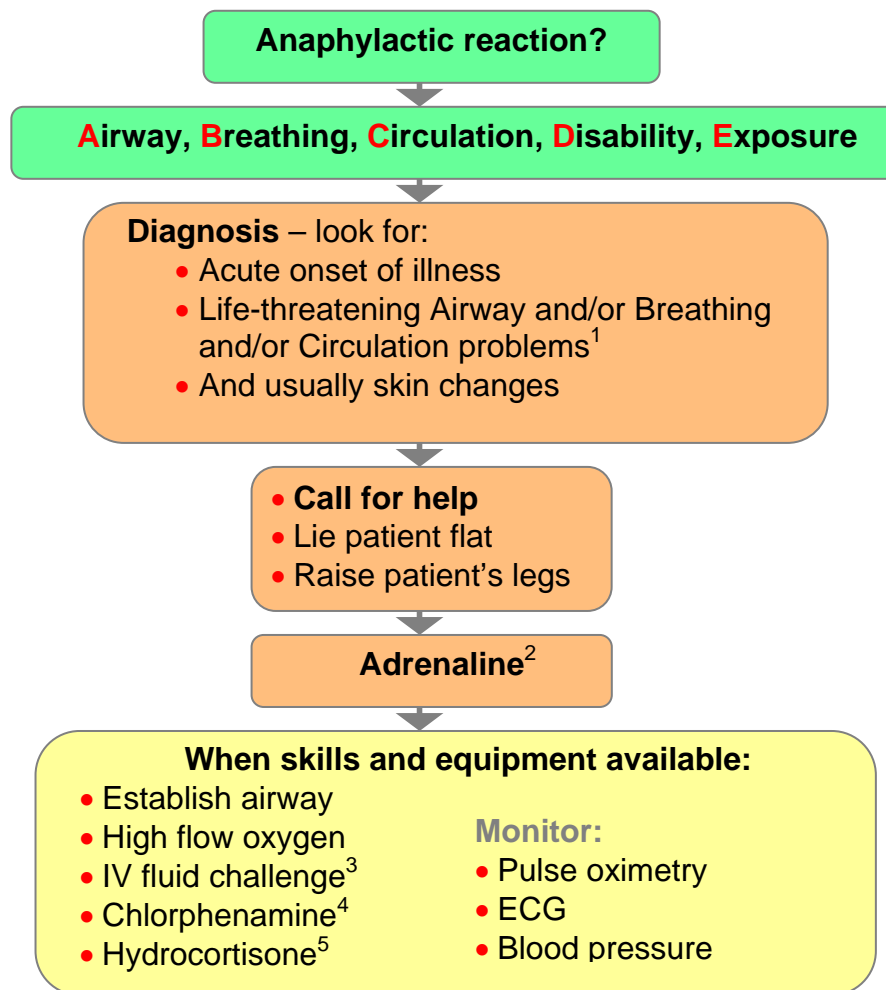
Paediatric Basic Life Support

(Healthcare professionals
with a duty to respond)



After 1 minute call resuscitation team then continue CPR

RESUSCITATION COUNCIL (UK) ANAPHYLAXIS ALGORITHM



¹ Life-threatening problems:

Airway: swelling, hoarseness, stridor
Breathing: rapid breathing, wheeze, fatigue, cyanosis, SpO₂ <92%, confusion
Circulation: pale, clammy, low blood pressure, faintness, drowsy/coma

² Adrenaline *(give IM unless experienced with IV adrenaline)*

IM doses of 1:1000 adrenaline (repeat after 5 min if no better)

- Adult 500 micrograms IM (0.5mL)
- Child more than 12 years: 500 micrograms IM (0.5mL)
- Child 6-12 years: 300 micrograms IM (0.3mL)
- Child less than 6 years: 150 micrograms IM (0.15mL)

Adrenaline IV to be given **only by experienced specialists**

Titrate: Adults 50 micrograms; Children 1 microgram/kg

³ IV fluid challenge:

Adult – 500 -1000 mL
 Child – crystalloid 20 mL/kg

Stop IV colloid if this might be the cause of anaphylaxis

⁴ Chlorphenamine (IM or slow IV)

Adult or child more than 12 years	10mg
Child 6-12 years	5mg
Child 6 months to 6 years	2.5mg
Child less than 6 months	250 micrograms/kg

⁵ Hydrocortisone (IM or slow IV)

200mg
100mg
50mg
25mg

WHEN TO ATTEMPT CARDIO-PULMONARY RESUSCITATION

It is appropriate to consider a do-not-resuscitate decision in the following circumstances:

- a) The term Do Not Attempt Resuscitation (DNAR) should be used at all times, where the patient's condition indicates that effective Cardiopulmonary Resuscitation (CPR) is unlikely to be successful.
 - b) Where CPR is not in accord with the recorded, sustained wishes of the patient who is mentally competent.
 - c) Where successful CPR is likely to be followed by a length and quality of life, which would not be acceptable to the patient.
- The decision not to attempt CPR (which is taken as full resuscitation including cardiac compression and artificial respiration) should be part of the Patient Management Plan and taken by the Consultant in charge after discussion with nursing and other members of staff. It is the responsibility of the Consultant to see that the decision is made, communicated and recorded.
 - In some instances, the decision not to attempt CPR may be made by a junior doctor (excluding pre-registration house officers), but must be communicated to the Consultant at the earliest convenient opportunity. If a junior doctor is in doubt about the patient's resuscitation status, the doctor should proceed to resuscitation until advice has been obtained.
 - In some patients a time limit may be set and then it may be necessary to review the decision daily. If the time limit expires and no further instruction given, the patient should be resuscitated. In other patients it may be decided that CPR may never be appropriate and no time limit given. This decision should only be made by a Consultant.
 - In making the decision the wishes of the competent patient take precedence and there may be circumstances in which sensitive exploration of the patient's wishes should be undertaken by the medical and nursing staff according to their clinical judgement. In coming to the decision, account should be taken of the perspectives of other professionals involved in the patient's care, and, with due regard to patient confidentiality the views of the patient's family or close friends may be sought. The nursing staff caring for the patient should be present if the decision is discussed with the patient or relatives.
 - The decision not to attempt CPR must be recorded in the notes using the Trusts DNAR form. The decision should not be made on age or disability
 - If, in the event of an arrest, the nurse in charge is uncertain of the patient's status, the doctor on duty should be called and CPR attempted.
 - If the doctor (or nurse) in charge at the time of arrest considers that circumstances have changed or that a simple procedure such as a Precordial thump or DC conversion is appropriate he/she may use his/her discretion. The decision must be recorded in the patient's notes.
 - In CHILDREN the decision not to attempt CPR must only be taken by a Consultant with the parents. The decision must be recorded in the notes, and in the absence of specific instructions to the contrary CPR should be attempted.
 - These guidelines are based on the Trust Policy DNAR a copy is obtainable from the Resuscitation officer

HYPERTENSION

HYPERTENSIVE EMERGENCIES AND URGENCIES

HYPERTENSIVE EMERGENCIES are those rare situations in which immediate blood pressure (BP) reduction is required (not necessarily to the normal range) to prevent or limit target organ damage.

Examples include - Hypertensive encephalopathy, left ventricular failure, aortic dissection, eclampsia and severe PET, unstable angina/M.I., phaeochromocytoma crisis, intracerebral/subarachnoid haemorrhage.

Most hypertensive emergencies initially receive parenteral treatment with an appropriate agent. The aim is to reduce mean arterial pressure by no more than 25% within minutes to 2 hours, thereafter aiming for a BP of 160/100 within two to six hours, avoiding excessive falls in BP which may precipitate cerebral, coronary or renal ischaemia.

I.V. therapy for hypertensive emergencies (titrate according to response): -

	Dose	Special Indications	Avoid In
Sodium Nitroprusside *	0.3 - 6mcg/kg/min	Most situations, especially (L)VF and dissection	Caution if renal impairment, eclampsia, raised intracranial pressure.
Glyceryl Trinitrate	0.5- 5mcg/kg/min	Coronary Ischaemia	
Hydralazine	10-20mg I.V. @ 1mg/min by I.V. bolus	Eclampsia (can also be given IM)	I.H.D.
Labetalol	2mg/min to total of 2mg/kg	Most situations	(L)VF, heart block, asthma.

* Degraded by light therefore syringe and giving set must be covered with lightproof foil during administration. Prolonged use (especially with renal impairment) may cause cyanide poisoning; check regularly for metabolic acidosis, which may suggest cyanide toxicity BEFORE cyanide levels rise.

HYPERTENSIVE URGENCIES are those situations when it is desirable to reduce BP within a few hours. Examples include stage III hypertension (BP > 180/110), hypertension with papilloedema, progressive target organ complications or severe perioperative of hypertension. Such cases can be managed with appropriately chosen oral agents including: -

- Beta-blockers e.g. atenolol 50-100mgs (especially with ischaemic heart disease or tachycardia).
- Long acting calcium channel blockers (N.B. **AVOID** short acting nifedipine tablets/capsules).
- ACE Inhibitors or in patients intolerant to ACE Inhibitors use AGII blockers (N.B. **Not** if renal artery stenosis is suspected.)
- Alpha-blockers.
- Thiazide diuretics.

ELEVATED BP ALONE, IN THE ABSENCE OF SYMPTOMS OR NEW/PROGRESSIVE TARGET ORGAN DAMAGE, RARELY REQUIRES EMERGENCY THERAPY.

ACUTE DEEP VEIN THROMBOSIS

Deep vein thrombosis (DVT) is common, particularly in hospital. The aim of treatment is to prevent embolism and reduce post-phlebotic complications.

If DVT occurs in pregnancy, the obstetricians or haematologists should be consulted before proceeding.

The DVT care pathway should be used for newly presenting patients, with the aim of avoiding admission. During office hours these patients will usually be seen by the Anticoagulant Nurse Specialist.

Confirmation of diagnosis by ultrasound is essential, as clinical diagnosis is notoriously unreliable, and the implications may be considerable.

Treatment should be started as soon as a DVT is suspected, unless there is a contra-indication to anticoagulation. The recommended treatment is the low molecular weight heparin (LMWH), tinzaparin, given once daily subcutaneously. The dose is dependent on the patient's weight, and details can be found on the pink Anticoagulant Chart. Low molecular weight heparins should be used with caution in renal (eGFR <25ml/min) and hepatic failure. Discuss with Haematologist if necessary.

If there is a high risk of bleeding, e.g. post-operatively, it may be advisable to start with IV heparin, as the half-life is shorter, and anticoagulation more readily reversed in case of bleeding. Give 5000units IV stat. followed by 1200 units/hr, ie 1.2mls per hour of 40,000units in 40mls. by continuous IV infusion, and adjust dose according to chart and daily APTR (therapeutic range 1.5-2.5). For children and adults under 50 Kg, use 15-25 units/Kg/hr. Post-operatively, start 20,000 units/24h and omit loading dose, aiming for APTR 1.5 -2.0 to minimise risk of bleeding. Follow dosing algorithm on anticoagulant chart. Heparin should be discontinued once INR >2 (ideally for 2 days), or if diagnosis not confirmed.

Warfarin may be started immediately, or once the diagnosis is confirmed: see Anticoagulant chart for starting doses. The quickest way to achieve correct anticoagulant levels is to measure the INR daily and follow the algorithm on the Anticoagulant chart. Elderly or malnourished patients or those with poor liver function, or those on amiodarone, may be very sensitive to warfarin, and require smaller doses: see alternative loading protocols on pink chart.

Monitoring of warfarin (and iv heparin) must be documented on the pink Anticoagulant Chart.

On Discharge

The pink Anticoagulant Chart must be completed for each patient and returned to the haematology laboratory immediately.

The critical information is:

- a. The clinical indication for anticoagulation.
- b. The duration of anticoagulation intended.
- c. Dose and INR on leaving the ward.
- d. Other drug therapy.

See recommendations on pink chart for duration of anticoagulation following DVT or PE.

Each patient should be given their own copy of the yellow anticoagulant booklet, with their medical details completed by the doctor. A pharmacist should counsel the patient to ensure he understands it.

Thrombophilia screening

This is not performed acutely, and will be arranged by the haematologists at the end of warfarin therapy if appropriate, as results may be unreliable during the acute episode. Similarly, thrombophilia screening during pregnancy is often inaccurate.

ACUTE PULMONARY EMBOLISM

The clinical syndromes that result from acute pulmonary embolism (PE) depend upon the degree of obstruction of the pulmonary vasculature. Patients can be divided into two broad categories depending on the haemodynamic disturbance:

- Minor pulmonary embolism with chest pain and/or dyspnoea but no haemodynamic disturbance.
- Major pulmonary embolism with circulatory collapse.

If major PE occurs during pregnancy consult the obstetricians before proceeding.

Minor Pulmonary Embolism

If arterial pO₂ low (less than 8kPa), give additional O₂ by mask.

Confirm the diagnosis of PE at the earliest opportunity with a ventilation/perfusion scan or CT-PA. While awaiting confirmation, start anticoagulation with LMWH and warfarin as per DVT (see previous section).

If patient well, consider discharge on tinzaparin before INR in range.

See recommendations on pink chart for duration of anticoagulation following DVT or PE.

Major Pulmonary Embolism

Patients with major PE are critically ill with severe haemodynamic disturbance due to massive obstruction of their pulmonary vasculature. Cardiac arrest is likely and removal of the obstruction is essential if adequate circulation is to be restored. Tinzaparin or IV heparin should be started, and a definitive diagnosis must be made as soon as possible by means of CT-PA or urgent echocardiogram. Echo should be requested by the Consultant involved to the Cardiology Consultant covering Coronary Care (contact via Coronary Care 5121).

Give additional O₂ 80% via non-rebreathe mask.

A high right sided filling pressure is required to maintain the circulation. Give fluids to keep the CVP at around 12cm above the sternal angle. Some patients need only 200-300ml sodium chloride 0.9% others a plasma expander. Because of this variability it is useful to use a CVP monitor, but caution required placing a central line in these hypoxic, and possibly anticoagulated, patients. Avoid vasodilators as they can cause catastrophic hypotension.

When the diagnosis is confirmed, institute thrombolytic therapy with Alteplase. This decision, which depends on the clinical state of the patient, should be taken in conjunction with the cardiologist and Dr Ross/ Dr Tate/ Dr Whitehouse. Some patients may be considered for transfer for open embolectomy. Once the patient is stable, start long term anti-coagulation with heparin and then warfarin as described in the DVT section. Initiation of warfarin should be delayed 48h after starting heparin.

Thrombolysis is contra-indicated in pregnancy and early post-partum because of the risk of haemorrhage from the placental bed.

PERIOPERATIVE ANTICOAGULANT PROTOCOLS

All patients should be discussed with the Haematologists prior to any surgical procedure. For elective cases, the Anticoagulant Clinic will give written advice if informed of the proposed operation and the date at least one week before.

Management of the warfarinised patient during surgery depends on two main factors:

1. *The level of haemostasis required for surgery,*

e.g. dental extraction INR 2.0-3.5

neurosurgery INR 1.0-1.3

2. *The thrombotic risk of the patient's underlying condition.*

Low risk: The risk of thrombosis occurring in these patients if they have an INR < 2.0 for several days is very low.

e.g. AF

Cardiomyopathy

Previous CVA

Single episode DVT, > 3months previously

Peripheral vascular disease.

High risk: these patients have a significant risk of thrombosis/embolism if they are not adequately anti-coagulated at all times. *Consider whether surgical procedure is absolutely necessary.*

e.g. Recent DVT or PE (within 3 months)

Thrombophilic tendency with recurrent thromboses

Prosthetic heart valve

Antiphospholipid syndrome

Arterial embolic disease

(1) Dental extraction

Advice to dentists from the BDA has recently been revised. Single extractions can be performed with no correction of INR provided the INR is below 4. Tranexamic acid is not available to dentists and is not recommended routinely.

(2) Full reversal of anticoagulation not required, e.g. minor skin lesions

In all patients, stop warfarin 2 days prior to the procedure.

Ideally, and if bleeding complications could ensue, the INR should be checked on the day of the procedure (INR < 2.5).

Recommence warfarin, at the patient's normal dose, on the evening of the procedure, provided haemostasis has been achieved.

- Some patients with prosthetic heart valves, especially Starr-Edwards, severe thrombophilia, or antiphospholipid syndrome, may have had previous problems when their INR fell below 3.0. These patients will require a more formal anticoagulant regime, and *must* be discussed with the Haematologists.

(3) Low risk patients requiring full reversal of anticoagulation.

Patients with AF etc should stop their warfarin 3-5 days prior to surgery, and can be admitted the day of the operation. Allow 5 days if possible before spinal anaesthesia.

On admission, start *prophylactic tinzaparin 3500U/4500U in the evening*, for all patients undergoing abdominal, orthopaedic, or gynaecological surgery, or who will be immobilised for any length of time.

Check INR prior to surgery, to ensure warfarin cleared.

Recommence warfarin, at double the normal dose on first day then normal dose thereafter, as soon as haemostasis is achieved. *Do not reload.*

Continue heparin until the patient is mobile, or the INR >2.0.

(4) High risk patients requiring full reversal of anticoagulation.

Stop warfarin 3-4 days pre-operatively.

Check INR daily, and introduce *therapeutic* dose of *tinzaparin*, as single daily sc injection (dose based on weight of patient) once INR <2.5. This may be able to be done as an outpatient. Last dose to be given the day before surgery.

BLEEDING WHILST ANTICOAGULATED WITH WARFARIN

FFP and Beriplex replace missing clotting factors, and so clotting is corrected as soon as the infusion is given.

Vitamin K is utilised by the body to synthesise new clotting factors, and so takes about 6h to be effective.

1. Life threatening haemorrhage:

- Vitamin K 10mg by slow iv injection. Stop warfarin
- PCC (clotting factor concentrate, Beriplex, approx 25U/Kg: usually 1500-2500U in total) should be available: contact Haematologist urgently, or use:
- FFP 10-15mls/Kg (approx 1 litre in an adult)
- Once bleeding settled, discuss merits of re-anticoagulation with haematologist if necessary.

2. INR>8 with evidence of bleeding:

- Vitamin K 10mg orally by slow injection. Stop Warfarin
- Consider therapeutic dose FFP/Beriplex (see above) especially if INR>12

3. Minor haemorrhage, with INR <8: or INR >8 with no bleeding.

- Vitamin K 1-2mg orally or IV. Withhold warfarin and repeat INR within 24 hours.
- INR>14, with no bleeding: repeat INR, give Vitamin K 1-2mg orally and admit for observation
- If any haemorrhage, even quite minor give 10mg Vit K orally.

4. INR 4.5-8 without haemorrhage:

- Withhold warfarin for 1-2 days and review.
- If unexpected bleeding occurs at therapeutic INR levels, investigate underlying cause.
- Try to establish cause for abnormally high INR, to prevent recurrence.

Vitamin K (Konakion) is well absorbed when given orally and works rapidly: IV route can cause anaphylaxis.

Consider whether potential risks of warfarin outweigh benefits.

THE USE OF PROTHROMBIN COMPLEX CONCENTRATE (PCC) BERIPLEX

Over anticoagulation is a common complication of anticoagulation therapy.

Therapeutic decisions on reversal of warfarin, nicoumalone (Sinthrome) and phenindione (Dindevan) depend on the INR result and the presence or absence of bleeding.

Purpose and Clinical Relevance

Beriplex is produced by the fractionation of pooled plasma from non-UK donors. It contains factors II, VII, IX and X in approximately equal concentrations and can be used for the rapid reversal of anticoagulation but due to the short half-life of Factor VII (6 hours), **it is essential also to give intravenous vitamin K.**

Use of PCC has the potential to cause thrombosis and disseminated intravascular coagulation (DIC), particularly in patients with pro-thrombotic clinical conditions or liver disease. Most patients treated with warfarin will, by definition, have a condition predisposing to thrombosis and so risks versus benefits must be assessed on an individual patient basis.

Indications for PCC

- Reverse oral anticoagulation when there is life-threatening bleeding, (for suspected intracranial bleed, it is preferable to obtain urgent CT scan prior to administration of PCC to confirm bleed rather than infarct.)
- Treat haemorrhage threatening limb viability or sight. (Includes cerebral haemorrhage, intraocular haemorrhage, retroperitoneal haemorrhage, muscle bleed with compartment syndrome, uncompensated bleeding with developing shock)
- Patients requiring life saving emergency surgery who are orally anticoagulated
- Active bleeding leading to hypovolaemic shock
- Bleeding which does not fit into the above categories but is clinically felt to be life-threatening

Dosage

Initial INR	2.0 – 3.9	4.0 – 6.0	> 6.0
~ Dose ml/kg body weight	1	1.4	2
~ Dose IU (Factor IX)/kg body weight	25	35	50

The dose should be rounded to the nearest 500 IU; the maximum single dose should not exceed 5000 IU.

Hazards & Safety Precautions

Beriplex is derived from pooled human plasma that has been virally inactivated; the possibility of transmitting infective agents cannot be totally excluded. This also applies to unknown or viruses and other pathogens. Rapid infusion may lead to thrombosis or allergic reaction.

Contraindications

- Known hypersensitivity to any of the components of the product
- Risk of thrombosis, angina pectoris, recent myocardial infarction (exception: life-threatening haemorrhages following overdose of oral anticoagulants)
- In disseminated intravascular coagulation, PCCs may only be used after termination of the consumptive state
- Known history of heparin-induced thrombocytopenia

If Beriplex is not available or is contraindicated; 15ml/kg FFP with 10mg intravenous vitamin K will partially reverse anticoagulation.

Procedure

- 1.1 Contact Consultant Haematologist with clinical details, INR and weight
- 1.2 The rationale for use of Beriplex should be documented in the notes
- 1.3 Beriplex must be prescribed on a prescription chart.
- 1.4 Reconstitute Beriplex on the ward under aseptic conditions according to manufacturers instructions. Ensure that the vial flip caps are removed and the stoppers are treated with an aseptic solution and allowed to dry prior to opening the Mix2Vial package.
- 1.5 The reconstituted solution should be used immediately, administered as a slow intravenous bolus (not more than 3 IU (FIX)/kg/min, max. 210 IU (FIX) /min, approximately 8 ml/min) through a separate infusion line. The use of a B pump to aid administration is ideal but not essential. Beriplex can be given peripherally or centrally. Take care that no blood enters the syringe filled with product, as there is a risk that the blood could coagulate in the syringe and fibrin clots would therefore be administered to the patient.
- 1.6 Flush with sodium chloride 0.9%.
- 1.7 Beriplex is effective straight away. Recheck the INR after 1-2hrs repeat doses are rarely required.

Do not mix with other drugs or fluids

THE USE OF FRESH FROZEN PLASMA (FFP)

FFP should only be used to treat a bleeding episode or prepare patients for surgery in certain defined situations.

Definite indications for the use of FFP

- Replacement of single coagulation factor deficiencies, where a specific or combined factor concentrate is unavailable
- Immediate reversal of warfarin effect
- Acute disseminated intravascular coagulation (DIC) with abnormal clotting tests and bleeding
- Thrombotic thrombocytopenia purpura (TTP).

Conditional Uses

FFP only indicated in the presence of bleeding and disturbed coagulation

- Massive transfusion (> 10 units red cells in 24 hours in adult)
- Liver disease
- Special paediatric indications.

National guidelines recommend that FFP is *not* issued for any other indication.

PATIENTS WITH INHERITED BLEEDING DISORDERS

- **Inform Consultant Haematologist *immediately* of any serious/potentially serious bleeding. Always inform Haematologists within 24h of attendance of patients with bleeding disorders.**
- Establish the diagnosis of the bleeding disorder, and the usual therapeutic material:
A list of locally registered patients is kept in the Haematology Department, in A&E, and, in the case of children, on Howard Ward.
All patients with severe bleeding disorders should carry a “green card” with details of their deficiency. They should also be under the care of a Haemophilia Centre, from which information can be obtained if necessary.
- No IM injections should be given. Patients should not receive aspirin. Haemarthroses should not be aspirated.
- All factor concentrates are kept in Blood Bank: contact on-call BMS. Visitors may bring their own concentrate, but need help with venepuncture. Always contact Consultant Haematologist before giving blood products or factor concentrate to a patient who has not received them before.
- DDAVP and tranexamic acid are supplied by pharmacy. DDAVP (desmopressin) is not a blood product.
- It is safest to treat all patients with bleeding disorders as though they were Hepatitis C positive, i.e. HIGH RISK.
- Patients are often aware of an early bleed before any signs are evident. Treatment at this stage will often arrest bleeding with a single dose of factor, and admission, analgesia etc will be unnecessary. No blood tests or x-rays are required routinely. Treatment of a more established bleed will usually require admission and repeated factor injections. FVIII is usually given twice daily and FIX once daily. In severe bleeds and peri-surgery, blood levels should be checked.
- Always seek advice about head injuries in these patients, however trivial they seem.

Severe/moderate Haemophilia A (FVIII deficiency <5%)

These patients require factor VIII replacement therapy. They will often have their own supply with them. Ask whether inhibitors ever detected.

All children and most adults should now receive recombinant product (Recombinate, ReFacto or Kogenate) if it is available. Patients who do not usually receive recombinant FVIII may receive high purity Replenate or Monoclate.

Inform consultant haematologist of any haemophiliac requiring treatment, but in general the dose of *Factor VIII* is as follows:

1. Large bruise/non-weight bearing joint e.g. hand: 10-15U/kg body weight
 2. Larger joint e.g. knee/muscle bleed: 20-25U/kg
 3. Head injury/potentially severe bleeding: 40-50U/kg
- (always rounding dose to a full bottle of FVIII: usually multiples of 500U, as factor very expensive).

Mild haemophilia A (Factor VIII >5%)

For minor bleeding, these patients will often not require blood products. They can be treated with DDAVP (desmopressin) and tranexamic acid: see "von Willebrand's disease". Discuss any major bleeding/head injury with a haematologist.

Von Willebrand's disease Type I and IIa [commonest forms] and mild haemophilia A

Most patients do *not* require blood products

1. All patients benefit from local/systemic *tranexamic acid*, 25mg/kg orally bd or tds (up to 1g qds in adults).
 - In oral bleeding, encourage the patient to swill the mouthwash around the mouth and then swallow it, to benefit from both local and systemic effects.
 - In dental extractions, give for 2 weeks to reduce risk of secondary haemorrhage.
 - Tranexamic acid should be avoided in haematuria.
2. *DDAVP (desmopressin)*: 0.3µg/kg body weight to a maximum of 24µg. Give in 50 mls sodium chloride 0.9% over 20 minutes IV.

Caution. *May cause fluid retention: use with caution in children aged less than 5 years, and fluid restrict gently for 24 hours. Avoid in adults with past history of CVS disease or hypertension. Less effective with repeated doses.*

Severe von Willebrand's disease (Type IIb or III) [rare]

These patients would often require replacement therapy: discuss with Haematologists.

Haemophilia B (Factor IX deficiency)

DDAVP is ineffective, so patients will require factor replacement unless very mild, e.g. carrier. Tranexamic acid is still useful.

Young patients and most adults should receive recombinant Factor IX.

Inform consultant haematologist of any haemophiliac requiring treatment, but in general the dose of *Factor IX* is as follows:

1. Large bruise/non-weight bearing joint e.g. hand: approx. 20-25U/Kg body weight
2. Larger joint e.g. knee/muscle bleed: approx. 25-40U/Kg
3. Head injury/potentially severe bleeding: approx. 50-70U/Kg

Do not give more than 70U/Kg, as there is a risk of thrombosis at high doses.

Other factor deficiencies (e.g. X, XI, V), and congenital platelet disorders

These are rare, and management should be discussed urgently with haematologist. Specific concentrates may be available for elective procedures, but FFP may need to be used for emergencies.

Factor XII deficiency does not usually cause bleeding.

MASSIVE BLOOD LOSS

Massive Transfusion can be defined as the replacement of a patient's total blood volume (approximately 5 litres in an adult) in less than 24 hours. Management requires early recognition, rapid and effective restoration of an adequate blood volume and securing normal haemostasis. Massive transfusion requires good communication between surgeon, anaesthetist, blood bank and haematologist. It is essential that staff in blood bank be notified immediately when a massive bleed occurs or is anticipated.

Blood Component Therapy Red Cells

Group specific red cells should be given in all emergency cases and can be made available within minutes. The only exception to this is in **extreme** emergencies where it may be necessary to use the O Rh Dneg 'flying squad' red cell packs.

Rapid transfusion of blood can cause hypothermia. Keep patient warm and use a blood warmer if giving blood at rates above 50ml/kg/h.

Platelets, FFP and cryoprecipitate

The requirements for these blood products are based on laboratory test results. Massive transfusion can cause a dilutional decrease in the platelet count, which should not be allowed to fall below 50×10^9 litre⁻¹ in acute bleeding.

Prolonged APTT and PT require correction with FFP. 12-15mls/kg will correct fibrinogen and most coagulation factor deficiencies. If after large quantities of FFP, fibrinogen levels remain below 1.0g/l, cryoprecipitate therapy should be considered. One adult dose (2 pooled packs) should be given initially and repeated based on fibrinogen estimation. FFP and cryo are blood group specific.

Antifibrinolytic Drugs

Tranexamic Acid 0.5-1g qds by slow IV injection

Caution: avoid if macroscopic haematuria

Aprotinin (Trasylol) This has been withdrawn after studies linked it to increased mortality.

Recombinant Factor VIIa (Novoseven) at a dose of 90ug/kg has proven effective for the treatment and prevention of haemorrhage in haemophiliacs. There is some evidence that rVIIa may also be effective in controlling massive haemorrhage in other patients. rVIIa is very expensive, can cause thrombosis, and can only be administered following discussions with a consultant haematologist.

Keep Blood Bank and Consultant Haematologist informed

MASSIVE HAEMORRHAGE IN OBSTETRIC CASES

The management of massive haemorrhage in obstetric cases differs from that in other medical conditions in that there is likely to be an element of DIC (disseminated intravascular coagulation). In view of this it is important to carry out a baseline clotting screen at the onset of bleeding in cases where massive haemorrhage may occur. Use the packs available on Labour ward to take blood, which will include:

- Prothrombin time
- Partial thromboplastin time
- Fibrinogen
- Platelet count.

It is also important to alert the transfusion laboratory and the Consultant Haematologist to the possibility of *massive obstetric haemorrhage*

Clinically significant DIC will be ruled out by a normal screen but may develop later and subsequent clotting studies may be required if bleeding persists. If the clotting screen is abnormal, or platelets low, the case should be discussed with a Haematologist who will advise on further management. If DIC is confirmed, a careful assessment of the patient should be undertaken to determine the cause and immediate steps taken to eliminate or control the triggering mechanism, e.g. sepsis, retained products of conception etc.

Otherwise the issuing of blood components will be the same as set out in the existing policy Massive Blood Loss – Previous section.

Massive Transfusion Protocol

Goal	Procedure
<p>Restore circulating volume</p> <p>Arrest Bleeding</p>	<ul style="list-style-type: none"> • 2 wide bore cannulae 14G or larger • Give adequate warm crystalloid • Aim for systolic BP>90 <i>and</i> urine output >30ml/hr • Consider CVP monitoring to guide replacement • Employ cell saver • Keep patient warm <p>Remember simple measures (pressure/elevation), early surgical intervention</p>
<p>Contact Key Personnel</p>	<p>If massive blood loss is likely a named individual should co-ordinate communication. They should contact:</p> <ul style="list-style-type: none"> • Senior Clinician • Consultant anaesthetist • Blood bank (Ext.3589. Bleep 070 on call) <p>Anaesthetist to contact Haematology Consultant if required.</p>
<p>Request lab investigations</p> <p>Ensure correct patient identification</p>	<ul style="list-style-type: none"> • Send FBC, group and save, clotting, and Chemistry profile • Phone blood bank– Order 6 units red cells initially, and give estimate of rate of bleeding (Ext.3589 normal working hours. Bleep 070 on call)
<p>Maintain Hb>8 g/dl</p>	<p style="text-align: center;">Use blood warmer if giving > 4 units of red cells stat.</p>
<p>Maintain Plts >75 × 10⁹/l</p>	<p style="text-align: center;">Keep platelet count >100 × 10⁹/l if multiple or CNS trauma or if platelet function abnormal (Allow for delivery time of 1-2 hrs)</p>
<p>Maintain PT <18s.</p> <p>APTT <40s.</p>	<p style="text-align: center;">Give FFP 15 ml/kg guided by tests. Anticipate need for FFP after 1–1.5 × blood volume replacement. Platelets and FFP may be needed earlier if DIC or liver failure present.</p> <p style="text-align: center;">Repeat tests after blood component infusion</p>
<p>Maintain Fibrinogen > 1.0 g/l</p>	<p style="text-align: center;">If not corrected by FFP give cryoprecipitate (2 packs of pooled cryoprecipitate for an adult)</p>
<p>Arrest Ongoing Bleeding</p>	<p>Is bleeding under control? – If 30-40 units looks likely:</p> <ul style="list-style-type: none"> • Discuss with consultant haematologist. • Give tranexamic acid (1g IV) unless renal tract bleeding • Order 2 packs platelets • Consider: cryoprecipitate, Vitamin K, Novoseven, • Repeat FBC, PT, APTT, Fibrinogen every 4 hrs if oozing, or every 8-10 units if bleeding. Use results to guide replacement.

THROMBOCYTOPENIC PATIENTS

1. No patient to have aspirin or NSAID.
2. Spontaneous bleeding rare when platelet count $>20 \times 10^9/l$.
3. In patients with reversible marrow failure, e.g. chemotherapy, platelet transfusions should be used to maintain platelet count $>10 \times 10^9/l$ (usually requires alternate day platelets). Patients who are unwell or have new haemorrhagic lesions may require platelet count maintained at $> 20 \times 10^9/l$.
4. Platelet transfusions are usually inappropriate in cases of increased peripheral platelet consumption, e.g. ITP.

NB Think ahead: platelets have a 5 day shelf life, and can be delivered daily on scheduled blood deliveries. A platelet transfusion costs £200, and special transport a further £30.

BLOOD TRANSFUSION

The infusion of incompatible blood may cause death. **The commonest cause is mislabelling of the crossmatch sample.** For maximum safety please adhere to the following procedures.

Completing the Request Form

Blood transfusion request forms should only be signed by a doctor. The completed form **MUST** include the patient's name, hospital number and date of birth. Add the blood group if it is known, whether the patient has been previously transfused, and whether atypical antibodies have been detected previously. If blood will be needed indicate how much, and when it is required. Give at least one day's notice when blood is required for a 'cold' procedure.

Collecting the Specimen

Positive identification of the patient is essential; in the case of patients who are judged capable of giving an accurate response, ask their full name and date of birth. For patients who cannot communicate, information must be taken from their wristband (**all patients must have a wristband and a patient ID number**). Samples require the following details written clearly **by hand**: First name, Surname, Date of Birth, Hospital number, Date of sample, Signature of the person who has taken the sample. The sample must be labelled immediately after sampling **next to patient**. *The minimum identification* for an unconscious or trauma patient is the A&E emergency random unique number, hospital number and gender.

If the request form or sample are inadequately completed the request will not be processed.

Prescription of blood products

The prescription must specify:

- Blood component, including any special requirements e.g. irradiated, CMV-negative.
- Quantity required
- Duration of transfusion (usually 2 hours for each unit of red cells, max 4h). Platelets are infused at 10ml/minute and should usually take no longer than 30 mins. FFP and cryoprecipitate are infused at 5-10 ml/minute as soon as possible after thawing.
- Special instructions, for example, medication to be given before starting, or during transfusion, such as furosemide or hydrocortisone.

In general all non-urgent blood transfusions should be administered during the daytime. The decision to administer blood products during the night should be made by a member of the medical team based on clinical need.

The Transfusion

Before giving the blood to the patient check the name, number and date of birth on the bag against those on the **patient's identification band**. A standard operating procedure should be available on every ward, and copies are available from the Haematology Nurse Specialist.

Acute Transfusion Reaction due to ABO incompatibility

This is a medical emergency: the patient becomes acutely unwell with fever, low back pain, chest tightness, hypotension and pain at the venflon site within a few minutes of the transfusion starting If a haemolytic transfusion reaction is suspected, stop the transfusion immediately, recheck the identities of patient and donor unit, and keep the line open using iv sodium chloride 0.9% through a new giving set. Maintain a good urine output. Inform Blood Bank and discuss with Consultant Haematologist. Most transfusion reactions are simply febrile episodes due to white cell pyrogens, or delayed haemolytic reactions with jaundice and anaemia developing over a few days. Discuss with blood bank.

THERAPEUTIC USE OF ALBUMIN SOLUTIONS

A Consultant Haematologist must agree any request for 20% albumin should be used with caution in patients liable to develop heart failure

4.5% Albumin

The two main indications for the use of 4.5% albumin are:

1. **Plasmapheresis** - except in TTP (thrombotic thrombocytopenic purpura)
2. **Plasma protein replacement in burns**

4.5% albumin is not required in most situations of acute plasma volume replacement; alternative crystalloids or colloids are preferable. In conditions such as septic shock, adult respiratory distress syndrome, and anaphylaxis colloid solutions are useful in maintaining haemodynamic stability.

20% Albumin

Hypoproteinaemia caused by an increased loss of plasma proteins through the kidneys or gut, or by underproduction of proteins by the liver in chronic liver disease leads to oedema and contraction of the intravascular volume that triggers compensatory retention of salt and water. In patients with liver disease and nephrotic syndrome who have oedema resistant to diuretics, 20% albumin followed by a bolus dose of frusemide may produce a diuresis that can then be maintained by smaller doses of diuretics alone.

Paracentesis of <5L of ascites should be followed by plasma expansion with a synthetic plasma expander and does **not** require volume expansion with albumin. If hypovolaemic after 5L has been drained give 200ml Gelofusine. If still continuing to drain and **Paracentesis of >5L** give 100 ml of 20% albumin (over 1 hour) for every 3L of ascites drained.

Inappropriate Use

- Parenteral nutrition
- Chronic protein loss
- Chronically impaired albumin production
- To maintain albumin levels in critically ill patients

Rates of Infusion

4.5% Albumin

Patients with greatly reduced blood volume and/or shock, the rate of infusion may be rapid but should usually not exceed 5ml/min (300ml/hour). As the patient improves, the rate should be adjusted according to the individual circumstances and indication.

20% Albumin

Circulatory overload is a risk when infusing 20% albumin (each 100 ml of 20% albumin will produce a transient expansion of circulating fluid volume up to four times the volume infused.) Rate of infusion should not exceed 2ml/min (120ml/hour), 1 bottle contains 100ml.

As the patient improves, rate should be reduced to a recommended rate of 1-2ml/min (60-120ml/hour).

SICKLE CELL SYNDROMES

Sickle cell disorders (SS, SC, S Beta thal) are life long disorders with considerable morbidity. They can present with life-threatening complications requiring urgent expert haematological input. In the Chichester area they are uncommon. They will often have been diagnosed on previous blood tests available on the hospital computer or on a haemoglobinopathy card the patient should carry. Diagnostic tests do not need repeating. In potential cases with an unknown phenotype, a sickle solubility test and FBC should be performed urgently. Sickle cell trait (AS) will be solubility screen positive but accompanied by a normal FBC. It seldom causes clinical problems and is mainly of importance for genetic counselling and anaesthesia. In all cases of admission with a major sickle cell disorder (SS, SC, S Beta thal) a FBC and film will be required, and the case must be discussed with the Haematology consultant on call. Careful attention to detail with I.V. hydration, oxygenation, vigorous treatment of infection (these patients are hyposplenic), analgesia and avoidance of cold will be required. Pain crises are extremely painful, and the patient should be offered adequate opiate analgesia, usually using morphine. If there are particular concerns, discuss with Haematologist.

The Consultant haematologist must be contacted urgently if a young patient presents with a stroke, or if a chest crisis is suspected, based on hypoxia and /or bilateral CXR changes.

ACUTE UPPER GASTROINTESTINAL BLEEDING

Immediate Assessment

1. Assess if a bleed has occurred: history of vomiting red blood or observation of coffee-ground like vomitus; and/or passage of black or red-black stool (confirmed by observation or rectal examination). If these features are not present, an acute upper GI bleed is unlikely.
2. If an upper GI bleeding is confirmed, assess severity of bleed:
 - a) Can be life threatening in patient aged > 60 years, where there is hypovolaemia (systolic BP < 100mmHg or diastolic BP falls on sitting or standing), Hb < 10mg or where there is severe disease (e.g. in patients with co-existing liver, cardiovascular, respiratory or renal disease).
 - b) Otherwise can be regarded as less severe.
 - c) Blood tests: do Hb, blood U & E, creatinine, liver function tests, coagulation screen, Hep B & Hep C serology; cross match blood if patient has had a severe bleed; blood group and save serum in others.

Immediate Management of the Severe Bleeder

1. Restore blood volume preferably with whole blood but plasma or plasma substitute can be used in life threatening emergencies. Central venous pressure measurement should be used to help determine transfusion requirements with the aim to restore CVP to + 1 cm of water.
2. Keep nil by mouth.
3. Observe for continued bleeding or re-bleeding (as evidenced by e.g. further haematemesis, fall in systolic BP, rise in pulse rate or fall in CVP).
4. Arrange for Endoscopy to be done as soon as possible. On normal working days this means contacting the Endoscopy co-ordinator on extension 5050/5051 as soon as possible. Outside normal hours there is not a formal Endoscopy rota at the moment but usually an Endoscopist can be contacted and arrangements made for an emergency Endoscopy if there is a need.
5. The on call surgical team should be notified about the patient.
6. IV proton pump inhibitor should be commenced.

7. Correct coagulation defects including stopping warfarin if on it. (Patients with e.g. cardiac valve replacements who have bled severely will need to be assessed very carefully).
8. If liver disease is present, avoid sedation; clear bowel with lactulose 30ml tds or an enema.

Follow-Up Treatment of the Patient with Severe Bleeding

1. If (in spite of possible endoscopic intervention) bleeding continues, surgery may be indicated. Patients who generally benefit from surgery are those > 60 years, requiring more than 4 units of whole blood to restore or maintain blood volume over 24 hours or those with continuing bleeding or re-bleeding.
2. For the others, when it has become evident after 12 hours that the patient is neither continuing to bleed or is re-bleeding, clear fluids may be begun. Oral drugs can be recommenced and an oral proton pump inhibitor should be prescribed. Provided that no re-bleeding has occurred by 24 hours, the patient can commence on a normal diet.

Immediate and Follow-Up Management of the Patient with Less Severe Bleeding (as defined above):

Arrange an in-patient Endoscopy by ringing the Endoscopy co-ordinator on extension 5050/5051. Should you want a patient added on a list, it must be agreed by the consultant running the list. Allow fluids by mouth on first day and food thereafter; observe for continued bleeding or re-bleeding and, if bleeding becomes severe, treat as above; otherwise arrange endoscopy on next routine list (with 8-hour period of being nil by mouth before – See page 116).

BLEEDING OESOPHAGEAL VARICES

As under **Acute Gastrointestinal Bleeding**. However, patients with suspected bleeding varices should be nursed at least initially in a high care environment.

Endoscopy

The Endoscopist should confirm the source of bleeding, as patients with known varices often have other sources of bleeding. If appropriate, banding will be carried out.

Balloon tamponade with a Sengstaken-Blakemore tube is needed in patients with known varices if bleeding is exsanguinating (even prior to a confirming endoscopy in an emergency or after an endoscopy has been done). However the use of them can be associated with serious complications they should only be passed by somebody experienced in their use.

Terlipressin (Glypressin®) injection will stop bleeding by lowering portal pressure. Initial dose of 2mg should be given by bolus intravenous injection, followed if necessary by further bolus doses of 1-2mg every 4 - 6 hours until bleeding is controlled, up to a maximum of 72 hours. Reconstitute each 1mg vial with the 5ml of diluent provided. Monitor blood pressure, fluid balance and U & E's throughout therapy. Caution in patients with hypertension, advanced atherosclerosis, cardiac dysrhythmias or coronary insufficiency; concomitant glyceryl trinitrate infusion may be needed in these patients if experiencing severe coronary adverse effects.

Hepatic encephalopathy. This may be precipitated in any patient with hepatic failure who bleeds into the gastrointestinal tract. It is essential to clear blood from the gut with lactulose and/or enemas as mentioned under Acute Gastrointestinal Bleeding. Avoid sedatives and use opiates very cautiously.

WORKING WITH HIV PATIENTS

Patients infected with HIV are most commonly diagnosed on routine serological testing for HIV 1 and 2 antibodies. The Sexual Health Strategy Guidelines, published in 2003 by the Department of Health, requires that all new attendees at GUM departments are offered HIV antibody testing.

Those patients with more advanced disease present with symptoms of an unrelated disease or with an AIDS defining illness.

The high-risk groups in the UK are:-

1. Practising male homosexuals and bisexuals
2. People from Sub-Saharan Africa, particularly Zimbabwe, Botswana, Zambia and South Africa. Other countries with high prevalence rates are India, Russia and Thailand.
3. Sexual partners and children of categories 2 and 3.
4. Intravenous drug users sharing needles only represent (5%) stats in UK
5. Recipients of blood transfusion before 1985

SERO CONVERSION ILLNESS

This occurs approximately 14-28 days after exposure to the virus. It is accompanied by a sore throat, fever, a macular popular rash on the trunk and generalised lymphadenopathy

PREGNANCY

All pregnant women are offered routine HIV antibody screening as an opt-out procedure. The uptake is in excess of 99.7% locally.

The prognosis for the baby is excellent if the diagnosis is made early; anti-retro viral therapy is initiated and delivery is by elective Caesarean section at around 38 weeks. Breast Feeding is **not** recommended risk of transmission is 14%-15%

OCCUPATIONAL EXPOSURE TO BLOOD BORNE VIRUSES AND POST-EXPOSURE PROPHYLAXIS SURVEILLANCE PROGRAMME

- There were 2140 reports of significant exposure incidents to the HPA between 1996 and 2004
- Nursing professionals were involved in 45% and medical professionals 37% of these percutaneous occupational exposures
- Nine Health Care Workers seroconverted (HIV/Hep B/Hep C) during this period. Of the nine seroconversions, five were preventable.
- At a minimum, HCV-RNA should be tested at six weeks, with both HCV-RNA and Hepatitis C antibodies (anti HCV) performed at 12 weeks and again at 24 weeks.
- The HIV seroconversion rate was 0.3% (1 in 300).
- Hepatitis B immunisation or booster is to be offered as required following screening and dependant on risk assessment.
- Health Care Workers who experience significant exposure should be offered post-exposure prophylaxis as early as possible preferably within one hour and within 72 hours for improved efficacy
- A Trust Sharps policy guideline is available. The PEP surveillance scheme operates through the Accident & Emergency department in conjunction with the Department of Sexual Health on PEP on call adviser.

Standard universal precautions to prevent needle stick incidents are the best methods of primary prevention. Simple precautions such as wearing gloves when performing phlebotomy or dealing with a wound etc are usually all that are necessary. Needles should not be re-sheathed. The use of masks and goggles is only occasionally needed when blood may be sprayed or aerosolised from

an injured infected patient. The virus is very fragile outside the body and is inactivated by simple disinfectant solutions and ordinary sterilising measures.

Post-exposure Prophylaxis is available should these measures fail. Please telephone the Sharps hotline (Ext 2405) or Occupational health (Ext 2403) during working hours, or contact the out of hours 'on call' Adviser, via the switchboard or attend accident and emergency.

HIV ANTIBODY SCREENING

Patients seeking confidential advice or counselling can be seen at the Fletcher Unit of Sexual Health first floor out patients. Self referral is encouraged to support confidentiality
A same day HIV testing service is available by appointment on Tuesday mornings. Phone Ext: 3669 or 831609/831607.

REFERRING HIV POSITIVE PATIENTS/SAMPLES TO OTHER DEPARTMENTS

Danger of infections (yellow) labels are available from Pathology and should be attached to the request forms. Please place specimens in a sealable polyethylene bag before placing it in the request form pocket, i.e. 'double bagging'. This is necessary for the protection of the Porters and Laboratory staff. Where specimens are "podded" to the laboratory

The labels should be used when the patient is suspected to have HIV, Hepatitis B, Hepatitis C, TB, Brucellosis, Typhoid, Paratyphoid and Viral Haemorrhagic Fevers, and **must include all patients in a risk category for HIV and Hepatitis B.**

The request form should be labelled as 'risk of blood borne viruses or high risk', rather than with the specific diagnosis, which breaches confidentiality. Necessary information for optimum specimen processing may still be provided without disclosure. If impossible, please discuss individual cases with a Consultant. Samples thought to constitute a risk to staff because of inadequate packing or warning may be discarded unanalysed.

WHEN TO TEST FOR HIV

1. HIV testing should be offered wherever knowledge of the individual's HIV status could improve or affect clinical outcome. Patient's best interests.
2. Doctors should strongly recommend HIV testing when a differential diagnosis is suspected.
3. Testing of unconscious patients where high probability of HIV is possible where two clinicians agree best interests of patient

This would include:

- Any unusual manifestations of bacterial, fungal or viral disease, i.e:
 - Infection with tuberculosis
 - Suspected *Pneumocystis carinii* pneumonia
 - Suspected cerebral toxoplasmosis
 - Oral/oesophageal candidiasis
 - Oral hairy leukoplakia
 - Persistent genital ulceration and recurrent severe genital candidiasis
 - Tinea pedis and onychomycosis of toes
 - Persistent severe seborrhoeic dermatitis and folliculitis
 - Presence of another blood-borne or sexually transmitted infection e.g. syphilis, hepatitis B or Hepatitis C
 - Suspected primary infection with seroconversion illness (e.g. flu-like illness, suspected glandular fever with negative EBV serology)
- Unusual tumours. i.e. cerebral lymphoma, non-Hodgkin's lymphoma or Kaposi's sarcoma
- Unexplained thrombocytopenia or lymphopenia, atypical psoriasis or extensive molluscum; and, re-occurring herpes zoster in a young person.
- Persistent generalised lymphadenopathy or unexplained lymphoedema
- Neurological problems including peripheral neuropathy or focal signs due to space-occupying intra-cerebral lesion
- Unexplained weight loss or diarrhoea, night sweats, or pyrexia of unknown origin.
- Any other unexplained ill health or diagnostic problem

3. **In addition**, for problems which require immuno-suppression, the exclusion of HIV should be considered prior to treatment. This list is not intended to be exhaustive and physicians are encouraged to use their clinical judgement.
4. **Clinical Nurse Specialist can be contacted on pager 076595139798 for complex cases**

HOW TO TEST FOR HIV

1. If established infection is suspected, an HIV antibody test should be performed on venous blood. Patients should be tested on presentation, but as HIV antibodies do not appear in the blood until some weeks after infection this test should be repeated 12 weeks after any suspected contact with the virus. Patients, however, may be infectious to others during this period prior to serconversion (the 'windowperiod') and should be advised of this. Baseline antibody testing is often useful with a repeat at 6 weeks and 12 weeks if there is high suspicion of infection.
2. A viral load may be a useful investigation and a fourth generation HIV antibody test which can be arranged through sexual health or the microbiology department extn 3560
3. HIV genome testing is also possible to support early diagnosis

OBTAINING CONSENT FOR HIV TESTING

1. Testing should be undertaken only with the individual's specific informed verbal consent which should be documented.
2. Pre-test discussion should include the following:
 - The benefits of testing to the individual (and significant other)
 - A risk assessment, including date of last risk activity to determine window period (see above)
 - How confidentiality will be maintained
 - Information on insurance issues where relevant most insurance companies ask if there has been a positive result only
 - Details of how the result will be given
 - Information about HIV transmission and risk reduction as necessary.
3. Testing should be considered for all patients if the outcome could affect their treatment. For patients who are unconscious or unable to understand what is being said to them, testing should be considered on a case-by-case basis according to their healthcare needs and in discussion with an HIV specialist. Care should be taken with the results of tests on unconscious patients, for example ITU where patients' relatives may wish to know information about status of a patient who is not able to consent to its disclosure. These complex cases require the expertise of an HIV specialist contact 01243 831607 and ask for a Health Adviser or CNS "Best Interests" on the patient to be considered as paramount
4. If a healthcare worker has occupational exposure, and testing of the source patient is considered necessary, the patients consent should be obtained. The obtaining of consent and testing should not be undertaken by the injured health care worker but by another responsible doctor/Health Adviser or CNS.
5. Please refer to the Trusts' Policy, which can be found in the Clinical Policies section of Staff net. <http://www.westernsussexhospitals.nhs.uk/clinical-resources/clinical-policies/>

FEEDBACK OF RESULTS

1. Arrangements for communicating the results should be discussed with the patient at the time of testing. Ideally this should be face to face where a positive result is likely or for certain patients with particular issues. (In the future, use of point of care tests may be appropriate in certain circumstances to enable results to be given on the same day) although the microbiology lab can usually provide a result within 4 hours
2. All HIV positive patients should be referred to a GUM or HIV specialist for further advice and management.
3. Post-test discussion in a GUM clinic should be offered with the view to discuss risk assessment and retesting where clinically necessary

THE 6 STEPS OF SEPSIS MANAGEMENT

STEP		SEPSIS	SEVERE SEPSIS /SEPTIC SHOCK
1	Document and Discuss	<ul style="list-style-type: none"> - Screen to identify source - Discuss treatment with F1/F2 - Monitor observations 2-4 hourly - MEWS > 3 contact CNS bleep 342 <p style="text-align: center;">Decision to treat</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>YES</p> <p>Go to step 2</p> </div> <div style="text-align: center;"> <p>NO</p> <p>Symptom control/LCP</p> </div> </div>	<ul style="list-style-type: none"> - Screen to identify source - Discuss treatment with F1/F2 - Monitor observations 1-2 hourly - MEWS >3 contact CNS bleep 342 <p style="text-align: center;">Decision to treat</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>YES</p> <p>Go to step 2</p> </div> <div style="text-align: center;"> <p>NO</p> <p>Symptom control/LCP</p> </div> </div>
2	Blood Cultures	<ul style="list-style-type: none"> - Take blood cultures as per protocol - IV access - Check Blood Glucose - Dipstick urine / MSU - Consider routine bloods 	<ul style="list-style-type: none"> - Take blood cultures as per protocol - IV access - Check Blood Glucose - Dipstick urine / MSU - Send routine bloods
3	Antibiotics	<ul style="list-style-type: none"> - Consider antibiotics and administer within 1 - 3 hours 	<ul style="list-style-type: none"> - Administer IV antibiotics within 1 hour
4	Lactate and Hb Measurement	<ul style="list-style-type: none"> - Consider measuring serum lactate and Hb, obtained via ABG or venous sample - Transfuse if Hb <7g/dl 	<ul style="list-style-type: none"> - Measure serum lactate and Hb, obtained via ABG or venous sample - Transfuse if Hb <7g/dl
5	Initial fluid resuscitation bolus	<ul style="list-style-type: none"> - Consider urinary catheter - Monitor fluid balance <p>If hypotensive and/or lactate > 4</p> <ul style="list-style-type: none"> - Initiate fluid challenge of 20ml/kg crystalloid - 10ml/kg of colloid and monitor response 	<ul style="list-style-type: none"> - Insert urinary catheter - Monitor fluid balance hourly <p>If hypotensive and / or lactate > 4</p> <ul style="list-style-type: none"> - Initiate fluid challenge of 20ml/kg crystalloid - 10ml/kg of Colloid and monitor response
6	Senior review for ongoing management	<ul style="list-style-type: none"> - Ensure all appropriate specimens sent - Consider CXR - Consider ECG - Administer oxygen as instructed/prescribed - Senior review to discuss treatment plan 	<ul style="list-style-type: none"> - Ensure all appropriate specimens sent - CXR - ECG - Administer oxygen - Senior review to discuss treatment plan - Consider ICU referral - Achieve CVP of >8 mmHg - Achieve ScvO2 > 70% - Consider insulin sliding scale if BM> 15mmol/L - Document resuscitation status

Definitions

SIRS – Systemic Inflammatory Response Syndrome

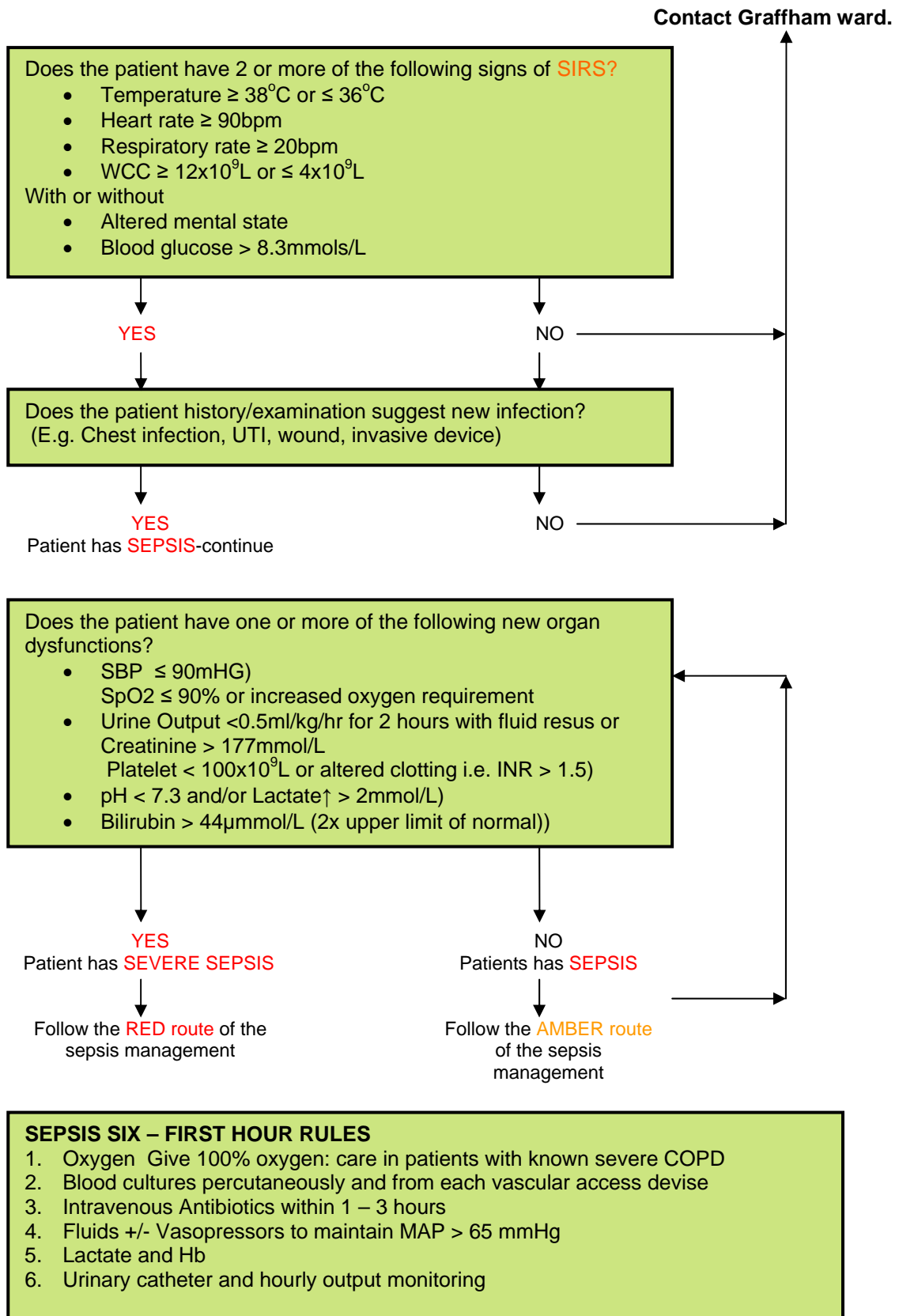
SEPSIS – A suspected or known infection, accompanied by two or more of the SIRS criteria

SEVERE SEPSIS – Sepsis associated with one or more organ dysfunction

SEPTIC SHOCK – Severe Sepsis with refractory hypotension which does not respond to fluid resuscitation

IDENTIFYING SEPSIS ON THE WARD

Is the patient currently on or recently received chemotherapy and now feeling unwell?
If yes follow the Neutropenic Sepsis guideline.



BLOOD CULTURE GUIDELINES

The following two pages have been removed due to an update to the Blood Culture Guidelines.

Current information can be found:

<http://www.westernsussexhospitals.nhs.uk/clinical-resources/patient-safety/infection-control>

Scrolling to the bottom of the list and clicking on 'Taking Blood Cultures.'

OUT OF HOURS INVESTIGATIONS

There is always pressure on laboratory out of hours services, which are provided by volunteer Biomedical Scientists. Please only request **essential tests** after midnight. The consultants monitor the requests for abuses. Essential tests are those where the result will have a high probability of influencing the *immediate* management of the patient. Other samples may be taken and sent to the lab to be analysed the next day. Please do not bleep the on call Biomedical Scientist after midnight for these tests. Where possible, these results will be available on Sema before 10am the following day.

Many patients have multiple problems and there will always be exceptions. However, the consultant body has proved supportive of rational requesting of on call pathology services. At a recent audit session, the following were agreed;

FBC results between midnight and 8am NOT required in:

Myocardial infarction, unstable angina, chronic obstructive airways disease \pm infections, asthma, stroke, epilepsy, most overdoses, DVT/pulmonary embolism, abdominal pain, emergency Caesarean sections (unless Hb not demonstrated to be > 10.5 at 36 weeks+ or <4 weeks ago).

'Clotting' NOT required unless:

On anticoagulants, massively transfused or a generalised bleeding tendency is evident or the clinical scenario suggests DIC. Urgent clotting not required at presentation in DVT/PE.

Cardiac Enzymes

These are not routinely to be requested on all chest pains.

Microbiology

MSU requests after midnight must be cleared with Dr M Greig (extension 3548).

ASTHMA

The death rate from asthma in the young is still what it was in the 1950's in spite of greater therapeutic resources. It is believed that nearly all these deaths are preventable, and that they arise from a common failure to recognise the seriousness of asthma.

Initial Assessment

When a patient finds that a bronchodilator aerosol fails to give the expected relief in amount, and especially in duration, corticosteroids should be given in adequate doses without delay: they can usually be decreased progressively over the next few days.

A patient who remains severely obstructed after the proper administration of a β -stimulant, e.g. salbutamol, should be admitted as an emergency, as should anyone who has remained in respiratory distress for 6 hours or more. Assessment of severity of obstruction is not easy, and it is essential to give the patient the benefit of any doubt. Marked inspiratory deformation of the chest, use of the abdominal muscles in expiration, respiratory rate greater than 20/min., peak expiratory flow rate of less than 150L/min. and a pulsus paradoxus of greater than 15mmHg are all signs of severe obstruction. A heart rate of 100 or more is a further indication that progress is not satisfactory. Wheeze sometimes decreases with increasing obstruction and the cerebral effects of anoxia are sometimes mistaken for neurotic over reaction.

TREATMENT OF ACUTE ASTHMA IN ADULTS

Monitoring

Arterial blood gases should be measured, and this may need to be done repeatedly to assess progress. The patient should have a pCO₂ below 5Kpa (33mmHg). A higher figure (pCO₂ 5-6Kpa, 38-45mmHg) should warn of the risk of imminent respiratory failure. Make arrangements so that, if required, mechanical ventilation can be instituted immediately. Initially peak flow measurements should be made 1-2 hourly. Beware the asthmatic with a 'normal' pCO₂.

Oxygen

Patients with acute severe asthma are hypoxaemic. This should be corrected urgently using high concentrations of inspired oxygen (usually 40-60%) and a high flow mask such as a Hudson mask. Unlike patients with COPD there is little danger of precipitating hypercapnea with high flow oxygen. Hypercapnea indicates the development of near-fatal asthma and the need for emergency specialist/ anaesthetic intervention. As per the SRH oxygen guidance (2008) maintain Sats at >94%. Arterial blood gases should be measured initially to assess and repeated within 2 hours of starting treatment or more frequently if condition worsens.

Additional Measurements

Measure and record PEF 15-30minutes after starting treatment and thereafter according to response. Measure and record PEF before and after nebulised or inhaled Beta 2 bronchodilator (at least 4 times a day) throughout hospital stay and until controlled after discharge. Also measure and record heart rate, serum potassium and serum glucose concentrations. Measure the serum theophylline concentration if on theophylline on admission or if an aminophylline infusion is continued for more than 24hrs. Inform Respiratory Nurse Specialist Sonja Rosell on bleep 179

Bronchodilation

Nebulised salbutamol (5mg in 4ml normal saline) driven by oxygen at a flow rate of 6-8 litres per minute should be given initially every 30 minutes then reduced to 4 hourly.

Steroid Therapy

Steroids reduce mortality, relapses, subsequent hospital admissions and requirements for Beta 2 agonist therapy. The earlier they are given in the acute attack the better the outcome.

Give Steroids in adequate doses in all cases of acute asthma.

Steroid tablets are as effective as injected steroids provided they can be swallowed and retained. Prednisolone 40-50mgs daily or parenteral hydrocortisone 400mgs daily (100mgs six hourly) are as effective as higher doses.

Continue prednisolone 40-50mgs for at least 5 days or until recovery.

Beta 2 Agonists

Oxygen driven nebulisers are preferred to nebulise beta 2 agonist bronchodilators in hospital. In most cases inhaled beta 2 agonists given in high doses act quickly to relieve bronchospasm with few side effects. There is no evidence for any difference in efficacy between salbutamol or terbutaline. Use high dose inhaled beta 2 agonists as a first line agent in non-life threatening acute asthma by repeated activations of a MDI via a large volume spacer, administer as early as possible. Reserve intravenous Beta 2 agonist for those patients in whom inhaled therapy cannot be used reliably.

In severe asthma (PEF or FEV₁ < 50% best or predicted) and asthma that is poorly responsive to an initial bolus dose of beta 2 agonist, consider continuous nebulisation.

Repeat doses of Beta 2 agonists at 15-30 minute intervals or give continuous nebulisation of salbutamol at 5-10mg /hour (Higher doses of salbutamol are unlikely to be more effective).

Ipratropium Bromide

Combining nebulised ipratropium bromide with a nebulised Beta 2 agonist produces significantly greater bronchodilation than a Beta 2 agonist alone, leading to a faster recovery and a shorter length of admission .

Add nebulised ipratropium bromide (0.5mg 4-6hrly) to Beta 2 agonist treatment for patients with acute severe or life threatening asthma or those with a poor initial response to Beta 2 agonist.

Intravenous Salbutamol / Terbutaline

Parenteral B2 agonists (or terbutaline) may have a role in ventilated patients or severe cases where inhaled therapy cannot be used reliably.

- A continuous I.V. infusion of a solution containing 10 micrograms/ml of salbutamol may be given at a rate of 3 to 20 micrograms/minute.
- If terbutaline is preferred a continuous I.V. infusion of a solution containing 5 micrograms/ml of terbutaline may be given at a rate of 2.5 to 5 micrograms/minute.

Alternatively terbutaline (although unlicensed) has been given as a continuous subcutaneous infusion at a rate of 7.5mg to 15mg daily. For further information on dilution or administration please see St. Richard's Hospital Intranet-Injectable Medicines (Adults) Policy –.

Intravenous Magnesium Sulphate

A single dose of Magnesium sulphate is safe and effective in patients with acute severe asthma. Consider giving a single dose of magnesium sulphate to patients with acute severe asthma who have not had a good initial response to inhaled bronchodilator therapy, or is life threatening or near fatal. IV magnesium sulphate (1.2-2g IV infusion over 20mins) should only be used following consultation with senior medical staff.

See St. Richard's Hospital Intranet-Pharmacy Injectable Medicines (Adults) Policy –

NOTE 200mgs = 0.8mmols so 2gms = 8mmols

Intravenous Aminophylline

Aminophylline may be used in patients if sufficient control is not achieved by the above.

If you know or suspect that the patient already takes oral theophylline or aminophylline DO NOT give I.V. aminophylline without first taking a plasma theophylline level. Contact MLSSO on-call for biochemistry.

Therapeutic range = 8-20 mg / L

Signs of toxicity include: Nausea and vomiting
Shaking
Tachycardia
Seizures

NB: Life threatening side effects are not necessarily preceded by minor side effects.

Factors affecting maintenance dose

The diseases listed below significantly alter the clearance of aminophylline or theophylline. A failure to take account of them may result in a patient receiving an inappropriate dose.

Age / disease	Factor *
Smoker / recent ex-smoker	1.6
Severe CCF	0.4
Acute pulmonary oedema	0.5
Hepatic cirrhosis	0.5
Severe pulmonary obstruction FEV ₁ <1 litre / min	0.8
Child - Call senior paediatrician	
All Other Patients	1.0

Note * A factor greater than one indicates that clearance is increased.
A factor less than one indicates that clearance is reduced.

Patients who have NOT taken oral aminophylline / theophylline

1. Give a loading dose of IV aminophylline while patient is on a cardiac monitor.

If the patient is *not* obese....

Loading dose = 5mg per kg IV over 20 minutes via syringe driver.

If the patient is obese, contact Drug Information (ext 3344) or bleep the pharmacist On-call.

2. Once the loading dose has been given, start a maintenance infusion.

Add 500mg of aminophylline to 500ml of sodium chloride 0.9% to produce a 1mg/ml infusion. The dose in ml per hour will be the same as the dose in mg per hour.

The maintenance dose required will also depend on obesity, concurrent disease or drug treatment. For a list of disease factors, see previous page. If help is needed, contact pharmacy for advice, otherwise...

Maintenance dose = 500micrograms x disease factor x wt.(kg) per hour

3. Check aminophylline level. This should be done 4-8 hours after starting the maintenance infusion and after discussion with the MLSO on-call in biochemistry.

If level is within range, continue on the same maintenance infusion. Further levels should be taken every 24 hours or earlier if toxicity is suspected. If the level comes back above the therapeutic range, **STOP THE INFUSION IMMEDIATELY.**

For advice on levels outside the therapeutic range, contact drug information or the pharmacist on-call. Once the patient is on a stable dose, cardiac monitoring is not usually required.

4. Monitor for signs of toxicity.

If it is known or suspected that the patient already takes oral theophylline or aminophylline

I. Take theophylline level as soon as possible. Do not give any IV aminophylline until level is known.

II. If level is: WITHIN RANGE: Do not give a loading dose, but follow guidelines on giving an IV maintenance dose if appropriate.

OUTSIDE RANGE: Contact pharmacy for further advice if necessary.

NOTE

“ To avoid excessive dosage in obese patients dose should be calculated on the basis of ideal height for weight” BNF March 2009

Intravenous Fluids

There are no controlled trials, observational or cohort studies of differing fluid regimes in acute asthma. Some patients will require rehydration and correction of electrolyte imbalance .

Hypokalaemia can be caused or exacerbated by Beta 2 agonists and /or steroid treatment and must be corrected.

Hydration

Patients tend to become dehydrated because of decreased intake and loss by hyperventilation.

The under hydration may in turn increase the tenaciousness of the bronchial plugs. Glucose 5% should be given I.V. in amounts adequate to maintain good urine flow. There is also a tendency to metabolic acidosis, and its correction with isotonic sodium bicarbonate may improve the response to stimulants.

Antibiotics

Please refer to hospital antibiotic policy, if productive cough send sample, request chest physiotherapy. Routine prescription of antibiotics is not indicated for acute asthma

Referral to Intensive Care

Indications for admission to intensive care or high dependency will include patients requiring ventilatory support and those with severe acute or life threatening asthma who are failing to respond to therapy, as evidenced by:

- Deteriorating PEF
- Persisting or worsening hypoxia
- Hypercapnea
- Arterial blood gas showing a fall in PH or a rising H⁺ concentration
- Exhaustion, feeble respiration
- Drowsiness, confusion
- Coma or respiratory arrest

All patients transferred to the intensive care unit should be accompanied by a doctor suitably equipped and skilled to intubate if necessary.

- Acute Asthma Care Pathway can be found on Staffnet under Departments/ Respiratory/ St.Richards Downloads:
- <http://www.westernsussexhospitals.nhs.uk/who-what-where/departments/respiratory/srh/>

CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

Exacerbations of COPD remain a major part of the acute medical workload.

Assessment

It may be difficult to assess patients with COPD, but note: -

1. signs of respiratory distress
2. cyanosis
3. tachypnea/hypopnea
4. arterial blood gas analysis (always a good idea): in acidotic patients, the mortality risk is at least comparable to acute Myocardial Infarction.

Also, in the history

- Beware the patient with a label of “asthma” who has a significant smoking history, because; there is no such thing as a “non-smoker” **only current, ex or never smokers** (of current, how much for how long; if ex, how much and how long ago).

Management

1. Oxygen: hypoxia in COPD needs treating, but with caution, as many patients are very sensitive to oxygen It is best to use Venturi masks as these give a definite percentage: nasal cannulae and other masks may not be as accurate.. When patients have been on oxygen or the F₁ O₂ is changed, repeat Arterial Blood Gases (ABG) after 30-60 minutes. Give oxygen to maintain SaO₂ between 88% - 92%. (as per BTS guidelines)
2. Medical therapy: give salbutamol nebule (5mg 4 hourly) and add ipratropium nebulisers (500mcg qds)* prednisolone 30mg, for 7- 14days,a reducing dose may be required. Patients who are not improving may benefit from IV aminophylline, although this should be used with caution in patients with ischaemic heart disease. In the event of type II respiratory failure diagnosis hypopnea, a doxapram infusion may be useful.
3. Do not stop the inhalers that the patient is normally on EXCEPT if the patient is having Ipratropium nebules and currently takes an Atrovent or Tiotropium inhaler then stop that inhaler only for the length of time they are having nebulisers and then restart it again.

4. If a COPD patient is acidotic, using non-invasive ventilation (NIV), (preferably BiPAP rather than CPAP) reduces mortality and allows patients to recover quickly. If NIV fails, you may need to discuss your patient with senior colleagues and ITU.
5. Chest X-ray
6. Full Blood Count and Urea and Electrolytes
7. Theophylline level if patient on theophylline on admission
8. Sputum Microscopy and culture if purulent.
9. Record MEWS score and keep senior staff informed.
10. Consider Cor Pulmonale in patients who have
 - peripheral odema
 - a raised venous pressure
 - a systolic parasternal heave
 - a loud pulmonary second heart sound
11. Assess patients with Cor Pulmonale for the need for long term oxygen therapy
12. Consider treating oedema with diuretic therapy

Assessment remains important: repeat examination and Arterial Blood Gases (ABG) are recommended hourly up to 4 hours.

NOTE: NIV is inappropriate in asthma, patients should be admitted to ITU for ventilation.

- ❖ **Oxygen is a drug and as such must be prescribed on the inpatient drug chart for a patient to use if required.**

Respiratory Failure: type I; $pO_2 < 8$, $pCO_2 < 6$: type II: $pO_2 < 8$, $pCO_2 > 6$

- For Antibiotics [see pages 60 onwards](#)

Setting up NIV

- Explain NIV to the patient.
- Select a mask to fit the patient and hold it in place to familiarise the patient.
- Set up the ventilator
- Attach pulse oximeter to patient.
- Commence NIV, holding the mask in place for the first few minutes.
- Secure the mask in place with straps/headgear.
- Reassess after a few minutes.
- Adjust settings if necessary
- Add oxygen if SpO₂ <85%.
- Instruct the patient how to remove the mask and how to summon help.
- Clinical assessment and check blood gases at 1–2 hours.
- Adjust settings/oxygen if necessary.

Contraindications

- Facial trauma/burns
- Recent facial, upper airway, or upper gastrointestinal tract* surgery
- Fixed obstruction of the upper airway
- Inability to protect airway*
- Life threatening hypoxaemia*
- Haemodynamic instability*
- Severe co-morbidity*
- Impaired consciousness*
- Confusion/agitation*
- Vomiting
- Bowel obstruction*
- Copious respiratory secretions*
- Focal consolidation on CXR
- Undrained pneumothorax*
- acute asthma

*NIV may be used, despite the presence of these contraindications, if it is to be the "ceiling" of treatment.

Refer for long term NIV if:

- Chest wall/ neuromuscular disease
- Spinal cord problems
- Failure to wean
- 3 admissions with AHRF in COPD

NIV in acute respiratory failure in Adults

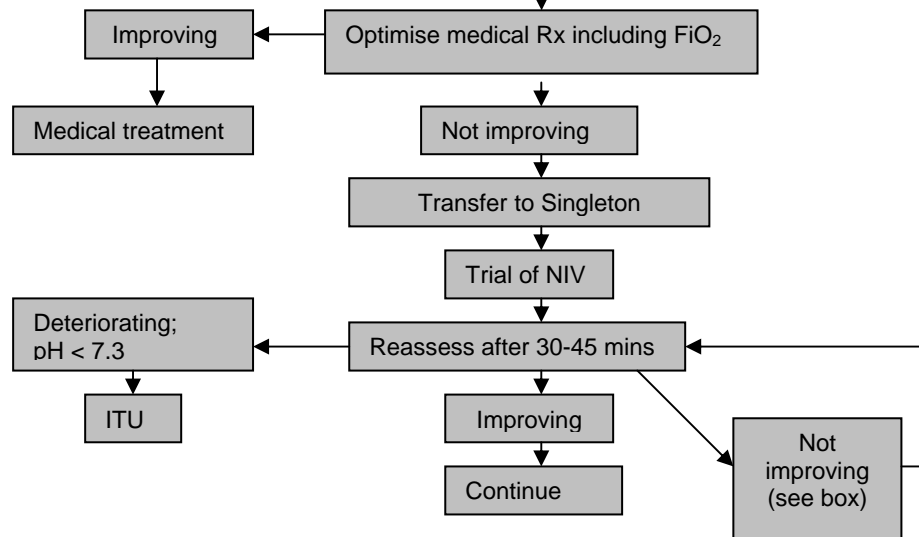
Consider in patients with

- COPD with pH 7.25-7.35, raised pCO₂
- Chest wall deformity, neuromuscular disorder, decompensated OSA
- Cardiogenic pulmonary oedema, unresponsive to CPAP

Premorbid state

- Potential for recovery to quality of life acceptable to the patient
- Patient's wishes considered

Decide if invasive ventilation is appropriate if NIV fails



Typical initial ventilator settings

for acute respiratory failure in COPD
 Mode: Spontaneous/timed
 EPAP 4–5 cm H₂O
 IPAP 12–15 cm H₂O (to be increased as tolerated to 20 cm H₂O)
 Triggers: maximum sensitivity
 Back up rate: 15 breaths/min
 Back up I:E ratio 1:3

Monitoring

Clinical: pulse, RR
 Chest wall movement
 Accessory muscle use
 Coordination with NIV
 Comfort, mental state

Inx: ABGs 0,1,4 hours
 transcutaneous CO₂ & O₂

Failure to improve?

Is the treatment of the underlying condition optimal?

- Check medical treatment and that it has been given
- Consider physiotherapy for sputum retention

Have any complications developed?

- Consider a pneumothorax, aspiration pneumonia, etc

Paco₂ remains elevated

- adjust O₂ to maintain SaO₂ between 85- 90%
- Is there excessive leakage - check mask fit
 - if nasal mask, consider chin strap or full-face mask
- check the circuit set up - check connections, leaks
- Is re-breathing occurring – is expiratory valve patent
 - consider increasing EPAP (if bi-level pressure support)
- Is the patient synchronising with the ventilator
 - adjust rate and/or IE ratio (with assist/control)
 - check inspiratory and expiratory trigger
 - consider increasing EPAP (in COPD)
- Is ventilation inadequate - observe chest expansion
 - increase target pressure (or IPAP) or volume
 - consider increasing inspiratory time
 - consider increasing resp rate (increases minute ventilation)
- Consider a different mode of ventilation/ventilator

Paco₂ improves but Pao₂ remains low

- Increase FiO₂
- Consider increasing E_{pa}

Setting up NIV

- Explain NIV to the patient.
- Select a mask to fit the patient and hold it in place to familiarise the patient.
- Set up the ventilator
- Attach pulse oximeter to patient.
- Commence NIV, holding the mask in place with the cpap valve off for the first few minutes and then attach valve.
- Secure the mask in place with straps/headgear.
- Reassess after a few minutes.
- Adjust settings if necessary
- Add oxygen if SpO₂ <85%.
- Instruct the patient how to remove the mask and how to summon help.
- Clinical assessment and check blood gases at 1–2 hours.
- Adjust settings/oxygen if necessary.

Contraindications

- Facial trauma/burns
- Recent facial, upper airway, or upper gastrointestinal tract* surgery
- Fixed obstruction of the upper airway
- Inability to protect airway*
- Life threatening hypoxaemia*
- Haemodynamic instability*
- Severe co-morbidity*
- Impaired consciousness*
- Confusion/agitation*
- Vomiting
- Bowel obstruction*
- Copious respiratory secretions*
- Focal consolidation on CXR
- Undrained pneumothorax
- Acute asthma

*NIV may be used, despite the presence of these contraindications, if it is to be the "ceiling" of treatment.

NOTE IF USING CPAP VIA THE VITAL SIGNS WHISPER FLOW CIRCUIT A **NON VENTED** MASK MUST BE USED AND THE BRIDGE OF THE NOSE MUST BE PROTECTED AGAINST PRESSURE INJURY.

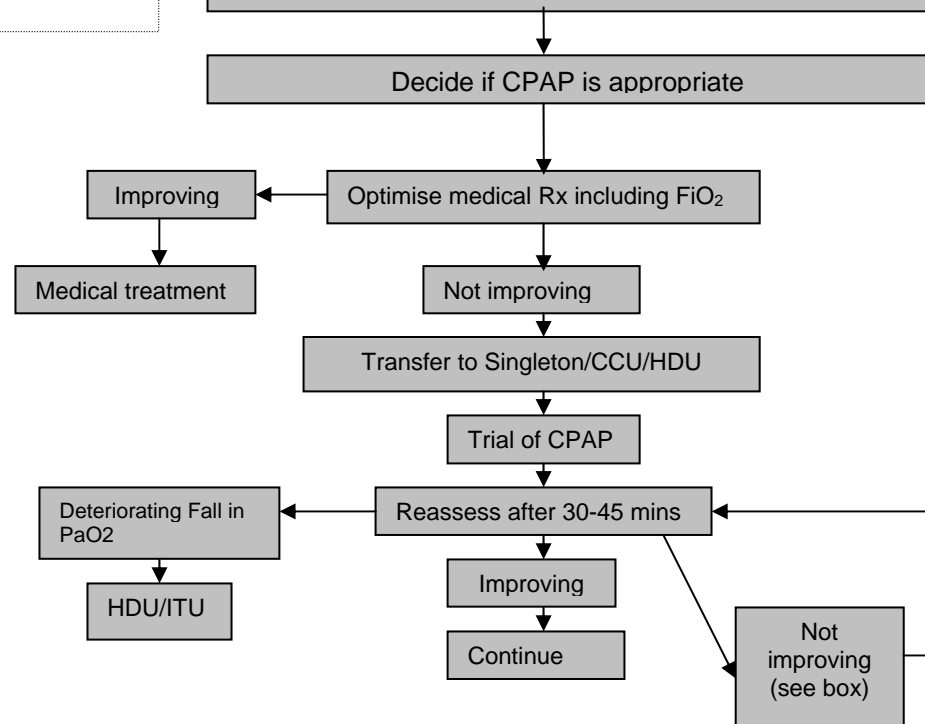
NIV in acute respiratory failure in Adults CPAP

Consider in patients with

- Type 1 Respiratory Failure PaO₂ < 8kpa with normal PCO₂
- Patients requiring high concentrations of oxygen > 60%
- Acute Lung Injury
Cardiogenic pulmonary oedema and LVF
To Mobilise secretions

Premorbid state

- Potential for recovery to quality of life acceptable to the patient
- Patient's wishes considered



Typical initial CPAP settings

for Acute Type I Respiratory Failure
Mode: CPAP
IPAP: 5-10 CMS H₂O

Monitoring

Clinical: Pulse, RR, BP, MEWS
Transcutaneous O₂
Chest wall movement
Accessory muscle use
Comfort, Mental State

Inx: ABGs 0,1,4 hours
transcutaneous CO₂ & O₂

Failure to improve?

Is the treatment of the underlying condition optimal?

- Check medical treatment and that it has been given
- Consider physiotherapy for sputum retention

Have any complications developed?

- Consider a pneumothorax, aspiration pneumonia, etc

PaO₂ remains low

- Is there excessive leakage – check mask fit
- Check the circuit set up

- Increase IPAP/CPAP incrementally by 2.5cms H₂O
If IPAP raised to maximum 10cm then and not improving, anaesthetic advise should be sought

- Increase FiO₂ to maintain saturations >90%

- If PaO₂ remains low and evidence of increased work of breathing consider BIPAP

ANAPHYLAXIS

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 which in hospital is now most commonly due to medicines such as penicillins, antisera, contrast media, vaccines or antigens given for 'desensitisation'. Other causes for those admitted to hospital with symptoms are commonly food (dairy, protein based i.e. fish, shell fish, nuts, some fruits) and stings. Latex allergy is not common but also may be a cause in hospital.

Adrenaline, ½ ml of a 1:1000 solution (i.e. 500micrograms) should be injected IM and this can be repeated if necessary after 5 mins. Chlorphenamine (Piriton) should be given IV in a dose of 10-20mg.

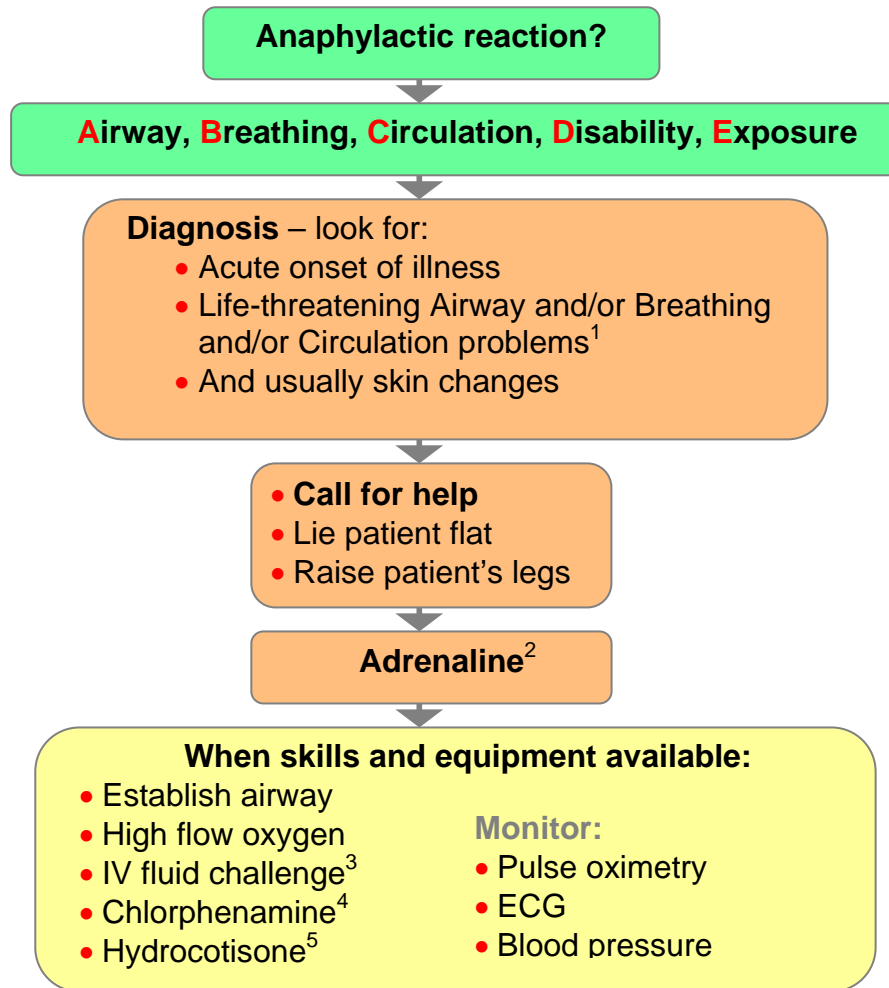
Remember - in patients who have been on long-term corticosteroids, full adrenal function may take months or even years to recover. In emergencies it is safest to assume that impairment persists.

If, despite adrenaline and chlorphenamine, there is significant upper airway obstruction, the patient should be intubated as a medical emergency. If asthma develops give nebulised salbutamol 5mg, and ipratropium 500mcg; if hypotensive, give 0.5 - 1 litre of sodium chloride 0.9%/ Hartmanns. Hydrocortisone 200mg IV can be given as a second line treatment, although these will not show effect until 4 – 6 hours, but will aid symptoms later on.

Ensure that the name of the agent that caused the reaction is written prominently in the patient's notes. Ideally blood should be taken for Mast cell tryptase at 1 -2 hours after onset of symptoms (once patient resuscitated), and at 24 hours or at follow up.

See accompanying flow chart [Resuscitation council guidelines page 21/54](#)
Or below

RESUSCITATION COUNCIL (UK) ANAPHYLAXIS ALGORITHM



¹ Life-threatening problems:

Airway: swelling, hoarseness, stridor

Breathing: rapid breathing, wheeze, fatigue, cyanosis, SpO₂ <92%, confusion

Circulation: pale, clammy, low blood pressure, faintness, drowsy/coma

² Adrenaline *(give IM unless experienced with IV adrenaline)*

IM doses of 1:1000 adrenaline (repeat after 5 min if no better)

- Adult 500 micrograms IM (0.5mL)
- Child more than 12 years: 500 micrograms IM (0.5mL)
- Child 6-12 years: 300 micrograms IM (0.3mL)
- Child less than 6 years: 150 micrograms IM (0.15mL)

Adrenaline IV to be given only by experienced specialists

Titrate: Adults 50 micrograms; Children 1 microgram/kg

³ IV fluid challenge:

Adult – 500 -1000 mL

Child – crystalloid 20 mL/kg

Stop IV colloid if this might be the cause of anaphylaxis

⁴ Chlorphenamine (IM or slow IV)

Adult or child more than 12 years

10mg

Child 6-12 years

5mg

Child 6 months to 6 years

2.5mg

Child less than 6 months

250 micrograms/kg

⁵ Hydrocortisone (IM or slow IV)

200mg

100mg

50mg

25mg

INSULIN REGIMES FOR DIABETIC PATIENTS

All patients requiring insulin should be referred to the Diabetic Team to ensure they are informed of patient's admission.

There are standardised Sliding Scales prescriptions available on the wards for: -

- Diabetic patients who are required to be Nil By Mouth
- Patients with Acute Myocardial Infarction (DIGAMI)

Sliding Scales are not to be used for Diabetic Ketoacidosis Management please see the information below.

SEVERE DIABETIC KETOACIDOSIS / HYPEROSMOLAR COMA

Diabetic Ketoacidosis

Diabetic ketoacidosis has a mortality of 2-5%, but may be as high as 50% in the elderly. Delays in presentation and treatment result in increased mortality. Ketoacidosis occurs as a result of insulin deficiency and counterregulatory hormone excess, and may be precipitated by infection in up to 50% of cases. Insulin deficiency results in hyperglycaemia and excess production of ketones, which cause acidosis and osmotic diuresis. The latter may be severe enough to cause cardiovascular collapse.

Assessment

Prompt clinical assessment and initiation of treatment is key to reducing hospital mortality. A senior member of the on call medical team should be closely involved at all stages.

The diagnosis is usually obvious clinically, and *investigation results are not usually needed before commencing treatment*. Time should **not** be wasted on elaborate history taking – the only key information required at this stage is the need for immediate resuscitation.

Resting tachycardia, hypotension and impaired level of consciousness should prompt admission to ITU.

Treatment should be commenced as soon as blood samples are collected for the following investigations:

- Arterial blood gases
- Lab glucose
- Urea & electrolytes
- Full blood count
- Urine ketones
- CXR, ECG blood and urine cultures – after commencing treatment.

Management

Fluids and insulin should be commenced as soon as IV access is gained, as outlined on next page.

General Measures

- Large peripheral or preferably central venous access
- Continuous central venous pressure (if access present)
- BP monitoring
- NBM until metabolic abnormalities are corrected
- NG tube if consciousness is impaired
- Prophylactic heparin
- Oxygen
- Antibiotics if there is evidence of bacterial infection (slight neutrophilia is usual and may not indicate infection).

Fluids

Total fluid deficit may be in the region of 5 litres. Rapid correction is needed for haemodynamic stability, but may not be possible if the patient has LV dysfunction. Continuation of IVI is needed until the metabolic abnormalities are corrected and the patient is able to retain oral fluids. Review potassium requirements as soon as initial results are available, as mentioned below.

- Normal LV function: 2 litres of sodium chloride 0.9% in the first 2 hours, 2 litres in the next 4 hours followed by 1 litre in 4 hours. Subsequent infusion rate can be reduced to 6 hourly litres. Once plasma glucose is <11 mmol/l, substitute with 5% glucose. CVP and urine output should be monitored regularly.
- If LV impairment is suspected: first 2 litres sodium chloride 0.9% over 4 hours, subsequent rate of infusion should be based on CVP, blood pressure and clinical assessment. Change to 5% glucose <11 mmol/l.

Potassium

Potassium is often falsely high at presentation because of acidosis. Potassium may be measured using a venous heparinized sample on a blood gas machine, checking with a laboratory measurement if any doubt. Levels should be checked hourly until acidosis is corrected, then 2-4 hourly for the next 12 hours. Ready made I.V. fluids containing 20mmol/l or 40mmol/l potassium are available and should be used.

40 mmol/l if <3.0
30 mmol/l if 3.0 – 4.0
20 mmol/l if 4.1 – 5.0
10 mmol/l if 5.1 – 6.0
none if >6.0

See 'Potassium Chloride Concentrate Solutions-Use of':
Staffnet- Departments/Pahrmacy/St.Richards/Policies

Insulin

Commence 6-8 units of soluble insulin per hour (50 units of Actrapid in 50ml 0.9% sodium chloride) to drop blood glucose by 5 mmol/hour. Occasionally up to 10units/hr is needed to achieve this. The infusion rate should be reduced subsequently to keep blood glucose around 10 mmol/l until after ketoacidosis has cleared (usually needs 3-6 units/hour).

Once the metabolic abnormalities are corrected and the patient is able to tolerate oral intake, subcutaneous insulin can be commenced. It is important to continue with the IV insulin for an hour after the subcutaneous insulin is given, before discontinuing the former. Unless subcutaneous analogue insulins (e.g. NovoRapid, Humalog) given in which case the pump can be discontinued straight away. If in doubt about dosages of subcutaneous insulin required, please contact the diabetes team.

Bicarbonate

The acidosis in this setting resolves spontaneously with the above measures and sodium bicarbonate is not usually needed (and may make intracellular acidosis worse). If using at all, use only when pH is <6.9 and in ITU setting. Use 1.26% sodium bicarbonate only (250 ml over 30 – 60 min) and aim for a pH no greater than 7.1.

Hyperosmolar Non-ketotic Diabetic Coma (HONK)

HONK affects older population than ketoacidosis, has a very high mortality (50%), and is very insidious in onset. The biochemical features are hyperglycaemia (30-70 mmol/l), high serum osmolality (>350) and no acidosis or ketonuria. *However, lactic acidosis due to infection or a myocardial event and starvation induced ketonuria can cause diagnostic confusion.*

Management

Fluid replacement, insulin and correction of precipitating cause are the mainstays of treatment. Aim for **very slow correction** of serum osmolality to prevent cerebral oedema. These patients are often very insulin sensitive, and therefore will respond to relatively lower doses of insulin. Thus the main differences between DKA and HONK management are:

- Less rapid and vigorous fluid replacement e.g. 1 litre sodium chloride 0.9% 1st hour, then 1 litre 2 hourly (2 litres), then 1 litre 4-6 hourly.
- Lower doses of intravenous insulin (2-4 units/hr)
- More aggressive use of broad-spectrum antibiotics.

0.45% sodium chloride is not always required, and may cause cerebral oedema by reducing osmolality rapidly. Declining consciousness after 8-24hr after starting treatment may suggest cerebral oedema and dexamethasone or mannitol may be helpful.

- Please notify the Diabetes team of the admission before the patient is discharged.

HYPOGLYCAEMIA

Hypoglycaemia is unusual except in patients with diabetes who commonly suffer the excessive effects of their own hypoglycaemic drugs. Symptoms include sweating, tremor, palpitations, incoordination, convulsions and coma, and in any diabetic patient with impaired consciousness, hypoglycaemia should be assumed to be the cause until it has been excluded by measurement of blood glucose, most simply done on a finger prick test. Occasionally, hypoglycaemia is induced by those drugs used in suicide bids by patients who are not diabetic. Other drugs, such as alcohol and aspirin, may also cause hypoglycaemia, and the problem may also arise as part of some underlying disease such as insulinoma, carcinoid, etc.

IMMEDIATE MANAGEMENT: *Adults who are unconscious and/or having seizures and/or are very aggressive*

Check: **Airway (and give oxygen)**

Breathing

Circulation

Disability (including GCS and blood glucose)

Exposure (including temperature)

If the patient has an insulin infusion in situ, **stop immediately**

Fast bleep a doctor

The following 3 options (i-iii) are all appropriate, but if IV access is available, option (ii) is preferred as readily available on the wards:

i) Glucagon 1mg IM (may be less effective in patients prescribed sulphonylurea therapy).

Glucagon, which may take up to 15 minutes to take effect, mobilizes glycogen from the liver and will be less effective in those who are chronically malnourished (e.g. alcoholics), or in patients who have had a prolonged period of starvation and have depleted glycogen stores or in those with severe liver disease. In this situation or if prolonged treatment is required, IV glucose is better

ii) If IV access available, give 150-160ml of 10% glucose (over 10-15 minutes). If an infusion pump is available use this, but if not readily available the infusion should not be delayed. Repeat capillary blood

glucose measurement 10 minutes later. If it is still less than 4.0mmol/L, repeat

iii) If IV access available, give 75 ml of 20% glucose over five minutes. Repeat capillary blood glucose measurement 10 minutes later. If it is still less than 4.0mmol/L, repeat

Any patient who does not recover fully in 30 minutes should be transferred to ITU and a specialist consulted;

Once the blood glucose is greater than 4.0mmol/L and the patient has recovered give a long acting carbohydrate of the patient's choice where possible, taking into consideration any specific dietary requirements. Some examples are:

- Two biscuits
- One slice of bread/toast
- 200-300 ml glass of milk (not soya)
- Normal meal if due (must contain carbohydrate)

DO NOT omit insulin injection if due (However, dose review may be required)

N.B. Patients given glucagon require a larger portion of long acting carbohydrate to replenish glycogen stores (double the suggested amount above)

If the patient was on IV insulin, continue to check blood glucose every 30 minutes until above 3.5mmol/L, then re-start IV insulin after review of dose regimen

Document event in patient's notes. Ensure regular capillary blood glucose monitoring is continued for 24 to 48 hours. Ask the

patient to continue this at home if they are to be discharged. Patients who have suffered hypoglycaemia secondary to oral hypoglycaemic medication need hospital admission for a minimum of 24hours. Give hypoglycaemia education and refer to Diabetes Specialist Nurse N.B. Patients who self manage their insulin pumps may not need a long acting carbohydrate

Reference

[The Hospital Management of Hypoglycaemia in Adults with Diabetes Mellitus March 2010](#)

www.diabetes.nhs.uk

ACUTE RENAL FAILURE

Acute renal failure (ARF), which is characterised by a sudden rise in blood urea and creatinine associated with an underlying fall in glomerular filtration rate (GFR), is relatively common in hospitals. The most frequent cause, and one from which recovery is eminently possible, is acute tubular necrosis (ATN). This is usually the result of hypovolaemia (haemorrhage, burns), sepsis or nephrotoxic insult (drugs, IV contrast media, myoglobin or haemoglobinaemia). Other, less common, causes of ARF are acute interstitial nephritis, as seen with drug hypersensitivity, and rapidly progressive glomerulonephritis occurring as a primary event or complicating multisystem disease.

ARF is sometimes associated with a normal urine output or even polyuria. More often there is oliguria (urine output less than 400ml/day) and occasionally anuria. However, complete anuria is more commonly the result of urinary outflow obstruction, a condition easily diagnosed by passing a bladder catheter (**remember to note the volume of urine passed!**).

Management

1. Assess state of hydration. Simple clinical assessment may be misleading and the best guide is given by measurement of CVP. In some patients, particularly the elderly and those with septicaemia, it might be necessary for a Swan Ganz catheter to be introduced to allow

measurement of pulmonary wedge pressures (NB. this procedure should be done in the ICU).

2. Correct hypovolaemia using colloidal fluids to achieve CVP (mid-axillary line as zero) of 5-10 cm H₂O.
3. Measure arterial pH and plasma bicarbonate. Correct acidosis as appropriate using crystalloids.
4. **hyperkalaemia:** (K⁺ greater than 6.5mmol. Obtain an ECG, but **do not delay following steps whilst ECG is being done**. Look for tented T waves, flat P wave and widened QRS complexes. Make sure any ECG changes are new and not related to a pre-existing conduction defect).
 - a. Give 10 ml of 10% calcium gluconate to protect the myocardium. Repeat this every 20 minutes if ECG changes described above are present until these resolve.
 - c. Give glucose/insulin infusion, 50ml of 50% glucose with 10 units of soluble 'human' insulin over 30 minutes, to move potassium into the cells. Check capillary glucose (BM) at start of infusion and 15 minutes after the end of infusion.
 - d. Start oral polystyrene sulphonate resin, either sodium based (Resonium A) or calcium based (Calcium Resonium), in a dose of 15g four times daily, to remove potassium from the body. These resins, which can be given by mouth, naso-gastric tube, or rectally, may take up to 6 hours to have an effect.
5. Insert a bladder catheter. If there is oliguria/anuria it need not remain in situ.
6. Infuse dopamine at a 'renovascular' dose of 1-3 mcg/kg/min.
7. Infuse dobutamine if the systolic BP is less than 100mmHg.
8. Administer 120mg furosemide as a bolus dose IV. (max rate 4mg/min) If diuresis is not achieved try a further dose of 250-500mg. Occasionally, infusion of mannitol IV (200ml of 10% solution) over 1 hour is helpful in promoting a diuresis.
9. If a diuresis does not occur give fluid hourly on the basis of replacing measured losses plus estimated insensible losses appropriate to clinical state. Remember that early mortality in ARF is often due to fluid overload with pulmonary oedema.

Urinary and other sepsis should be sought and treated. Give all an H₂ blocker to prevent gastrointestinal haemorrhage. Renal ultrasound should be performed at the earliest possible opportunity to exclude obstructive nephropathy and to assess renal size. Loss of parenchymal mass suggests pre-existing chronic renal disease. Renal biopsy should only be considered if there are atypical clinical features or features to suggest a multisystem disease.

Indications for dialysis or haemofiltration:

- Life-threatening or intractable pulmonary oedema
- Uncontrollably rising K⁺
- Severe (pH < 7.1) or worsening acidosis
- Rapidly rising serum creatinine (> 100µmol/l/day)
- Creatinine > 1000µmol/l; urea > 50mmol/l
- Uraemic pericarditis
- Encephalopathy.

Specialist advice

Early referral to the consultant renal physician/senior registrar should be considered in any patient with:

- Oliguria or anuria
- Creatinine > 400µmol/l
- K⁺ > 6.5mmol/l.

Remember ARF can often be prevented. So, for example, take special care to avoid dehydration in high-risk patients (e.g. those with diabetes, myeloma, or established renal failure), and those subjected to overnight fast, surgery or investigations involving IV contrast. Hypovolaemia due to blood or fluid loss should be avoided or rapidly reversed, and drugs that might cause renal damage used with great caution.

Antimicrobial Prescribing Guide

Go

- Only start an antimicrobial if there is evidence of infection
- Follow the recommendations in the Antimicrobial Formulary
- Document the indication and course length (or review date) on the prescription chart and in the Medical Notes
- Restricted antimicrobials may only be used after discussion with a Medical Microbiologist
- Give an oral agent if clinically appropriate or the oral formulation has good bioavailability

- Review antimicrobial prescriptions daily (Monday to Friday)
- Document a weekend plan in the patient's notes
- Change to the most narrow spectrum agents when sensitivities are known
- Switch from IV to oral antibiotics at 48 hours if the patient is responding (except in deep-seated infections or neutropenia, patients unable to take oral medication or if the organism is not sensitive to any oral agents)

Review

Stop

- Discontinue antimicrobials once infection is excluded. There is no need to complete a course
- If it is clear when the antimicrobial course should end, pharmacists should alter the administration boxes on the drug chart to prevent a longer course being given
- Nurses must not administer an antimicrobial agent after the stop date has been reached

Medical Microbiologist: ext 5569 (W&S) 3547 (SRH)
Microbiology Results: Available on Sema Helix or ext 5572 (W&S) 3565 (SRH)
Antimicrobial Pharmacist: ext 5751/bleep 505 (W&S) ext 3349/bleep 451 (SRH)

Microbiology Advice may be obtained from:

Worthing & Southlands Hospitals

Contact Duty Microbiologist (Dr Bates, Dr Child, Dr Legg or SpR) via switchboard/ext 5569 or via switchboard out of hours.

Microbiology Results: ext 5572
Antimicrobial Pharmacist: ext 5751/bleep 505
Pharmacy Medicines Information: ext 5471

St Richard's Hospital

Contact Duty Microbiologist (Dr Greig, Dr Jerwood or SpR) via ext. 3547 or via switchboard out of hours.

Microbiology Results: ext 3565
Antimicrobial Pharmacist: ext 3349/bleep 451
Pharmacy Medicines Information: 785471

Microbiology results are also available through the “Clinical Workstation” in Sema Helix.

Principles of good antimicrobial prescribing

- **Documentation:** *In the medical notes*, record the indication for and choice of antimicrobial therapy, and a plan for treatment to assist on-call and weekend teams. *On the prescription chart*, record the indication in the “Additional Instructions” box and clearly indicate the duration of treatment or a review date.
- **Duration:** Record a review or stop date on the prescription chart at the time of prescribing.
- **De-escalation:** Change to narrower-spectrum agents when microbiology results are known.
- **Dosing:** The dose and route of administration should be appropriate for the clinical scenario and the patient. Switch from IV to PO therapy at 48 hours if the patient is clinically responding and can take oral medication, except in deep-seated infection.
- **Do:** Give antimicrobials orally if PO is equivalent to IV, e.g. metronidazole, ciprofloxacin, levofloxacin, clindamycin, fluconazole
- **Don't** treat colonisation or contamination. **Don't** use cephalosporins or quinolones unless for an approved indication as they increase the risk of *C. difficile* and MRSA.

Restricted antimicrobials

The following antimicrobials are restricted in this Trust. They may only be prescribed for the indication given in the formulary, or on the approval of a Medical Microbiologist. This must be clearly documented in both the medical notes and on the prescription chart.

Amikacin	Clindamycin (IV & PO)	Linezolid (IV & PO)
Liposomal Amphotericin B	Co-trimoxazole (IV)	Meropenem
Cefuroxime	Daptomycin	Piperacillin & tazobactam (Tazocin)
Cefotaxime	Ertapenem	Sodium fusidate (IV)
Ceftazidime	Fluconazole (IV)	Teicoplanin
Ceftriaxone	Imipenem	Tigecycline
Chloramphenicol (IV)	Itraconazole (IV)	Voriconazole (IV & PO)
Ciprofloxacin (IV & PO)	Levofloxacin (IV & PO)	Vancomycin (IV)

Important information about the Formulary

- Doses are for non-pregnant adults with normal renal function. Refer to the BNF, a pharmacist, or Medicines Information for dosing in renal impairment.
- The following should be avoided in pregnancy: quinolones, tetracyclines, trimethoprim (1st trimester only), nitrofurantoin (3rd trimester only) and rifampicin
- These guidelines refer to the empirical treatment of infections. If special circumstances exist or the patient fails to improve, please seek advice.
- If the patient has previously had *Clostridium difficile* diarrhoea, be cautious with prescribing antimicrobials for infection. Seek advice. Low risk antimicrobials include teicoplanin, gentamicin and metronidazole.
- Gentamicin dosing is 5mg/kg lean body weight (LBW) IV OD. Levels need to be monitored. See full gentamicin guidelines on StaffNet.
- **Penicillin allergy** choices are for patients with non-severe allergies, e.g. rash. If a patient is known to have anaphylaxis with penicillins, discuss with a Microbiologist.
- Penicillin-containing antibiotics include co-amoxiclav (Augmentin) and piperacillin/tazobactam (Tazocin).

IV to oral switching

- Switching to oral antimicrobial agents should be considered for patients who meet all of the following criteria after 48 hours of IV therapy:
 - Clinical condition improving
 - Afebrile for more than 24 hours
 - Improving CRP and WCC
 - Viable oral route – no evidence of malabsorption, vomiting, or unsafe swallow
 - Appropriate oral antimicrobial available
 - No haematological malignancy or neutropenia
 - No serious deep-seated infection that requires high-dose IV, e.g. endocarditis, *Legionella* pneumonia, exacerbations of cystic fibrosis, infected prosthetic device or foreign body, osteomyelitis, septic arthritis, abscess or

- The following agents have excellent oral bioavailability. Oral formulations of these agents should be used whenever the oral route is available, unless advised otherwise:

Amoxicillin	Co-amoxiclav	Linezolid
Ciprofloxacin	Flucloxacillin	Metronidazole
Clarithromycin	Fluconazole	Voriconazole
Clindamycin	Levofloxacin	

Prescribing Antimicrobials

- When prescribing an antimicrobial, ensure that the indication and a duration or review date are clearly documented on the patient's prescription chart and in the medical notes, e.g.:

Start Date: 13/10	Drug: Flucloxacillin	9	13	14	15	16	17
Dose: 2g	Route: IV	Signature: [Signature]	13				
Pharm.	Additional Instructions: Cellulitis Review e 48 hrs.	17					
		22	1	2	RV	4	5

Start Date: 13/10	Drug: Trimethoprim	9					
Dose: 200mg	Route: PO	Signature: [Signature]	13				
Pharm.	Additional Instructions: Uncomplicated UTI	17					
		22	3/7	1	2	3	

- Administration times on the prescription chart should be amended so that the antimicrobial is given at the correct time interval (e.g. 12-hourly for bd, 8-hourly for TDS).

		13
IV		
12		
12		
12		
12		
		1

- When a patient is changed from IV to oral therapy, cross through the IV prescription and write a new prescription for oral medication. Do not amend the existing prescription.

Prescribing for patients with a penicillin allergy

True penicillin allergy is rare; the estimated frequency of anaphylaxis is 1–5 per 10,000 courses of penicillin administered. However, hypersensitivity to penicillin is the antibiotic's most important side effect and can cause:

- Nausea
- Vomiting
- Pruritus
- Urticaria
- Wheezing
- Laryngeal oedema
- Cardiovascular collapse.

A patient with a history of anaphylaxis or rash immediately after penicillin is at risk of immediate hypersensitivity and should not receive penicillin.

Patients with a history of minor rash (i.e. non-confluent rash restricted to a small area of the body) or a rash that occurs more than 72 hours after penicillin administration are probably not hypersensitive to penicillin. In these patients penicillin should not be withheld for serious infection. However, the potential for a hypersensitivity reaction should be borne in mind.

Many patients who claim to have a penicillin allergy have in fact experienced an adverse reaction to penicillin, most commonly diarrhoea. It is important to take and document an accurate history of the suspected allergy, as otherwise patients may have to be given alternative agents that are not the ideal choice for their infection. However, if there is any uncertainty about a patient's allergy status, it would be prudent to avoid the use of the antibiotic concerned if there are alternatives.

Combination products such as co-amoxiclav (Augmentin®), co-fluampicil (Magnapen®), piperacillin/tazobactam (Tazocin®) and Ticarcillin/clavulanic acid (Timentin®) contain penicillins. Serious medication errors have occurred where doctors have prescribed these medicines, often by brand name, for patients with a penicillin allergy, not recognising that they contain penicillins.

Patients who are penicillin allergic may also be sensitive to cephalosporins and carbapenems due to their similar chemical structures. These drugs should be avoided in patients with a history of an immediate hypersensitivity reaction to penicillin, but may be used with caution in patients with a non-severe allergy. Where penicillin allergy choices are given in the formulary, these are for patients with non-severe allergy. Patients with a severe penicillin allergy should be discussed with a Medical Microbiologist.

CONTRAINDICATED Do not use	USE WITH CAUTION May be given if penicillin allergy is not severe	CONSIDERED SAFE	
Amoxicillin Ampicillin Augmentin (Co-amoxiclav) Flucloxacillin Benzylpenicillin (Penicillin G) Phenoxymethylpenicillin (Penicillin V) Tazocin (Piperacillin & tazobactam) Timentin (Ticarcillin & clavulanic acid) Magnapen (co-fluampicil)	<i>All cephalosporins and carbapenems</i> Cefadroxil Cefalexin Cefotaxime Ceftazidime Ceftriaxone Cefuroxime Imipenem Ertapenem Meropenem	Amikacin Azithromycin Aztreonam Ciprofloxacin Clarithromycin Clindamycin Colistin Co-trimoxazole Doxycycline Erythromycin Gentamicin	Levofloxacin Linezolid Metronidazole Nitrofurantoin Norfloxacin Sodium fusidate Teicoplanin Tetracycline Tobramycin Trimethoprim Vancomycin

The formulary is annotated to show which agents are suitable for use in patients with varying degrees of penicillin allergy:

- ▲ Contains a penicillin. Do not use with patients known to be penicillin-allergic.
- ▼ Do not use in patients known to have anaphylaxis to penicillins - discuss these with a Microbiologist
- Suitable for use if any penicillin allergy.

Changes to the Antimicrobial Formulary

This is the first single Hospital Antimicrobial Formulary (HAF) for Western Sussex Hospitals NHS Trust. Separate formularies previously existed for St Richard's Hospital and Worthing & Southlands. This table lists the changes that were made when the formularies were combined.

Indication	St Richard's Hospital	Worthing & Southlands Hospitals
CAP	Previously divided into severe and non-severe. Now divided into three based on CURB-65 score. IV clarithromycin has replaced IV erythromycin for severe pneumonia. Teicoplanin now recommended in addition to levofloxacin for severe CAP.	
HAP	Metronidazole should no longer be added to levofloxacin for severe HAP. Ertapenem replaces levofloxacin as choice for non-severe HAP.	Levofloxacin replaces meropenem as drug choice in penicillin allergy. Teicoplanin now only used if patient is MRSA positive.
Exacerbation of COPD	Doxycycline dose changed to 200mg OD PO (was 100mg BD PO). Ertapenem replaces levofloxacin as choice for severe/recent antibiotics with penicillin allergy.	Doxycycline dose changed to 200mg OD PO (was 100mg BD PO) Ertapenem replaces levofloxacin as choice for severe/recent antibiotics with penicillin allergy.
Complicated UTI	Ertapenem replaces gentamicin/ ciprofloxacin as penicillin allergy choice	Previously combined with pyelonephritis.
Pyelonephritis	Ertapenem replaces ciprofloxacin as choice for penicillin allergy.	Previously combined with complicated UTI. Ertapenem replaces gentamicin as choice for penicillin allergy.
Cellulitis	Clarithromycin no longer recommended in addition to teicoplanin for penicillin allergy. Information added regarding MRSA positive patients	No change
Canula site infection	Section added	No change
Necrotising fasciitis	Ertapenem replaces cefuroxime and metronidazole in patients with penicillin allergy.	Clindamycin added to treatment for penicillin allergic patients.
Animal/human bite	Ertapenem replaces cefuroxime for severe animal or human bites	
Diabetic foot	Co-amoxiclav, ertapenem or teicoplanin now recommended instead of treatment as per cellulitis	
Bacterial meningitis	Ceftriaxone replaces cefotaxime	
Brain abscess	Ceftriaxone replaces cefotaxime	
Gastroenteritis	Advice added	
<i>C. difficile</i> diarrhoea	Change to vancomycin dosing	
<i>H. pylori</i> eradication	Section added	
Chlamydia <i>trachomatis</i>	Azithromycin replaces erythromycin as a 1 st line agent. Erythromycin now only used in pregnancy.	
Pelvic Inflammatory Disease	Erythromycin with metronidazole replaces ciprofloxacin with metronidazole as 2 nd line agents	
Septicaemia with no localising signs	Ertapenem replaces cefuroxime in penicillin allergy	
GI/Biliary/Female genital tract focus	Ertapenem replaces cefuroxime and metronidazole in penicillin allergy	
Neutropenic Sepsis	Clarithromycin replaces erythromycin as advice for adding atypical agent. Tazocin dose changed to QDS for this indication only.	Ceftazidime replaces meropenem in penicillin allergy. Tazocin dose changed to QDS for this indication only.
Threadworms	Section added	
Scabies	Section added	
Post-splenectomy antibiotic prophylaxis	Clarithromycin replaces erythromycin in penicillin allergy	
Prevention of infection in GI haemorrhage associated with liver cirrhosis	Section added	
Prevention of GBS infection in neonates	Doses of both agents changed	Doses of both agents changed

Respiratory Tract Infections

Infection	Comments	First-line drug	Penicillin allergy choice?	Duration
Pharyngitis/ Tonsillitis	Majority are viral	Phenoxymethylpenicillin ▲ 500mg BD-QDS PO	Clarithromycin● 500mg BD PO	10 days
Otitis media	Many are viral	Amoxicillin▲ 500mg TDS PO	Clarithromycin● 500mg BD PO	3 to 7 days
Sinusitis	Many are viral	Amoxicillin▲ 500mg TDS PO	Clarithromycin● 500mg BD PO or Doxycycline● 200mg stat then 100mg OD	3 to 7 days
Acute epiglottitis	HiB now rare	Ceftriaxone▼ 2g BD IV		7 days
Suspected Diphtheria	Rare, but consider especially if the patient has been abroad. Contact Medical Microbiologist			
<p>CURB-65 Scoring: 1 point each for: New onset or worsening Confusion, Urea > 7mmol/l (new onset, Respiratory rate \geq 30/min, Blood pressure (systolic < 90 mmHg or diastolic < 60mmHg), Age \geq 65. Use clinical judgement if score is < 3. Change from IV to PO when responding.</p>				
Community-acquired Pneumonia	Mild (CURB-65 \leq 1)	Amoxicillin▲ 500mg TDS PO	Clarithromycin● 500mg BD PO or Doxycycline● 200mg stat then 100mg OD PO	7 days
	Moderate (CURB-65 = 2)	Amoxicillin▲ 500mg – 1g TDS PO and Clarithromycin● 500mg BD PO	Doxycycline● 200mg stat then 100mg OD or Levofloxacin● 500mg OD PO	7 days
	Severe (CURB-65 = 3 to 5)	Co-amoxiclav▲ 1.2g TDS IV and Clarithromycin● 500mg BD IV	Levofloxacin● 500mg BD PO/IV – only use IV if unable to take PO and Teicoplanin● 400mg 12 hourly for three doses, then 400mg OD IV	7 days
Rarely caused by atypical organisms				
Hospital-acquired Pneumonia	Non-severe, including aspiration	Co-amoxiclav▲ 1.2g TDS IV	Ertapenem▼ 1g OD IV	7 days
	Severe (not aspiration)	Piperacillin/tazobactam (Tazocin)▲ 4.5g TDS IV	Levofloxacin● 500mg OD PO/IV – only use IV if unable to take PO	7 days
	<i>If MRSA positive or high-risk</i>	Add Teicoplanin● 400mg 12 hourly for three doses then 400mg OD IV		7 days
	<i>Recent</i>	Contact Microbiology		

Infection	Comments	First-line drug	Penicillin allergy choice?	Duration
	<i>antibiotics, ITU or HDU</i>			
Exacerbation of COPD (i.e. no consolidation on CXR)	Treat only if two or more of the following are increased: - Sputum volume - Sputum purulence - Increased dyspnoea			
		Doxycycline● 200mg OD PO		5 to 7 days
	Severe or recent antibiotics	Co-amoxiclav▲ 1.2g TDS IV	Ertapenem▼ 1g OD IV	5 to 7 days
Bronchiectasis	Treatment depends on most recent sputum culture results			

Urinary Tract Infections

Infection	Comments	First choice drug	Penicillin allergy choice?	Duration
Acute uncomplicated UTI (Cystitis)	No fever or flank pain	Trimethoprim● 200mg BD PO or Nitrofurantoin● 100mg QDS PO (caution in renal impairment)		Women: 3 days Men or recurrent: 7 days
	Pregnancy	Caution needed with choice of antibiotic. Avoid quinolones and tetracyclines throughout, trimethoprim in the first trimester and nitrofurantoin in the third trimester.		7 days
	2 nd line	Depends on sensitivities – e.g. amoxicillin▲, co-amoxiclav▲, cefalexin▼		
Recurrent UTI in women (> 3/year)	Do not give broad spectrum antibiotics as prophylaxis	Try standby antibiotics at first. If this is unsuccessful, then: Nitrofurantoin● 50mg OD PO (if long-term, monitor bloods and lung function – see BNF) or Trimethoprim● 100mg OD PO		Nocte or post-coital
Complicated UTI	Switch to oral when responding. Be guided by sensitivities	Co-amoxiclav▲ 1.2g TDS IV +/- Gentamicin● 5mg/kg LBW (1-2 doses)	Gentamicin● 5mg/kg LBW (normal renal function) Ertapenem▼ 1g OD IV (renal impairment)	7-14 days
Pyelonephritis		Co-amoxiclav▲ 1.2g TDS IV +/- Gentamicin● 5mg/kg LBW	Ertapenem▼ 1g OD IV	7-14 days 1-2 doses
Catheter-associated UTI	Only treat if clinical symptoms. In the presence of a catheter, antibiotics will not eradicate bacteria. Do not dipstick CSU and only send for culture if symptomatic. If treatment is necessary, be guided by sensitivities.			
Acute prostatitis Epididymo-orchitis	Treatment for four weeks may prevent chronic infection	Ciprofloxacin● 500mg BD PO		28 days

Skin, soft tissue and joint infections (If MRSA carrier, contact Microbiology for advice)

Infection	Comments	First-line drug	Penicillin allergy choice?	Duration
Topical antibiotic use should be minimised to reduce resistance				
Impetigo	Minor infections only	Fusidic acid●, topically QDS		5 days
		Flucloxacillin▲ 500mg QDS PO	Clarithromycin● 500mg BD PO	7 days
Cellulitis	Increase doses if poor response. Elevate limb.	Benzylpenicillin▲ 1.2g 4-6 hourly IV and Flucloxacillin▲ 1-2g QDS IV	Teicoplanin● 400mg 12 hourly for three doses, then 200mg/400mg OD IV	
	IV to PO switch when improving (check microbiology)	Flucloxacillin▲ 500mg-1g QDS PO +/- Amoxicillin▲ 500mg TDS PO	Discuss IV to PO switch with Microbiologist.	7 to 14 days
	MRSA Positive	Teicoplanin● 400mg 12 hourly for three doses, then 200mg/400mg OD IV. Discuss IV to PO switch with Microbiologist		
Wound Infection/ Abscess	Abscess will require drainage	Flucloxacillin▲ 500mg QDS PO (mild), 1-2g QDS IV (severe)	Clarithromycin● 500mg BD PO (non severe) Teicoplanin● 400mg 12 hourly for three doses then 400mg OD IV (severe)	7 days
	MRSA Positive	Teicoplanin● 400mg 12 hourly for three doses then 400mg OD IV		
Cannula Site Infection	Superficial infection – if severe/septic see 'septicaemia' section below	Flucloxacillin▲ 500mg QDS PO	Teicoplanin● 400mg 12 hourly for three doses then 200mg/ 400mg OD IV. Discuss IV to PO switch with Microbiologist	10 days
	MRSA Positive	Teicoplanin● 400mg 12 hourly for three doses then 200mg/400mg OD IV. Discuss IV to PO switch with Microbiologist.		

Infection	Comments	First-line drug	Penicillin allergy choice?	Duration
	Discuss all cases with a Microbiologist. Early surgical debridement is essential.			
Necrotising Fasciitis	Group A Streptococcus/ Toxic Shock Syndrome	Benzympenicillin ▲ 1.2g 2-4 hourly QDS IV and Flucloxacillin ▲ 1-2g QDS IV and Clindamycin ● 1.2g QDS IV	Ertapenem ▼ 1g OD IV and Clindamycin ● 1.2g QDS IV	10 to 14 days
	Synergistic gangrene, e.g. Fourniers	Co-amoxiclav ▲ 1.2g TDS IV and Gentamicin ● 5mg/kg LBW	Ertapenem ▼ 1g OD IV and	10 to 14 days 1 to 2 doses
	Surgical toilet most important. Assess tetanus and rabies, HIV, hepatitis B & C risk. Antibiotic prophylaxis advised for bites > 24 hours old, cat bite, hand wounds and at risk patients e.g. diabetics, immunocompromised.			
Animal/human bite			Metronidazole ● 400mg TDS PO and	
		Co-amoxiclav ▲ 375-625mg PO TDS or 1.2g TDS IV	Doxycycline ● 100mg BD PO (animal, mild) or Clarithromycin ● 500mg BD PO (human, mild) or Ertapenem ▼ 1g OD IV (severe animal or human)	7 days
Diabetic Foot	Cellulitis/not limb threatening	Co-amoxiclav ▲ 1.2g TDS IV	Ertapenem ▼ 1g OD IV	7 days
	MRSA Positive	Add teicoplanin ● 400mg 12 hourly for three doses then 400mg OD IV		
Leg Ulcers	Do not treat colonising flora (e.g. 'Coliforms', Pseudomonas). Only treat if clinical signs of infection. Treatment is as for cellulitis.			
	Take aspirates & blood cultures. Modify when sensitivities known. Discuss with Microbiologist			
Septic arthritis or acute osteomyelitis		Flucloxacillin ▲ 1—2g QDS IV	Teicoplanin ● 400mg 12 hourly for three doses then 400mg OD IV	Septic Arthritis: 2-3 weeks Osteomyelitis: up to 3 months
	MRSA Positive	Teicoplanin ● 400mg 12 hourly for three doses then 400mg OD IV		
Prosthetic Joint Infection	Directed by culture results from deep sites (multiple specimens required). Seek Medical Microbiologist advice. For SRH only: please discuss with Medical Microbiologist before referral to IC@H service			

Infection	Comments	First-line drug	Penicillin allergy choice?	Duration
	If pregnant, seek advice. Clinical value of antivirals is limited unless secondary household case, facial or ophthalmic shingles or severe pain and treatment started within 2 days of rash onset.			
Chickenpox & shingles		Aciclovir● 800mg 5 times a day PO		7 days
	Severe Infection	Aciclovir● 5mg/kg TDS IV		7 to 10 days
	Immuno-compromised	Aciclovir● 10mg/kg TDS IV		
Conjunctivitis	Bacterial	Chloramphenicol● 0.5% eye drops 2-hourly for 48 hours reducing to QDS and Chloramphenicol● 1% ointment at night		Continue treatment for 48 hours after resolution

Meningitis

Infection	Comments	First-line drug	Penicillin allergy choice?	Duration
Bacterial Meningitis	Empiric – modify once organism isolated on advice of Medical Microbiologist. Give antibiotics without delay.	Ceftriaxone▼ 2g BD IV. Seek advice from a Medical Microbiologist if patient is penicillin anaphylactic.		7 to 14 days
	Consider <i>Listeria</i> if immuno-suppressed, elderly or pregnant	Add amoxicillin▲ 2g TDS IV	Discuss with a Medical Microbiologist	14 days
		Add Dexamethasone (as sodium phosphate) IV 10mg qds for 4 days starting before or with first dose of antibiotics unless septic shock, immunocompromised or post-neurosurgery		4 days
Viral meningo-encephalitis	HSV most common. Request viral PCR on CSF. Send viral throat swab and faeces	Aciclovir● 10mg/kg TDS IV		10 to 21 days
<i>Prophylaxis of contacts</i>	<i>Meningitis is a notifiable disease. Notify Public Health Doctor – 01243 770772 9am to 5pm, or via Hospital Switchboard out of hours</i>			
Brain abscess	Mixed flora. Consider referral for drainage	Ceftriaxone▼ 2g BD IV and Metronidazole● 400mg TDS PO		4 to 6 weeks

Gastrointestinal Infections

Infection	Comments	First-line drug	Penicillin allergy choice?	Duration
Gastroenteritis	Infectious diarrhoea does not necessarily require antimicrobials. Fluid replacement is essential. If symptoms are severe or prolonged then discuss antimicrobial choice with a Medical Microbiologist			
	Only treat if symptomatic			
<i>C. difficile</i> (See Broadwater policy for W&SH, <i>C. difficile</i> policy for SRH)	Mild/moderate disease	Metronidazole● 400mg TDS PO		10 days
	Severe disease or no response to metronidazole after 7 days	Vancomycin● 125mg QDS PO, <i>increased to 250mg QDS PO if no response after 7 days</i>		10 days
	Life-threatening disease/relapse	Discuss with a Microbiologist		
<i>H. pylori</i> eradication	¹³ C-urea breath test is the method of choice for diagnosis	Omeprazole● 20mg BD PO and Clarithromycin● 500mg BD PO and Amoxicillin▲ 1g BD PO	Omeprazole● 20mg BD PO and Clarithromycin● 250mg BD PO and Metronidazole● 400mg BD PO	All for 7 days (14 days in relapse)

Genital Tract Infections – First-line treatment only. Refer difficult cases and all STIs to GUM clinic

Infection	Comments	First-line drug	Penicillin allergy choice?	Duration
Candidiasis	Avoid oral azoles in pregnancy	Clotrimazole● 10% vaginal cream 5g stat or Clotrimazole● 500mg pessary stat or Fluconazole● 150mg PO stat		Single doses
Bacterial vaginosis		Metronidazole● 400mg BD PO		7 days
Trichomoniasis	Treat as STI. All partners should be treated simultaneously	Metronidazole● 400mg TDS PO		7 days
Chlamydia trachomatis		Azithromycin● 1g PO stat or		Single dose
		Doxycycline● 100mg BD PO		7 days
	Pregnancy (Doxy contraindicated)	Erythromycin● 500mg QDS PO		7 to 14 days
Pelvic Inflammatory Disease (PID)	1 st Line	Doxycycline● 100mg BD PO and Metronidazole● 400mg TDS PO		14 days
(Test for <i>Chlamydia</i> and <i>N. gonorrhoea</i>)	2 nd Line	Erythromycin● 500mg QDS PO and Metronidazole● 400mg TDS PO		14 days

Contact GUM Clinic for advice on the treatment of *N. gonorrhoea* and other STIs including blood-borne viruses.

Septicaemia – First dose of antibiotic should be administered within one hour of diagnosis

Infection	Comments	First-line drug	Penicillin allergy choice?	Duration
Septicaemia with no localising signs	If toxic shock-like syndrome add clindamycin – see skin and soft tissue	Co-amoxiclav ▲ 1.2g TDS IV and	Ertapenem ▼ 1g OD IV and	Until diagnosis then modify
		Gentamicin ● 5mg/kg OD IV (Lean Body Weight)		1-2 doses
Gastrointestinal/ biliary tract/ female genital tract focus	Treat for five days if perforated viscus repaired surgically	Co-amoxiclav ▲ 1.2g TDS IV +/-	Ertapenem ▼ 1g OD IV +/-	7 days (see note)
		Gentamicin ● 5mg/kg OD IV (Lean Body Weight)		1-2 doses
Line Infection	Usually <i>Staph. aureus</i> but may be Gram-negative. Take blood cultures from line and peripherally. Remove line and send tip to lab. Duration depends on response to line removal and culture results. Discuss with Medical Microbiologist.			
		Teicoplanin ● 400mg 12 hourly for three doses, then 200mg/400mg OD IV		Depends on response
	If very unwell, add	Gentamicin ● 5mg/kg OD IV (Lean Body Weight)		
Neutropenic Sepsis	If line infection suspected, add teicoplanin ●. If respiratory focus, consider adding atypical agent (e.g. clarithromycin ●). Duration depends on response. Change to second line agents if no response at 48 hours (see haematology protocol). Discuss with Consultant Haematologist.			
		Piperacillin/tazobactam (Tazocin) ▲ 4.5g QDS IV and	Ceftazidime ▼ 2g TDS IV and	Depends on response
	Gentamicin ● 5mg/kg OD IV (Lean Body Weight)			
Infective Endocarditis	Take 3 sets of blood cultures from different sites & times. Contact Microbiologist for advice before commencing antibiotics.			

Parasitic Infections

Infection	Comments	Treatment	Duration
Threadworms	Treat household contacts. Morning shower or bath and hand hygiene is essential to prevent reinfection	Mebendazole● 100mg stat PO	Single Dose
Scabies	See Infection Control Policy		
	Send blood film to Haematology for urgent examination. Need travel and prophylaxis history. Seek specialist advice in severe cases (e.g. deterioration on therapy or very high parasite count).		
		1. Quinine● 600mg (of quinine salt) 8 hourly PO with or followed by either	5-7 days
	Falciparum malaria, or unknown – two regimes possible.	Doxycycline● 200mg OD PO or	7 days
		Clindamycin● 450mg TDS PO	7 days
		2. Malarone● 4 tablets OD (not in pregnancy)	3 days
Malaria	If patient is seriously ill and/or vomiting give IV therapy	Quinine●: Loading dose 20mg salt/kg (max 1.4g) over four hours, then eight hours after start of loading dose, maintenance dose of 10mg salt/kg (max 700mg) infused over 4 hours every eight hours	Until PO therapy tolerated. Complete 7 day course including Doxy/Clin as above
	Non-falciparum malaria (e.g. <i>P. vivax</i> , <i>P. ovale</i> , <i>P. malariae</i>)	Chloroquine● 620mg (of base) followed by 310mg (of base) 6-8 hours later, followed by 310mg daily PO for 2 days	
	<i>P. vivax</i> & <i>P. ovale</i> require radical cure with primaquine. Seek advice in pregnancy	Primaquine●* (after chloroquine) – 15mg/day (<i>P. vivax</i>), 30mg/day (<i>P. ovale</i>).	14 days

Antibiotic Prophylaxis – The following are indications for antibiotic prophylaxis, do not give for routine urinary catheterisation or line insertion.

Condition/Procedure	Comments	First-line drug	Penicillin allergy choice?	Duration
Infective Endocarditis	See BNF section 5.1. NICE Guidelines state that prophylaxis is no longer recommended, except for high-risk patients undergoing high-risk procedures on the request of a Consultant Cardiologist. Used on a case-by-case basis only.			
Surgical Prophylaxis	See separate policy. One pre-op dose only for most surgery			
Post-splenectomy antibiotic prophylaxis	See full policy in Infection Control Manual on wards. Remember vaccinations	Phenoxyethylpenicillin ▲ 250-500mg BD PO	Clarithromycin ● 250-500mg OD PO	Lifelong if possible. 1 st 2 years most important
Prophylaxis of close contacts of patients with meningococcal sepsis	Only on the advice of CCDC	Rifampicin ● 600mg BD PO. Do not use in pregnancy. Discuss alternatives with CCDC.		2 days
Prevention of gas gangrene post lower limb amputation or following major trauma	Remember tetanus prophylaxis	Benzylpenicillin ▲ 300-600mg QDS IV	Metronidazole ● 400-500mg TDS PO/IV	5 days
Prevention of infection in gastrointestinal haemorrhage associated with liver cirrhosis		Co-amoxiclav ▲ 1.2g TDS IV	Ertapenem ▼ 1g OD IV	Maximum 7 days
Prevention of Group B streptococcus infection in neonates	See neonatal policy. Give antibiotics at onset of labour	Benzylpenicillin ▲ 3g initially then 1.5g 4 hourly IV	Clindamycin ● 900mg TDS IV	Until delivery
Open Fracture		Co-amoxiclav ▲ 1.2g TDS IV	Ertapenem ▼ 1g OD IV	For 72 hours or 24 hours post-closure
	MRSA Positive	Teicoplanin ● 400mg 12 hourly for three doses then 400mg OD IV		

Advice may be obtained from:

Worthing & Southlands Hospitals

**Contact Duty Microbiologist (Dr Bates, Dr Child, Dr Legg or SpR) via
switchboard/ext 5569 or via switchboard out of hours.**

Microbiology Results: ext 5572
Antimicrobial Pharmacist: ext 5751/bleep 505
Pharmacy Medicines Information: ext 5471
Paediatric Pharmacist: ext 5751/bleep 854

St Richard's Hospital

**Contact Duty Microbiologist (Dr Greig, Dr Jerwood or SpR) via ext. 3547 or via
switchboard out of hours.**

Microbiology Results: ext 3565
Antimicrobial Pharmacist: ext 3349/bleep 451
Pharmacy Medicines Information: 785471
Paediatric Pharmacist: ext 3344/bleep 170

Microbiology results are available through the “Clinical Workstation” in Sema Helix.

Aims and scope of this formulary

This formulary is intended to guide the prescribing of antimicrobials to treat and prevent infections in children and neonates being treated at Western Sussex Hospitals NHS Trust. This guideline should be used in conjunction with existing paediatric and neonatal guidelines on the treatment of conditions and in conjunction with the standard dosing reference guides – Children’s BNF (BNFC), Neonatal Doses (St Richards) and Trevor Mann Baby Unit Formulary (TMBU – Worthing Hospital).

It is not for use in primary care.

Key Points

Principles of treatment

- The recommendations made in this formulary are empirical therapy. Treatment should be reviewed in light of culture and sensitivity results.
- *Dose and frequency of administration are not given for most of the drugs as this should be checked in the BNFC or Neonatal Doses/TMBU formulary if a neonate. Where doses and frequencies are given, this is to highlight local practice.*
- The formulary is based on the best available evidence, but it’s application should be informed by professional judgement.

- An antibiotic should only be prescribed when there is likely to be a clear clinical benefit.
- It is inappropriate to use new and more expensive antibiotics (e.g. quinolones and cephalosporins) when standard and less expensive agents remain effective. The use of these newer agents increases the risk of *C. difficile*, MRSA and resistant UTIs.
- Avoid the widespread use of topical antimicrobials as indiscriminate use can contribute to the development of resistance.
- In pregnancy, avoid tetracyclines, aminoglycosides, quinolones and high dose metronidazole. Short-term use of trimethoprim (theoretical risk of malformation in first trimester in mothers with a poor diet) or nitrofurantoin (theoretical risk of neonatal haemolysis if given at term) is unlikely to be problematic.

If 'best guess' therapy has failed, or special circumstances exist, seek advice from a Medical Microbiologist (details given above)

Prescribing for patients with a penicillin allergy

True penicillin allergy is rare; the estimated frequency of anaphylaxis is 1–5 per 10,000 courses of penicillin administered. However, hypersensitivity to penicillin is the antibiotic's most important side effect and can cause:

- Nausea
- Vomiting
- Pruritus
- Urticaria
- Wheezing
- Laryngeal oedema
- Cardiovascular collapse.

A patient with a history of anaphylaxis or rash immediately after penicillin is at risk of immediate hypersensitivity and should not receive penicillin.

Patients with a history of minor rash (i.e. non-confluent rash restricted to a small area of the body) or a rash that occurs more than 72 hours after penicillin are probably not hypersensitive to penicillin. In these patients penicillin should not be withheld for serious infection. However, the potential for a hypersensitivity reaction should be borne in mind.

Many patients who claim to have a penicillin allergy have in fact experienced an adverse reaction to penicillin, most commonly diarrhoea. It is important to take and document an accurate history of the suspected allergy, as otherwise patients may have to be given alternative agents that are not the ideal choice for their infection. However, if there is any uncertainty about a patient's allergy status, it would be prudent to avoid the use of the antibiotic concerned if there are alternatives.

Combination products such as co-amoxiclav (Augmentin®), co-fluampicil (Magnapen®), piperacillin/tazobactam (Tazocin®) and Ticarcillin / clavulanic acid (Timentin®) contain penicillins. Serious medication errors have occurred where doctors have prescribed these medicines, often by brand name, for patients with a penicillin allergy, not recognising that they contain penicillins.

Patients who are penicillin allergic may also be sensitive to cephalosporins and carbapenems due to their similar chemical structures. These drugs should be avoided in patients with a history of an immediate hypersensitivity reaction to penicillin, but may be used with caution in patients with a non-severe allergy. Where penicillin allergy choices are given in the formulary, these are for patients with non-severe allergy. Patients with a severe penicillin allergy should be discussed with a Medical Microbiologist.

CONTRAINDICATED Do not use	USE WITH CAUTION May be given if penicillin allergy is not severe	CONSIDERED SAFE	
Amoxicillin Ampicillin Augmentin (Co-amoxiclav) Flucloxacillin Benzylpenicillin (Penicillin G) Phenoxymethylpenicillin (Penicillin V) Tazocin (Piperacillin & tazobactam) Timentin (Ticarcillin & clavulanic acid) Magnapen (co-fluampicil)	<i>All cephalosporins and carbapenems</i> Cefadroxil Cefalexin Cefotaxime Ceftazidime Ceftriaxone Cefuroxime Imipenem Ertapenem Meropenem	Amikacin Azithromycin Aztreonam Ciprofloxacin Clarithromycin Clindamycin Colistin Co-trimoxazole Doxycycline Erythromycin Gentamicin Levofloxacin	Linezolid Metronidazole Nitrofurantoin Norfloxacin Sodium fusidate Teicoplanin Tetracycline Tobramycin Trimethoprim Vancomycin

The formulary is annotated to show which agents are suitable for use in patients with varying degrees of penicillin allergy:

- ▲ Contains a penicillin. Do not use with patients known to be penicillin-allergic.
- ▼ Do not use in patients known to have anaphylaxis to penicillins - discuss these with a Microbiologist
- Suitable for use if any penicillin allergy.

MRSA Decolonisation

Neonates:

5 day course of:-

- Octenisan solution bath and hair wash
- Mupirocin 2% nasal ointment TDS
- Consider treating parents and siblings simultaneously.

Children:

5 day course of:-

- Chlorhexidine 4% bath and hair wash (Octenisan solution can be used in patients with skin lesions including eczema)
- Mupirocin 2% nasal ointment TDS
- Consider treating parents and siblings simultaneously.

Swabs should be repeated two days after completing the course. Contact Infection Control for further advice on ext 3674 (SRH) or 5544/4525 (W&SH).

Respiratory Tract Infections

Infection	Comments	First-line drug	Penicillin allergy choice?	Duration
Pharyngitis/ Tonsillitis	Majority are viral	Phenoxymethylpenicillin ▲ PO	Clarithromycin ● PO	10 days
Otitis media	Many are viral	Amoxicillin ▲ PO. Use co-amoxiclav ▲ PO if failure to respond	Clarithromycin ● PO	5 to 7 days
Dental abscess		Metronidazole ● PO or amoxicillin ▲ PO	Metronidazole ● PO	5 days
Mastoiditis		Co-amoxiclav IV ▲ – seek ENT advice	Discuss with a Medical Microbiologist	As per advice
See site-specific CAP guidelines				
Community- acquired pneumonia	Uncomplicated	Amoxicillin ▲ PO for 5 to 7 days (longer if unwell)	Azithromycin ● PO for 3 days	
	Severe	Cefuroxime ▼ IV. Switch to oral once apyrexial for 24 hours. Speak to a Medical Microbiologist for advice on choice of oral agent.		Up to 10 days
	Pneumonia caused by atypical organisms e.g. <i>Mycoplasma pneumoniae</i>		Azithromycin ● PO	3 days
Hospital-acquired Pneumonia		Discuss with a Medical Microbiologist		
Cystic Fibrosis		See Ward guidelines		

Urinary Tract Infections

Infection	Comments	First choice drug	Penicillin allergy choice?	Duration
See site-specific UTI guidelines				
Uncomplicated UTI			Trimethoprim ● PO	At least 3 days
See site-specific UTI guidelines				
Severe UTIs, including acute pyelonephritis			Cefotaxime ▼ IV	7 to 10 days

Skin, soft tissue and joint infections (If MRSA carrier, contact Microbiology for advice)

Infection	Comments	First-line drug	Penicillin allergy choice?	Duration
Conjunctivitis		Chloramphenicol● 0.5% drops every six hours – increased to every two hours in severe cases until controlled. Continue for 48 hours after symptoms resolve. Treat both eyes		
Cervical adenitis	Antibiotics may need to be changed based on culture results from incision and drainage or if failure to respond. Discuss with a Medical Microbiologist.			
	Mild	Flucloxacillin▲ PO	Clarithromycin● PO	7 to 10 days
Moderate/severe	Flucloxacillin▲ IV	Cefuroxime▼ IV		
Abscess	Drainage is normally recommended along with antimicrobials. For oral alternative to cefuroxime, discuss with a Medical Microbiologist.			
	Non-severe	Flucloxacillin▲ PO	Clarithromycin● PO	Up to 7 days
Severe	Flucloxacillin▲ IV	Cefuroxime▼ IV		
Septic Arthritis	Discuss with orthopaedic surgeons before initiating treatment. Treat for total three weeks if unifocal (switch to oral antibiotics can be considered once afebrile, pain free and CRP < 20 mg/L or decreased by two-thirds). If complex or PVL-positive case then prolonged IV treatment needed for 14 to 21 days followed by prolonged oral treatment for at least six weeks. Discuss duration of treatment and choice of oral antibiotics with a Medical Microbiologist.			
	Age < 3 months	See neonatal infections section		
	Age ≥ 3 months ≤ 5 years	Cefuroxime▼ IV 50mg/kg TDS. Discuss with a Medical Microbiologist if penicillin anaphylactic.		
	Age >6 years	Flucloxacillin▲ IV 50mg/kg QDS	Clindamycin● IV 10mg/kg QDS. Maximum dose 675mg	See above

Infection	Comments	First-line drug	Penicillin allergy choice?	Duration
Osteomyelitis	Discuss with orthopaedic surgeons before initiating treatment. Treat for total three weeks if unifocal (switch to oral antibiotics can be considered once afebrile, pain free and CRP < 20 mg/L or decreased by two-thirds). If complex or PVL-positive case then prolonged IV treatment needed for 14 to 21 days followed by prolonged oral treatment for at least six weeks. Discuss duration of treatment and choice of oral antibiotics with a Medical Microbiologist.			
	Age < 3 months	See neonatal infections section		
	Age ≥ 3 months ≤ 5 years	Cefuroxime ▼ IV 50mg/kg TDS. Discuss with a Medical Microbiologist if penicillin anaphylactic.		See above
	Age >6 years	Flucloxacillin ▲ IV 50mg/kg QDS	Clindamycin ● IV 10mg/kg QDS. Maximum dose 675mg	
Herpetiform eczema		Aciclovir IV ● (consider switch to oral when improving)		5 days
Shingles	Treat only if immunocompromised - See oncology guidelines			
Scabies		Malathion ● (Derbac-M) 0.5% lotion. Apply all over the body and wash off after 24 hours. Reapply to hands after washing. Ensure scalp, neck, face and ears are covered. Refer to Infection Control policy.		Repeat after 7 days
Preseptal/orbital cellulitis	See periorbital cellulitis guidelines (SRH only). Discuss oral alternatives to cefuroxime with a Medical Microbiologist.			
		Co-amoxiclav ▲ IV then PO	Cefuroxime ▼ IV (add metronidazole in orbital cellulitis)	7 to 14 days (usually 10 days)
Surgical Wounds	Swab wound before administering antibiotics. Duration normally seven days but depends on wound severity and type. Discuss oral alternatives to cefuroxime with a Medical Microbiologist.			
	Mild	Flucloxacillin ▲ PO	Clarithromycin ● PO	7 days, depends on wound type and severity
	Severe	Flucloxacillin ▲ IV	Cefuroxime ▼ IV	
Compound fractures & extensive soft tissue damage	Duration normally five days but depends on severity and type. Discuss oral alternatives to cefuroxime with a Medical Microbiologist.			
		Benzylopenicillin ▲ IV and flucloxacillin ▲ IV	Cefuroxime ▼ IV	5 days

Gastrointestinal Infections

Infection	Comments	First-line drug	Penicillin allergy choice?	Duration	
See surgical prophylaxis section for pre-op dosing.					
Gangrenous or ruptured appendix	Post-op – no need for further antibiotics unless ruptured, gangrenous or localised pus collection	Co-amoxiclav ▲ IV +/- Gentamicin ● IV	Cefuroxime ▼ IV and metronidazole ● IV		
Giardiasis		Metronidazole PO ●		3 days	
Peritonitis		Cefuroxime ▼ IV and metronidazole ● IV +/- gentamicin ● IV (If penicillin anaphylactic discuss with a Medical Microbiologist)	Change to co- amoxiclav ▲ when converting from IV to PO	Discuss oral alternatives with a Medical Microbiologist	7 days (5 days if surgical repair of viscus)
Threadworms	Refer household contacts to GP or community pharmacy for treatment. Advise morning shower or bath and hand hygiene. Repeat treatment after two to three weeks if re-infection occurs.				
	Age < 2 years	Piperazine ● PO		Single dose	
	Age > 2 years	Mebendazole ● PO		Single dose	

Sepsis and Meningitis

Infection	Comments	First-line drug	Penicillin allergy choice?	Duration
	See meningitis guidelines (SRH only). <i>Meningitis is a notifiable disease. Notify Public Health Doctor – 01243 770772 9am to 5pm, or via Hospital Switchboard out of hours. Use cefotaxime ▼ for at least 48 hours until clinically stable.</i> If > 1month old Ceftriaxone ▼ 80mg/kg OD could be used after this time (max 4g daily).			
Bacterial Meningitis	Age < 7 days	Cefotaxime ▼ IV, 50-100mg/kg BD		
	Age 7 -21 days	Cefotaxime ▼ IV, 50mg/kg TDS		7 - 21 days dependant on organism.
	Age > 21 days (incl. child or adolescent)	Cefotaxime ▼ IV, 50mg/kg QDS (maximum dose is 3g)		Discuss with a Medical Microbiologist
	Age < 3 months or immunocompromised	Consider adding amoxicillin ▲ IV	Discuss with a Medical Microbiologist	
	Prophylaxis	Any patient with confirmed meningococcal meningitis who has received one dose of ceftriaxone ▼ is appropriately decolonised. If cefotaxime ▼ has been used then decolonisation with the normal oral rifampicin ● prophylaxis course or at least one dose of ceftriaxone ▼ (instead of cefotaxime ▼) will be needed before removal from isolation/discharge. Close contacts will also need rifampicin ● prophylaxis. Ceftriaxone ▼ IM is the preferred choice of prophylaxis in pregnant women. Always discuss prophylaxis with CCDC.		
Disseminated herpes (incl. encephalitis)		Aciclovir ● IV		Up to 21 days
	Duration dependent on organism and response. Consultant can consider ceftriaxone ▼ once stable.			
Septicaemia of unknown focus	Age < 1 month	Cefotaxime ▼ IV 50mg/kg/dose +/- amoxicillin		Depends on organism & response
	Age > 1 month	Cefotaxime ▼ IV 50mg/kg/dose (max dose 3g)		
Meningococcal Septicaemia	Duration dependent on response. Consultant can consider ceftriaxone ▼ once stable.			
		Cefotaxime ▼ IV 50mg/kg/dose (max dose 3g)		Depends on response

Infection	Comments	First-line drug	Penicillin allergy choice?	Duration
	Duration of treatment varies dependent on response and organism. If an oncology patient, refer to oncology guidelines. Take blood cultures from the line and peripherally.			
Septicaemia related to IV lines	Peripheral line	Flucloxacillin ▲ IV	Discuss with a Medical Microbiologist	
	Central line	Teicoplanin ● IV +/- gentamicin ● IV if very unwell.		
	MRSA Positive	Teicoplanin ● IV – discuss with Medical Microbiologist		
Febrile neutropenia	Refer to oncology guidelines			

Other infections

Infection	Comments	First-line drug	Penicillin allergy choice?	Duration
Standard Treatment				
Lyme Disease (Send blood for serology in all suspected cases)	Age < 12 years	Amoxicillin ▲ PO	Discuss with a Medical Microbiologist	2 weeks
	Age > 12 years	Doxycycline ● PO		
	<i>If neurological or cardiac involvement</i>	Ceftriaxone ▼ IV		10 to 28 days
	<i>Prophylaxis</i>	Not routinely recommended. Discuss suspected chronic conditions with a Medical Microbiologist		
Falciparum				
Malaria (Please refer to BNFC section 5.4.1 for dosing advice)	Age < 12 years	Quinine sulphate ● PO and either Clindamycin ● PO or		Give both drugs together for seven days each
	Age > 12 years	Doxycycline ● PO		
	If seriously unwell, give quinine ● IV together with or followed by clindamycin ● or doxycycline ● as above.			
	Ovale, vivax or malariae	Chloroquine ● PO		
	<i>If P. vivax or P. ovale</i>	Will require radical cure with primaquine ●. (Not suitable for children aged < 6 months – discuss with a specialist)		
Chloroquine phosphate 250mg tablets = 155mg chloroquine base Chloroquine sulphate 68mg/5ml syrup = 50mg/5ml chloroquine base For dosing information refer to the Children's BNF (Section 5.4.1)				

Surgical Prophylaxis

Infection	Comments	First-line drug	Penicillin allergy choice?
General surgery prophylaxis	In gangrenous or ruptured appendix ongoing treatment will be needed. Refer to Gastrointestinal Infections section	Co-amoxiclav ▲ IV 30mg/kg (max 1.2g) stat at induction	Cefuroxime ▼ IV 50mg/kg (max 1.5g) stat at induction +/- metronidazole ● IV 7.5mg/kg (max 500mg) stat depending on type of surgery. (Reduce cefuroxime ▼ dose to 30mg/kg 8-hourly if repeated doses needed)
Orthopaedic surgery prophylaxis – only required for prosthesis insertion	If MRSA positive or high risk	Co-amoxiclav ▲ IV 30mg/kg (max 1.2g) stat at induction	Cefuroxime ▼ IV 50mg/kg (max 1.5g) stat at induction
Surgery in MRSA	Discuss with Medical Microbiologist at pre-op. See policy in Infection Control manual.	Add teicoplanin ● IV to above regime	
Splenectomy	See Infection Control Manual for information on vaccines and long-term prophylaxis		

Neonatal Guidelines

Infection	Comments	First-line drug	Penicillin allergy choice?	Duration
Septic Arthritis	Cefotaxime ▼ frequency of dosing: Age <7days old BD, 7-21 days old TDS, > 21 days QDS. Amoxicillin ▲ frequency of dosing: Age <7 days old BD, >7 days TDS. Stop amoxicillin once Listeria meningitis excluded. IV treatment should continue for at least 2-3 weeks in unifocal disease and for at least 3 weeks in complex or PVL-positive cases, followed by oral therapy for a minimum total treatment course of 6 weeks or more. Discuss duration of treatment and oral alternatives with a Medical Microbiologist.			
	Neonates < 3 months old	Cefotaxime ▼ IV 50mg/kg/dose		See above
	If sepsis or meningitis considered	Add amoxicillin ▲ IV 50mg/kg/dose	Discuss with a Medical Microbiologist	
Osteomyelitis	Cefotaxime ▼ frequency of dosing: Age <7days old BD, 7-21 days old TDS, > 21 days QDS. Amoxicillin ▲ frequency of dosing: Age <7 days old BD, >7 days TDS. Stop amoxicillin once Listeria meningitis excluded. IV treatment should continue for at least 2-3 weeks in unifocal disease and for at least 3 weeks in complex or PVL-positive cases, followed by oral therapy for a minimum total treatment course of 6 weeks or more. Discuss duration of treatment and oral alternatives with a Medical Microbiologist.			
	Neonates < 3 months old	Cefotaxime ▼ IV 50mg/kg/dose		See above
	If sepsis or meningitis considered	Add amoxicillin ▲ IV 50mg/kg/dose	Discuss with a Medical Microbiologist	
Early neonatal sepsis (<2 days old at initiation) or cover in babies at high risk of sepsis	Treat for at least 48 hours if cultures are negative. Otherwise treat for five to 14 days or longer in confirmed infection, dependent on organism and severity. Discuss with a Medical Microbiologist if unsure.			
		Cefotaxime ▼ IV 50mg/kg BD		See above
		Cefotaxime ▼ IV 100mg/kg BD +/-		
Severe sepsis or meningitis	Amoxicillin ▲ IV	Discuss with a Medical Microbiologist		

Infection	Comments	First-line drug	Penicillin allergy choice?	Duration
	Flucloxacillin ▲ frequency of dosing: Age 0-7 days old use BD, 7-21 days old use TDS, > 21 days old use QDS			
Late neonatal sepsis (>2 days old at initiation)	St Richards	Flucloxacillin ▲ IV 50mg/kg/dose and gentamicin ● IV (refer to SRH neonatal dosing guide)	Discuss with a Medical Microbiologist	Depends on response
	Worthing	Flucloxacillin ▲ IV 50mg/kg/dose and gentamicin ● IV	Discuss with a Medical Microbiologist	
Necrotising enterocolitis (NEC) in neonates	St Richards	Metronidazole ● IV and Amoxicillin ▲ IV and Gentamicin ● IV	Discuss with a Medical Microbiologist	Minimum 10 days if confirmed
	Worthing	Flucloxacillin ▲ IV and Gentamicin ● IV and Metronidazole ● IV	Discuss with a Medical Microbiologist	
Sepsis caused by <i>Staphylococcus epidermidis</i> (Coagulase –ve)	St Richards	Teicoplanin ● may be required. Discuss with a Medical Microbiologist		As advised
	Worthing	Discuss with a Medical Microbiologist		

- For more details, refer to the full Antibiotic Prophylaxis in Surgery Guidelines available on the Intranet.
- Co-amoxiclav (Augmentin) is a penicillin-containing antibiotic
- Prophylaxis should be given at or within 60 minutes prior to induction, unless otherwise stated.
- If a patient is already receiving antibiotics prior to surgery, discuss with a Medical Microbiologist
- If a patient is penicillin anaphylactic, discuss with a Medical Microbiologist

Type of Surgery		Primary Antibiotic & Dose		Penicillin Allergy (not anaphylaxis)		
Head & Neck						
	Contaminated/clean contaminated surgery Consider in clean malignant neck dissection	Co-amoxiclav	1.2g	Ertapenem	1g	
ENT	Complex septorhinoplasty Grommet insertion (topical single dose)					
Facial	Open reduction & internal fixation of compound mandibular fractures Intraoral bone grafting procedures Orthognathic surgery					
Ophthalmic	Cataract Surgery Glaucoma or corneal grafts Lacrimal surgery Penetrating eye injury Intraocular surgery	Cefuroxime 1mg/0.1ml subconjunctival/ intracameral injection (Gentamicin 2nd line)				
Thorax						
Breast	Breast cancer surgery Breast surgery with implant	Co-amoxiclav	1.2g	Ertapenem	1g	
Cardiac	Pacemaker insertion	Flucloxacillin	1g	Teicoplanin (MRSA Positive/ High Risk)	400mg	
Upper Gastrointestinal						
	Oesophageal Surgery Stomach & duodenal surgery Gastric bypass surgery Small intestine surgery	Co-amoxiclav	1.2g	Ertapenem	1g	
Hepatobiliary						
	Bile duct surgery Pancreatic surgery Liver surgery Gallbladder surgery (open) <i>High-risk laparoscopic gallbladder surgery (intraop cholangiogram, bile spillage, acute cholecystitis/pancreatitis, jaundice, pregnancy, immunosuppression)</i>	Co-amoxiclav	1.2g	Ertapenem	1g	
Lower Gastrointestinal						
	Appendicectomy Colorectal surgery	Co-amoxiclav	1.2g	Ertapenem	1g	
Abdomen						
	<i>Therapeutic endoscopic procedures in high risk patients (e.g. pancreatic pseudocyst, immunosuppression, incomplete biliary drainage)</i>	PEG	Co-amoxiclav	1.2g	Ertapenem	1g
		ERCP	Ciprofloxacin 500mg PO 1-2 hours pre-op			
Spleen	<i>Splenectomy (consider in immunosuppression)</i>	Co-amoxiclav	1.2g	Ertapenem	1g	

Type of Surgery		Primary Antibiotic & Dose		Penicillin Allergy (not anaphylaxis)	
Gynaecology	Abdominal hysterectomy Vaginal hysterectomy	Co-amoxiclav	1.2g	Ertapenem	1g
	Caesarean section (give post clamping of cord) Perineal tear (third or fourth degree) Consider for manual removal of placenta	Co-amoxiclav	1.2g	Cefuroxime and metronidazole	1.5g 500mg
	Induced abortion	Metronidazole 1g PR at time of op, & doxycycline 100mg BD PO 7 days post op. (If known Chlamydia positive pre-op replace doxycycline with azithromycin 1g stat pre-op)			
Urogenital	Shockwave lithotripsy Percutaneous nephrolithotomy Endoscopic ureteric stone fragmentation/removal Transurethral resection of the prostate, Transrectal biopsy of the prostate, Insertion of prosthetic device, Cystoscopy (<i>high risk patients/bacteriuria only</i>)	Gentamicin 120mg. Additional antibiotics depend on pre-operative urine result (if not taken, send a diagnostic CSU).			
Limb					
Orthopaedic	Open fracture, Open surgery for closed fracture, Hip fracture, Other orthopaedic implant surgery	Flucloxacillin and gentamicin	1g 240mg	Teicoplanin and gentamicin	400mg 240mg
	<i>Orthopaedic surgery and MRSA positive/high risk</i>	Teicoplanin 400mg and gentamicin 240mg			
	Arthroplasty (needs 24 hours of prophylaxis)	Flucloxacillin and gentamicin at induction, then	1g 240mg	Teicoplanin and gentamicin (at induction only, no post-op doses)	400mg 240mg
Vascular	Lower limb amputation	Co-amoxiclav	1.2g	Ertapenem	1g
	Vascular surgery (abdominal and lower limb arterial reconstruction)				
	<i>Vascular surgery with graft and MRSA positive</i>	Add teicoplanin 400mg to regimen			
If gross faecal contamination , then also give treatment course of antibiotics for five days.		Co-amoxiclav +/- gentamicin	1.2g TDS 5mg/kg LBW* OD	Ertapenem +/- gentamicin	1g OD 5mg/kg LBW* OD

LBW = Lean Body Weight. See full Antibiotic Policy for gentamicin prescribing.

Gentamicin

- **Gentamicin must be used with care as high levels are associated with nephro- and ototoxicity.**
- **Never give to blind patients as ototoxic side-effects would be catastrophic.**
- **Use with caution in patients with renal impairment, or impaired hearing/balance, elderly, or patients likely to need long term antibiotics.**
- **Two different gentamicin regimens are used for adults in this Trust: once daily and multiple daily dosing (for example for infective endocarditis treatment)**
- **For gentamicin prescribing in paediatrics and neonates, see department guidelines**

1. Once daily Gentamicin

- **Once daily gentamicin is used for most patients (See exceptions)**
- **Most patients will only need one or two doses in addition to a normal course of a beta-lactam.**
- **Further doses only to be continued if indicated clinically and/ or appropriate for culture results.**
- **Avoid prolonged courses i.e. >7 days**

1.1 Exceptions

- **Infective endocarditis. Low doses are used for synergy with benzylpenicillin, (see below)**
- **Use with caution in pregnant women- seek advice**

1.2 Dosage

5mg/kg Lean Body Weight, once daily IV (dose interval depends on level), typical dose 250-350mg daily

1.3 Dosage adjustment in obese patients

- **Aminoglycosides poorly distribute into adipose tissue. Dose adjustment is needed if the patient is obese (BMI > 30 kg/m²)**
- **Dose is based on Lean Body Weight (LBW)**
- **Calculate the LBW in kg as follows**
- **Female** $45.5 + (2.3 \times \text{Height in inches} >5 \text{ feet})$ **See dose calculator on StaffNet**
- **Male** $50 + (2.3 \times \text{Height in inches} >5 \text{ feet})$

1.4 Dosage adjustments in renal impairment

- **Use the same once daily dose as above, then use the nomogram (after blood level testing) to determine the time interval of subsequent doses (likely to be >24 hourly dosing)**

1.5 Gentamicin monitoring

- **Send the sample in a yellow topped vacutainer or a red topped vacuette to Biochemistry.**
- **Take the blood sample 6-14 hrs after the 1st dose**
- **Take further levels twice weekly if 1st level satisfactory and renal function stable**
- **NB: for haemodialysis patients follow the Dixon Ward protocol for gentamicin monitoring (W&S)**

1.6 Completing the request form

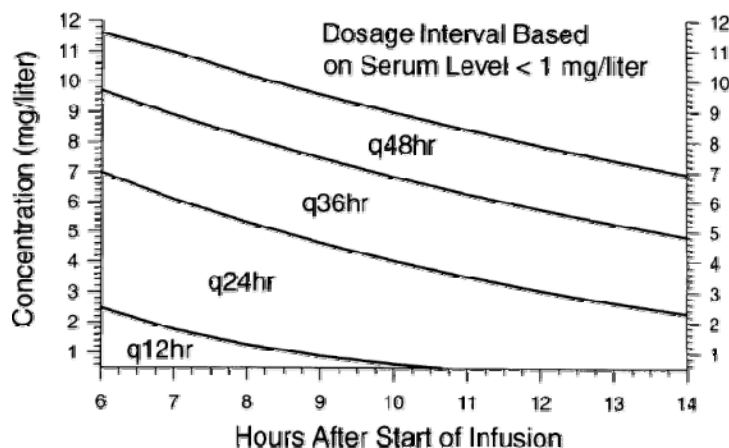
In addition to the usual demographic information, the following details must be provided

- **Sample type** - should be post-dose, or random if previously high level
- **Dosing regimen**
- **Date + exact time of blood sample**
- **Date + exact time last dose was given**

1.7 Interpretation of Gentamicin levels

- **Gentamicin levels are reported electronically by Biochemistry**
- **Calculate the time between previous dose and the time of the level**
- **Plot the level against dosing interval on the nomogram below to determine the time interval for subsequent doses i.e. 12, 24, 36, or 48 hourly.**
- **Give the same dose as previously (i.e. 5mg/kg lean body weight) at the time interval indicated by the nomogram**
- **If the level falls beyond the 48 hourly line do not give any further doses of gentamicin and discuss with a Medical Microbiologist non-urgently**
- **Levels taken later than 14 hours cannot be interpreted with the nomogram but if the result is <1mg/L it is safe to give another dose at 24 hours.**

The Nomogram¹



2. Gentamicin prescribing in Infective Endocarditis

2.1 Dosage

1mg/kg lean body weight every eight hours, typical dose: 60 or 80mg TDS IV

2.2 Dosage adjustment in obese patients

- **Aminoglycosides poorly distribute into adipose tissue. Dose adjustment is needed if the patient is obese (BMI > 30kg/m²)**
- **Dose is based on Lean Body Weight (LBW)**
- Calculate the LBW in kg as follows
- **Female** $45.5 + (2.3 \times \text{Height in inches } >5 \text{ feet})$ **See dose calculator on StaffNet**
- **Male** $50 + (2.3 \times \text{Height in inches } >5 \text{ feet})$

¹ Urban, AW, Craig, WA. Daily dosage of aminoglycosides. In: Remington, JS, Swartz, MN. Current Clinical Topics in Infectious Diseases. Vol 17. Malden (MA):Blackwell Science; 1997. p. 236-255

2.3 Dosage adjustments in renal impairment

- Please discuss these patients with a Medical Microbiologist

2.4 Gentamicin monitoring

- Send the sample in a yellow topped vacutainer or red topped vacuette to Biochemistry.
- Take a pre-dose level (trough) just before the 3rd dose + a post dose level (peak) 1 hr after
- Take further levels twice weekly if first set of levels satisfactory and renal function stable

2.5 Completing the request form

In addition to the usual demographic information the following details must be provided

- Sample type (Pre-dose, pos-dose, random sample)
- Dosing regimen
- Date + exact time of blood sample
- Date + exact time of last dose

2.6 Target levels

In Endocarditis Trough <1mg/L Peak 3-5mg/L

If levels are higher than these ranges, discuss dose adjustment with a Medical Microbiologist

VANCOMYCIN TESTING

Dose

Usually 1g bd but this depends on renal function, age etc. (discuss with pharmacy extension 3347)

Levels

Usually trough dose only required which is collected pre 3rd or 4th dose unless renal impairment. Collected immediately prior to the next dose. Give next dose without waiting for the results unless there is a reason to suspect toxicity e.g.sudden change in renal function

Request form

Green (biochemistry)

Specimen

clotted Blood sample (red vacuette)

Details

Exact time of last dose and blood sample must be recorded.

The sample does not need to be processed overnight unless the next dose is being withheld for some reason as above.

Trough levels should usually be 10-15mg/L but on some occasions (eg some resistant organism) you may be asked to aim for higher levels.

THERAPEUTIC DRUG LEVEL MONITORING

	Digoxin	Theophylline	Lithium
Therapeutic range	0.8 – 2 mcg/l	8 – 20 mg/l	0.4 – 0.8 mmol /L
Time to steady state	7 days (longer in renal failure)	2 days	3-7 days
Sampling time (plain tube, at least 2ml sample)	At least 6 hours post dose or immediately pre-dose	Liquid preps: peak 2 hrs post dose. SR tabs: peak 4hrs post-dose, trough immediately prior to next dose.	12 hours post dose
Laboratory	CLINICAL BIOCHEMISTRY		
Emergency Service (out of hours)	Available at all times if needed	Available at all times if needed	Available at all times if needed
Advice	Dr Quiney: ext 3573 Out of hours: Consultant on call via switchboard.		

	Gentamicin	Phenytoin	Carbamazepine
Therapeutic range	Based on nomogram	10-20mg/L	Single therapy: 8-12mg/L Multiple therapy: 4-8mg/L
Time to steady state	N/A	7 days or longer	At start of therapy 2-4 weeks. After dose change 4-5 days.
Sampling time (plain tube, at least 2ml sample)	(see page 91)	Anytime	Immediately prior to next dose
Laboratory	BIOCHEMISTRY (use yellow request form)	CLINICAL BIOCHEMISTRY	
Emergency Service (out of hours)	Levels will not be routinely processed overnight unless there is an urgent clinical need. (discuss with on-call medical microbiologist)	Available at all times if needed	Discuss with Dr Quiney
Advice	Microbiology (ext 3548) Pharmacy (ext 3347)		Dr Quiney: ext 3573 Out of hours: Consultant on call via switchboard.

FEBRILE NEUTROPENIC PATIENT

Rapidly progressive and potentially fatal infections tend to be caused by gram negative organisms. Patients with septicemic shock must be urgently assessed and *antibiotics started immediately* after blood cultures have been taken.

Neutropenia

A total neutrophil count $<1.0 \times 10^9/l$. However, overwhelming sepsis more likely when neutrophil count <0.1 .

Pyrexia

$>39^{\circ}$ C on one occasion or

$>38^{\circ}$ C on two occasions two hours apart or

rigors or other indications of systemic illness with or without fever. Hypothermia may occur.

Clinical Examination

A full clinical examination must be performed including examination of the mouth, chest, abdomen, perianal area and Hickman line/PICC line insertion site. Do not perform rectal examination in neutropenic patients.

Investigations

1. Blood cultures: peripheral and central if a Hickman line/PICC line is in situ (especially if there is a history of rigors in relation to line flushing or other evidence of line infection).
2. MSU
3. Swabs/samples from any clinically relevant sites.
4. Chest x-ray if the patient has not had one within the previous 7 days. (This can often be deferred until normal working hours if it is unlikely to alter initial management)

Prophylactic Anti-fungal Agents

Neutropenic patients should receive fluconazole 50 mg daily.

Antibiotic Therapy

Dosage modification of all antibiotics should be considered in the presence of renal impairment. If in doubt please contact the Consultant Haematologist.

First Line

1. *Tazocin (piperacillin & tazobactam)* 4.5 g IV tds.

Patients who are sensitive to penicillin should receive ceftazidime 2g IV tds in place of tazocin.

2. *Gentamicin* 5mg/kg (lean body weight) IV once daily (in 100mls sodium chloride 0.9 % over 30mins) unless the patient has previously been on level-adjusted gentamicin in which case the last satisfactory dose should be used.
 - Monitoring of the gentamicin levels must be undertaken between 6 and 14 hours after the initial dose (see attached guidelines). In apparently stable patients levels should be monitored twice weekly unless the gentamicin is about to be stopped
 - Check renal function within the first 24 hours, and always before a second dose is given.

REASSESS AT 48 HOURS and discuss with the Consultant Haematologist and if necessary the Microbiologist.

Second Line

If remains febrile at 48 hours, continue the above regimen but add in: -

- *teicoplanin* 400mg IV bd 12hrly for 1st 3 doses then once daily.

REASSESS AT 72 HOURS.

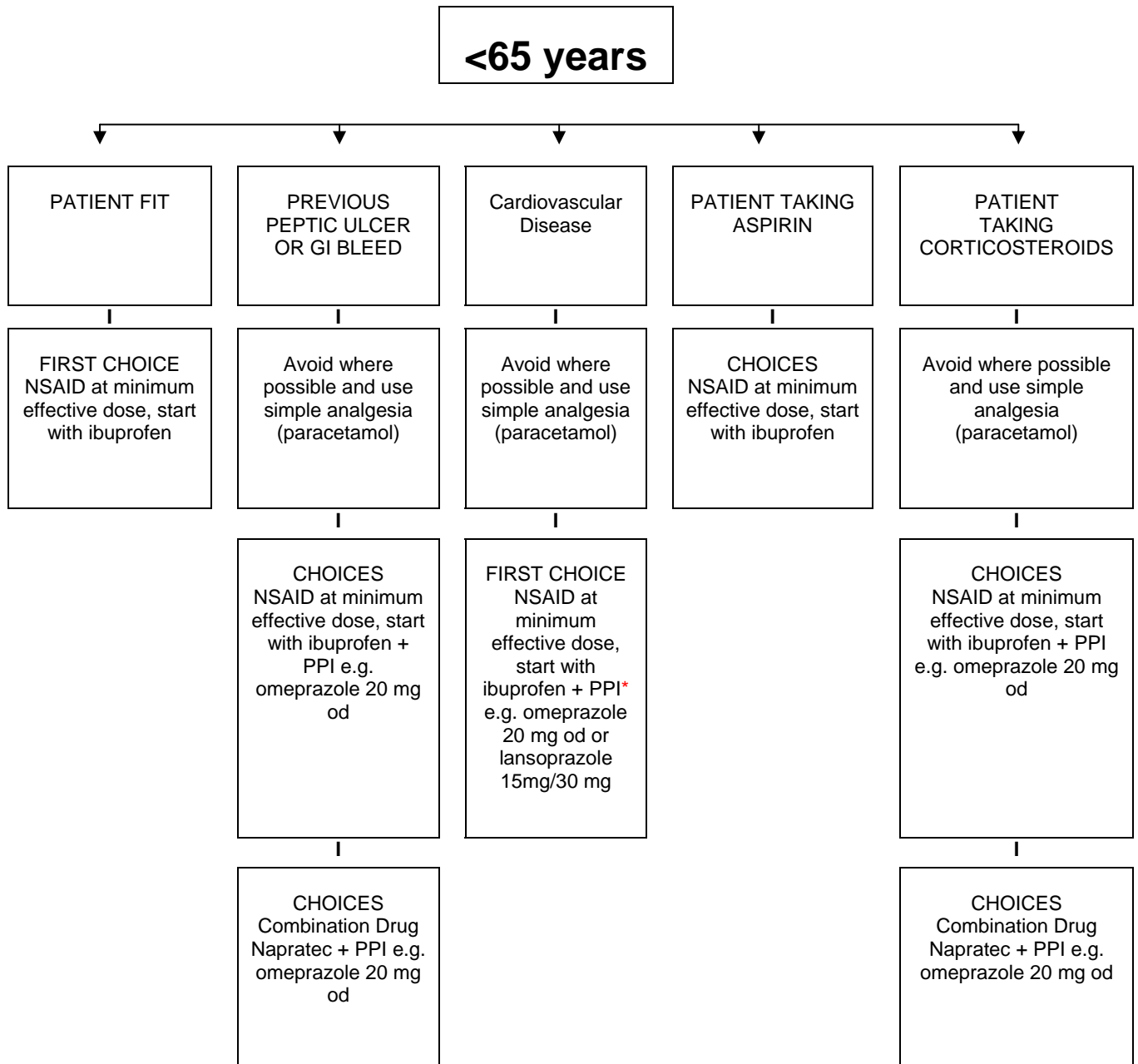
Third Line

Third line antibiotics or anti-fungal agents will be introduced if there have been positive culture results or on the advice of the Consultant Microbiologist or Haematologist.

- *Non-liposomal amphotericin*, **FUNGIZONE** 1mg/Kg daily. (brand name, generic and patient's weight to appear on the prescription chart). Adrenal function and potassium must be checked daily and LFTs twice a week. Pay meticulous attention to fluid balance and iv potassium supplementation, keeping patient well hydrated. Prescribe amiloride 5 mg daily to reduce hypokalaemia.
Give chlorpheniramine 10 mg and hydrocortisone 100mg prior to each infusion if pyrexia and rigors occur.
- In the event of amphotericin failure or toxicity, or renal impairment consider *voriconazole* IV or liposomal amphotericin (**AMBISOME**) IV. The dose of this is 1-3mg/kg daily (max 5mg/kg which is an unlicensed dose). (Brand name, generic and patient's weight to appear on the prescription chart.)
- The dose of *voriconazole* iv is 6mgs/kg bd for 24 hours followed by a maintenance dose of 4mgs/kg bd. Administered at a maximum rate of 3mg/ kg per hr.

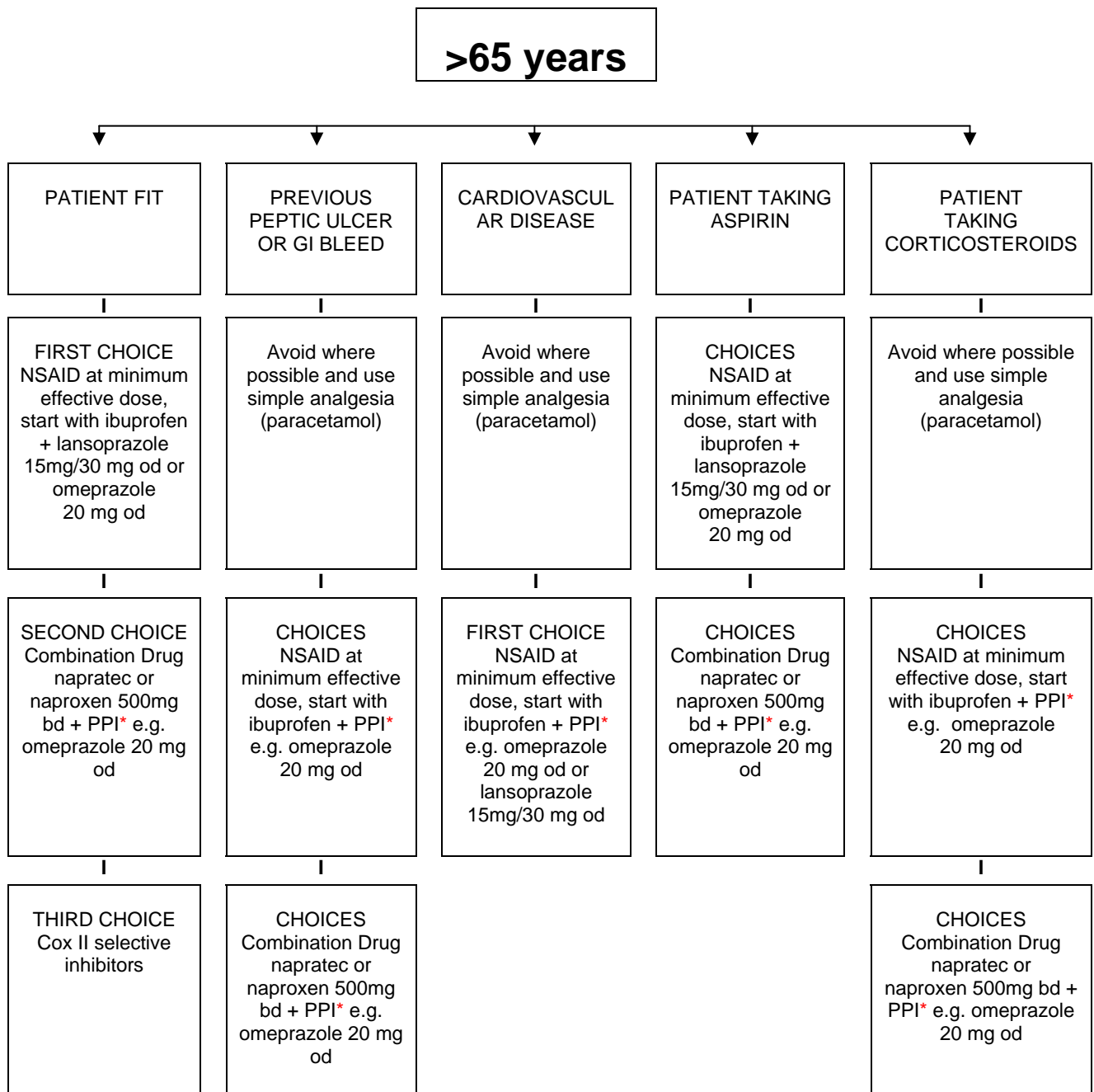
Consider the need for treatment of Herpes Simplex with *aciclovir*.

PATIENTS TAKING NON-STEROIDAL ANTI-INFLAMMATORY DRUGS AND THE NEED FOR GASTRO-PROTECTION



- ❖ Only omeprazole (20mg od) and lansoprazole (15mg or 30mg od) are licensed for the prophylaxis of NSAID-associated benign gastric ulcers, duodenal ulcers and relief of symptoms in patients requiring continued NSAID treatment and lansoprazole 15mg daily remains the cost effective choice in primary care.
- ❖ NSAIDs- consider ibuprofen or diclofenac first line at the lowest effective dose. Diclofenac and doses of ibuprofen > 400mg tds should be avoided in patients with cardiovascular disease. Consider naproxen with PPI in those patients.
- ❖ Avoid indometacin, piroxicam & azapropazone due to adverse GI effects.
- ❖ *Patients who need gastroprotection who are taking clopidogrel post NSTEMI/STEMI or ACS should be given Lansoprazole 30mg om

COX II INHIBITOR AND NSAID PRESCRIBING GUIDELINES



- ❖ Only and omeprazole (20mg od) or lansoprazole (15mg or 30mg od) are licensed for the prophylaxis of NSAID-associated benign gastric ulcers, duodenal ulcers and relief of symptoms in patients requiring continued NSAID treatment and lansoprazole 15mg daily remains the cost effective choice in primary care.
- ❖ NSAIDs- consider ibuprofen first line at the lowest effective dose or naproxen where doses of ibuprofen > 400mg tds are required.
- ❖ Avoid indometacin, piroxicam & azapropazone due to adverse GI effects.
- ❖ *Patients who need gastroprotection who are taking clopidogrel post NSTEMI/STEMI or for ACS should be given Lansoprazole 30mg om

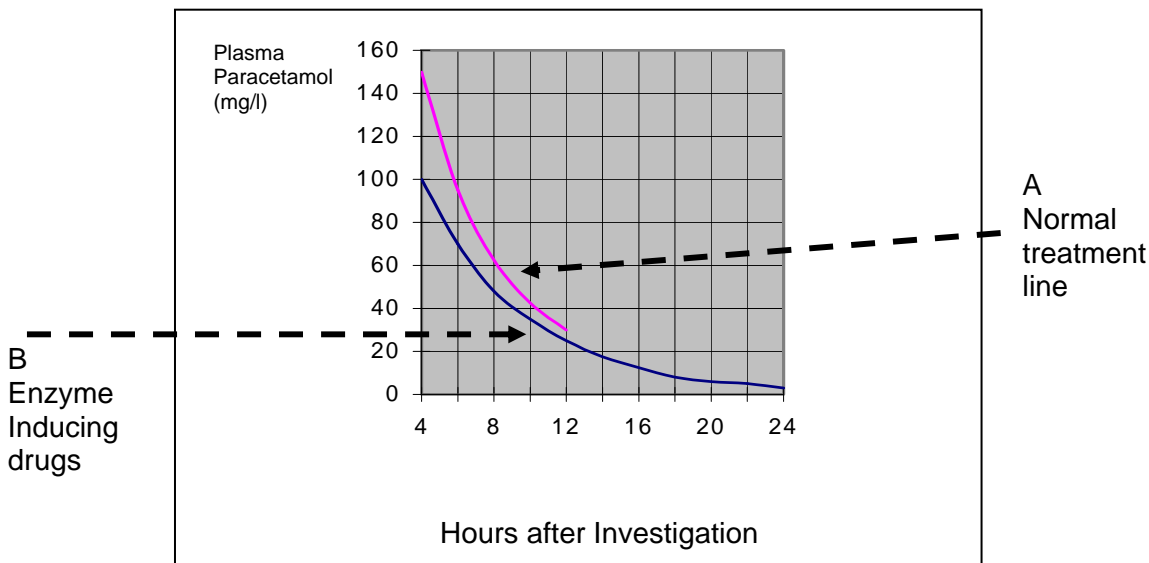
COMMON DRUG OVERDOSES

Paracetamol

Relatively small amounts of paracetamol can cause fatal liver damage and plasma levels must be measured as part of routine screening in all suspected paracetamol overdoses. Treatment should be given to every patient whose blood level lies above the line on the graph. In patients who have induced liver enzymes (such as patients on anticonvulsants, who drink heavily, or who are malnourished) the high risk line on the graph should be used N-acetylcysteine may be started immediately when a staggered overdose has been taken so a 4 hour level is unreliable..

If a level within the toxic range is obtained, give IV N-acetylcysteine (PARVOLEX) 150 mg/kg over 15 minutes, then 50 mg/kg over the next 4 hours, followed by 100 mg/kg over the next 16 hours. Further bags of 100mg/kg over 16 hours should be prescribed, to continue until repeat blood tests after the initial 16 hour bag show a normal INR. **DO NOT STOP GIVING PARVOLEX WHILST WAITING FOR THE REPEAT INR.** If the INR remains >1.1 then repeat the 16 hour bags until the INR normalises and seek specialist advice.

N-acetylcysteine may be given up to 36 hours post-overdose. Paracetamol overdose may rarely be complicated by an early metabolic acidosis, check blood gases if patient hyperventilating. Some patients may develop hypoglycaemia several hours after paracetamol - beware of this.



For Management of Children

All Patients presenting 8-15 hours}	Refer to chart in A&E
All patients presenting 15-24 hours}	“ “ “
All patients presenting > 24 hours}	“ “ “

Adverse Reactions to N-Acetylcysteine

Can occur in up to 15% patients, usually within first 30 minutes of infusion. Nausea, vomiting, flushing, urticarial rash, angio-edema, tachycardia, hypotension, bronchospasm, respiratory depression and collapse.

Management

- 1 **Stop infusion** (is usually all that is required).
 - a) Antihistamine steroids - only if reaction severe.
 - b) Nebulised salbutamol, if reaction severe.
 - c) Once reaction settled, recommence at infusion rate of 50 mg/kg over 4 hours.

2 **Barbiturates**

A multi-dose activated charcoal regime is the treatment of choice. Give 50g stat, then 50g 4 hourly.

3 **Tricyclics**

The fatal dose in adults is probably 2.5 –3.5 g, although death has occurred after ingestion of 520mg. 120mg could be fatal for a 2year old.

Give activated charcoal. Rhythm disturbances are common and the ECG needs continuous monitoring until the heart rate falls below 100 beats/min, the QRS complex returns to normal and there is no evidence of a conduction defect. Check and correct K⁺, and arterial blood gases. Reverse any metabolic acidosis with IV sodium Bicarbonate. Resist the temptation to treat arrhythmias with drugs if at all possible. In the presence of arrhythmias give 50 mmol of sodium bicarbonate. Do not give flumazenil if a benzodiazepine has already been ingested.

Tricyclic overdose patients should be admitted under the Medical team on take and are not suitable patients for Accident and Emergency overnight observation beds.

4 **Opiates**

Give naloxone 0.8 - 1.2 mg IV stat and repeat twice if ineffective. Once a response has occurred infuse naloxone continuously IV (up to 5 mg/hr depending on the patient's state) until the effects of the opiate have waned.

5 **Aspirin**

NB: Salicylate poisoning is potentially fatal.

- a) Give oral activated charcoal (50 g for an adult, 10-15 g for a child) to adults and children who have ingested more than 120 mg/kg body weight salicylate within 1 hour.
- b) Asymptomatic patients with a reliable history of ingestion of less than 120 mg/kg do not require plasma salicylate concentrations.
- c) For those who have ingested more than 120 mg/kg salicylate, the plasma salicylate concentration should be measured at least 2 hours after ingestion. The salicylate concentration should be repeated after 2 hours because of the possibility of continuing absorption.
- d) Carry out arterial blood gas analysis. In children, capillary gases or venous blood gases would be a suitable alternative.
- e) Check U and Es, INR/PTR and blood glucose.
- f) If the serum potassium concentration is within the normal range correct metabolic acidosis with intravenous sodium bicarbonate.
- g) If the serum potassium is low this must be corrected before giving sodium bicarbonate.
- h) If the serum potassium concentration is within the normal range give sodium bicarbonate intravenously to enhance the urinary salicylate excretion (optimum urine pH 7.5-8.5) using the following dosage regime:

◆ **If the salicylate level in adults > 500 mg/L (3.6 mmol/L)**

Dose: 225 ml 8.4% sodium bicarbonate over 2 hours (or 1.5 L of 1.26%)

◆ **If the salicylate level in children > 350 mg/L (2.5 mmol/L)**

Dose: 1 ml/kg 8.4% sodium bicarbonate diluted in 5% dextrose or saline at 2-3 ml/kg/hour

- ◆ Further amounts of 8.4% sodium bicarbonate may be required to maintain the urine pH 7.5-8.5.
- ◆ The plasma salicylate concentration should be repeated to ensure that treatment has been effective.
- ◆ Effective alkalinisation of the urine may be complicated by hypokalaemia and, therefore, it is important to recheck the plasma potassium.
- ◆ Forced diuresis should not be used since it does not enhance salicylate excretion and may cause pulmonary oedema.

- i) Haemodialysis is the treatment of choice for severe poisoning and should be seriously considered in patients with:
- ◆ plasma concentrations greater than 700 mg/L (5.1 mmol/L)
 - ◆ renal failure
 - ◆ congestive cardiac failure
 - ◆ non-cardiogenic pulmonary oedema
 - ◆ convulsions
 - ◆ CNS effects not resolved by correction of acidosis
 - ◆ persistently high salicylate concentrations unresponsive to urinary alkalinisation
 - ◆ severe metabolic acidosis

Patients < 10 years or > 70 years have increased risk of salicylate toxicity and may require dialysis at an earlier stage. Children who require haemodialysis should be discussed with the local paediatric intensive care unit.

- j) Repeat plasma salicylate concentrations will be required to ensure that treatment has been effective.
- k) A second dose of charcoal may be warranted in patients whose blood level continues to rise, suggesting delayed gastric emptying, or who have taken enteric coated preparations where absorption may be slower.

NB: Salicylate poisoning is potentially fatal - please call your nearest NPIS centre for severe cases (0870 600 6266 or #5108).

DRUG OVERDOSAGE / ACUTE POISONING

The acute management of drug overdose and poisoning

Priority is given to ABC's.

Airway

The airway should be protected in a patient with a decreased conscious level by the use of an appropriate technique. Available techniques include: the recovery position; oropharyngeal airway; naso-pharyngeal airway, laryngeal mask and endo-tracheal intubation. The choice of the technique used to be determined by the physical state of the patient. High flow oxygen should be given and suction should be readily available. Contact an anaesthetist at an early stage if concerned about the safety of the airway or respiratory effort.

Breathing

Respiratory rate should be monitored. If low and an opiate OD is suspected naloxone should be given. Oxygen saturation should be measured using a pulse oximeter. Ventilatory support via a bag, valve mask or ventilator may be required. Blood gas measurement is required to assess hypoxia and acidosis.

Circulation

Capillary refill, pulse and blood pressure should be monitored. An intravenous line should be inserted and bloods sent for FBC, Electrolytes, Glucose, LFT's, paracetamol. Salicylate should only be measured if the patient has symptoms of salicylate overdose or is known to have ingested salicylates. The blood sugar level should be checked using a BM Stick at an early stage. Hypotension should be treated by intravenous crystalloid. A sample sent for clotting must be sent for all high dose paracetamol levels may be unreliable.

CNS

The Glasgow Coma Scale and pupillary responses should be monitored.

Specific Treatments

Once the ABC's have been addressed enquiries should be made to the nature of the overdose with particular emphasis on getting an accurate idea as possible to the questions:

- What was taken?
- How much was taken?
- When was it taken?
- Does the patient have any risk factors or significant medical history?

The National Poisons Information (NPIS) Toxbase Database should be accessed to obtain up to date information on managing the specific drug(s) ingested. **The Toxbase can be accessed via a computer in A&E.** An alternative source of information is NPIS Telephone Helpline #5108 (0870 600 6266).

Continuing Care of Drug Overdose and Poisoning

The management plans detailed by Toxbase or NPIS Telephone Helpline should be followed.

Patients must have regular cardiovascular, respiratory monitoring and nursing staff must be advised who to contact should these parameters be abnormal. Seek senior help if a patient is very ill, or is failing to respond to treatment.

Adults who are unwell or require specific treatments (N-acetylcystine, naloxone infusions etc.) or cardiac monitoring should be referred to the on call medical team. Patients who have ingested cardioactive drugs should not be kept under A&E care but referred for medical admission

Adults who are well, with a GCS 15 and who only require observation should be admitted to the A&E Observation Ward under the care of the A&E Team.

All children who have taken an overdose, under the age of 16 and those 16-18 in full time education should be referred to the paediatric on call team b/p 260.

Psychiatric Referral

The patient may be referred to the psychiatrists once their medical treatment is complete and they are able to be interviewed coherently. See elsewhere in the book for guidelines on psychiatric referral.

Common Pitfalls in Overdose and Poisoning

- Inadequate monitoring of the patient's condition leading to undetected deterioration.
- Failure to recognise an underlying condition and erroneously attributing the symptoms to an overdose.
- Delays in informing senior medical staff when a seriously ill patient is admitted.

UNCONSCIOUS PATIENTS -NON-TRAUMA

The arrival of an unconscious patient to the A&E department requires a rapid assessment and initiation of resuscitative measures. The specific diagnosis of the cause of decreased conscious level is of secondary importance to the initiation of resuscitation. The following guidelines will help you get your priorities right. The main learning points are:

- 1 Do not worry about getting the diagnosis immediately, get on and see to the ABC's and do not miss the immediately treatable causes of unconsciousness e.g. hypoglycaemia and opiate ingestion.
- 2 Be aware that as soon as someone's conscious level is reduced their airway is at risk:
 - As their tongue relaxes and obstructs the upper airway.
 - They are at risk of aspiration. This may happen silently as they lie on their backs, you may not see anything by just observing the patient.
 - The gag reflex is not either just present or absent. It becomes reduced as the conscious level reduces – simply finding some response to a tongue depressor pushed to the back of the throat should not reassure you that the patient's protective reflexes are intact.
- 3 There are many causes of unconsciousness. Most commonly we see drugs and alcohol, post-ictal states and intracerebral bleeds. Some patients may have 2 or more of these factors concurrently, so be careful – drunk patients may have an intracerebral bleed. It is extremely dangerous to put a patient's condition just down to alcohol alone.
- 4 Although the airway is at risk in the unconscious patient not all of these patients need to be intubated. Some may rapidly improve their conscious level e.g. a hypoglycaemic patient having been given glucose. If you are reasonably sure that the cause of the unconsciousness will resolve in a short time e.g. a benzodiazepine overdose that responds to flumazenil, you may not need to arrange for intubation but the airway must be looked after by nursing the patient in the recovery position with oxygen, suction and monitoring handy (and with someone who knows how to use them handy to look after the patient and watch them closely!).
- 5 If the diagnosis is in doubt and the patient's conscious level has failed to improve, generally speaking the next step in their management is to progress to CT scan of the brain. It is essential that the airway is protected in these patients who are going to be on their backs in scan at risk of aspiration. Contact an anaesthetist EARLY. Unless the patient is really 'flat', if they need to be intubated the anaesthetist will need to use sedating and paralysing drugs in order to achieve intubation. This requires a certain level of skill and experience and it is best on the whole if the Anaesthetic Registrar is called as well as the SHO.
- 6 These patients require a high level of care and monitoring. Do not hesitate to let your senior doctor know what is going on. There is nothing to be gained by you battling on without help. It is stressful for you and it is in the patient's best interest that senior doctors are involved at an early stage, even if just to discuss the case

UNCONSCIOUS PATIENTS

MANAGEMENT

HAS THE PATIENT ARRESTED? – IF SO CALL FOR HELP

Clear the airway – open mouth:

- suction out debris
- chin lift
- jaw thrust

Is the gag reflex normal?:

- if absent, insert oral airway and put in recovery position

Continued over page

- if present but weak, keep in recovery position
- give oxygen

Do they need intubating?

- Call anaesthetist if...
 - Glasgow Coma Scale 8 or less and will need to be supine e.g. for CT scan
 - blood gases show hypoxia and/or hypercarbia
 - you can not maintain a good airway by basic airway manoeuvres
 - they need to have gastric lavage

Assess how well they are breathing

- record respiratory rate
- measure arterial blood gases

Assess circulation:

- pulse
- blood pressure
- capillary refill (normal < 2s)
- insert IV cannula
- if hypotensive, consider IV fluids

Withdraw blood samples:

- request other investigations as indicated e.g. portable CXR

DO THEY HAVE LOW BLOOD SUGAR?

- give 50mls 50% glucose IV slowly

COULD THEY HAVE TAKEN AN OPIATE OVERDOSE?

- consider 400 micrograms of naloxone IV stat.

COULD THEY HAVE TAKEN A BENZODIAZEPINE OVERDOSE? on its own

- consider flumazenil 200 micrograms IV

REMEMBER:

- If you can not get IV access and your patient is hypoglycaemic, give IM glucagon whilst trying to gain access, naloxone can also be given IM
- Get history from all sources
- Request old notes
- Make provisional diagnosis
- Refer early to named doctor, and record time of referral, to A&E doctors

OBSERVATIONS TO BE DONE ON ALL PATIENTS WITH A GLASGOW COMA SCORE OF 12 OR LESS

- Pulse rate
- Blood pressure
- Respiratory rate
- Temperature
- Glasgow Coma Scale
- Stick blood sugar estimation

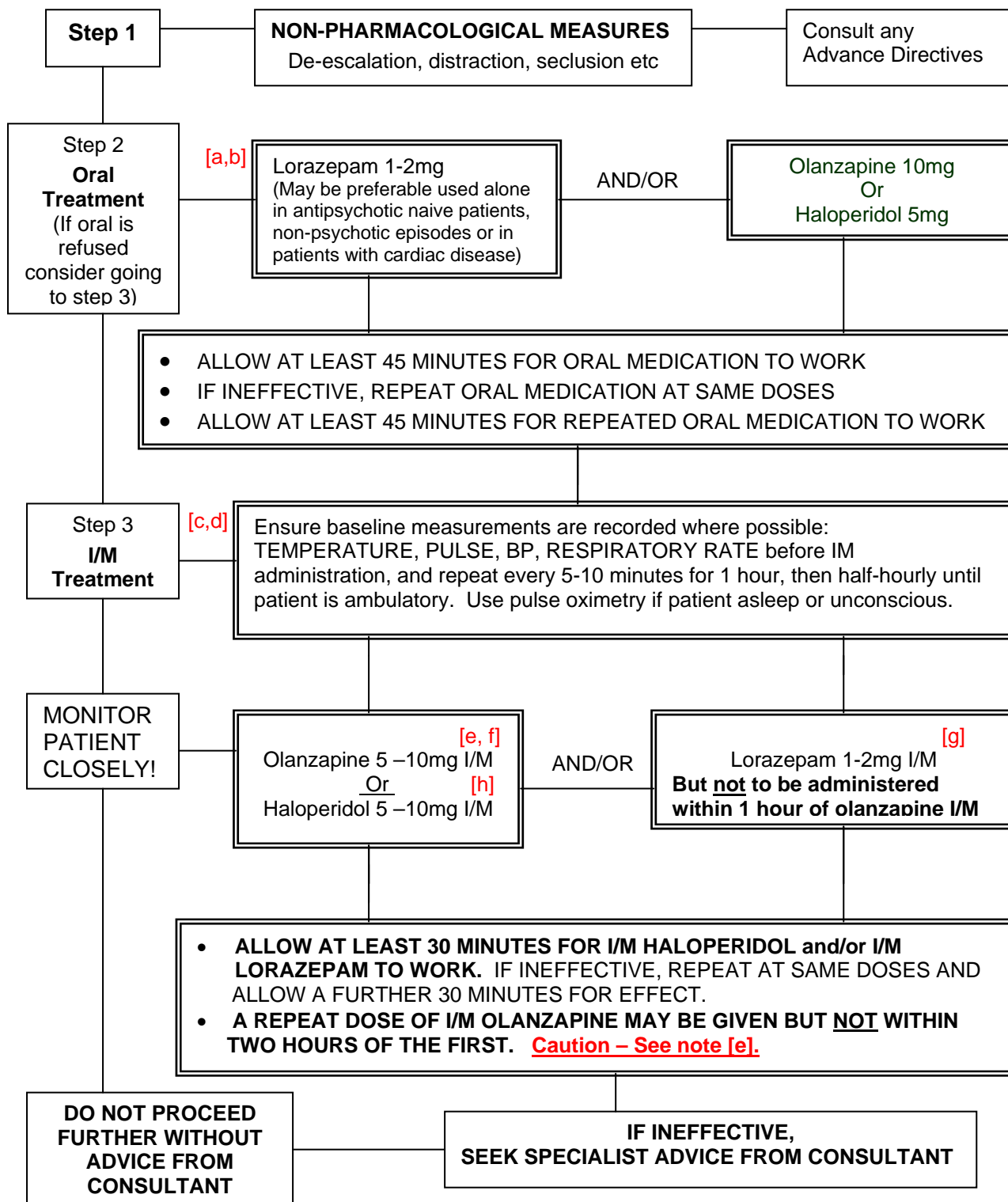
Monitoring

- ECG
- Blood pressure
- Pulse oximeter

Investigations

- FBC
- U+E
- Blood sugar
- Arterial blood gases
- ECG
- CXR
- Others as indicated e.g. blood cultures, toxicology, paracetamol and salicylate, Group and save.

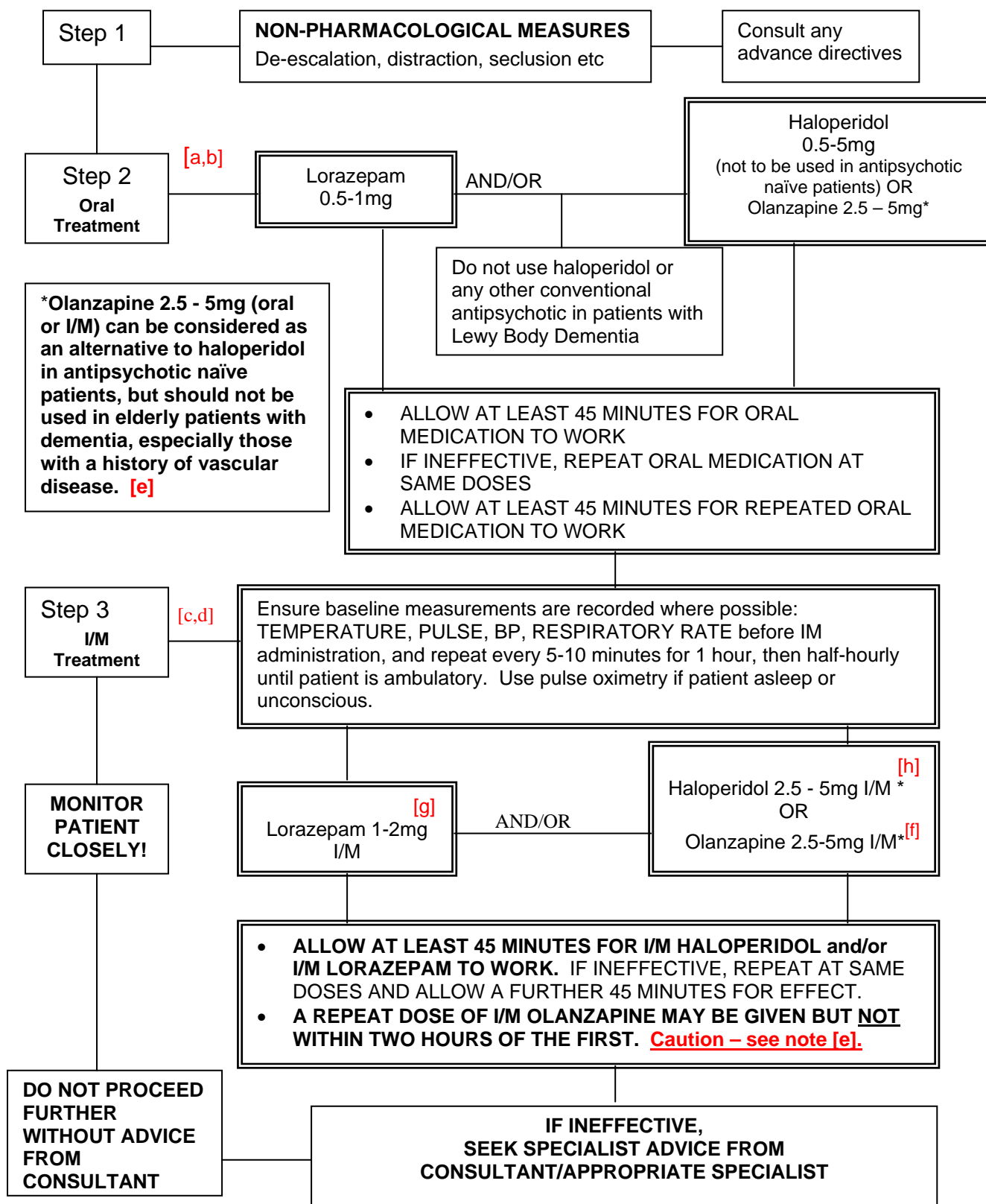
Rapid Tranquillization of the Acutely Disturbed / Violent Patient - Working Age Adult -



[a, b, c, d, e, f, g, h – see notes].

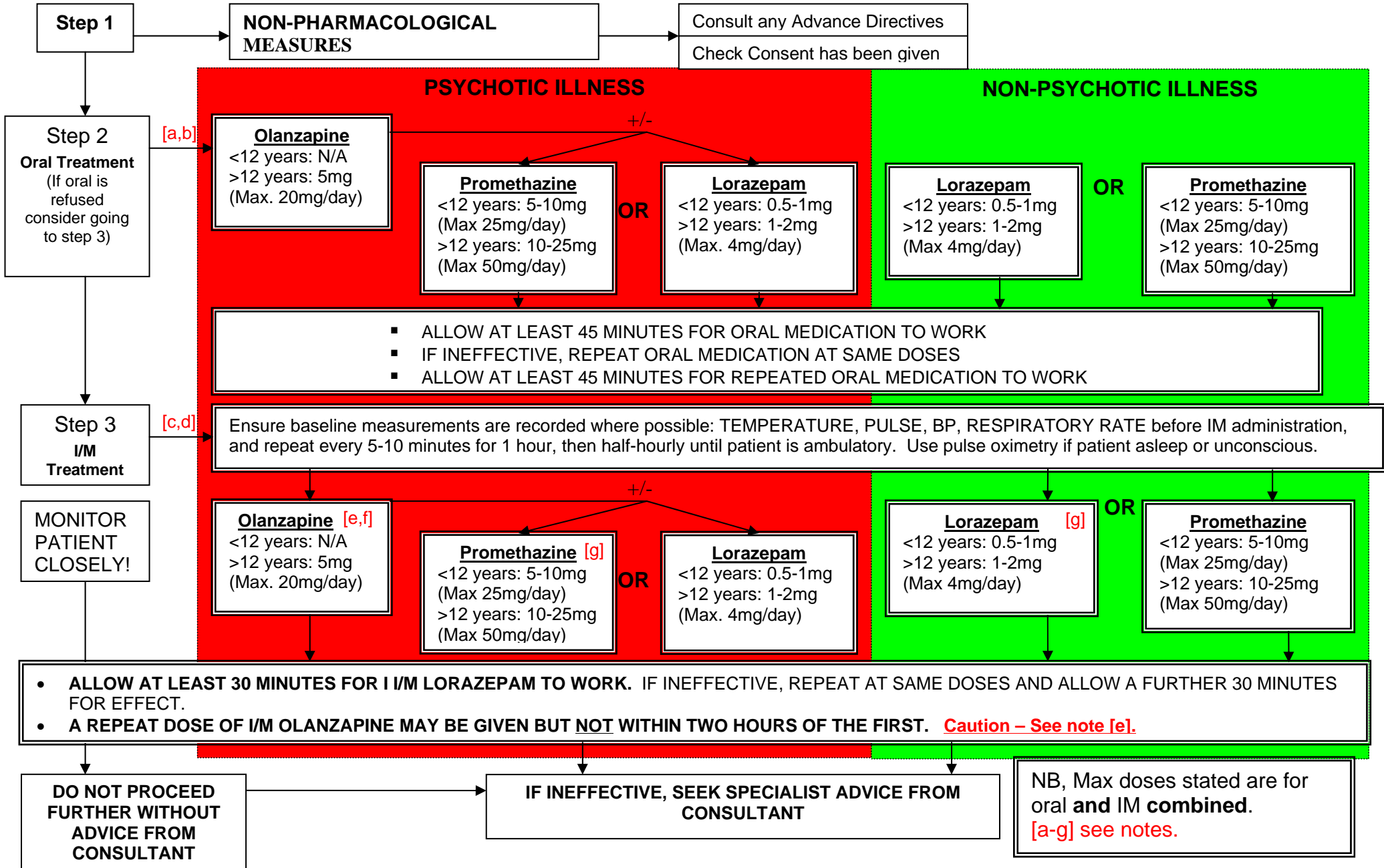
Rapid Tranquillization of the Acutely Disturbed / Violent Patient

- Patient Aged Over 65 Years – (not for routine management of delirium)



[a, b, c, d, e, f, g, h – see notes].

Rapid Tranquillization of the Acutely Disturbed / Violent Patient - Children and Adolescents Aged 6 to 17 Years



Notes:

a. Choice depends on current treatment. If patient is established on antipsychotics, lorazepam may be used alone. If the patient uses 'street drugs' or already receives regular benzodiazepines, an antipsychotic may be used alone.

Working Age Adult For the majority of patients, best response will be with combination therapy.

Patient Aged Over 65 For the majority of patients who are not antipsychotic naive, best response will be with combination therapy.

Children and adolescents aged 6 to 17 years. For the majority of patients who are not antipsychotic naive, best response will be with combination therapy.

Promethazine may be useful for patients who develop disinhibition as a result of benzodiazepine use.

b. Ensure procyclidine injection is available. Antipsychotic may cause acute dystonic reaction.

c. As in (a), either antipsychotic, benzodiazepine or promethazine may be used alone. Promethazine may be useful for patients who develop disinhibition with benzodiazepine use.

d. Ensure flumazenil injection is available to reverse effects of lorazepam injection.

e. The maximum dose of olanzapine is 20mg/24 hours by any (combined) route(s) – this should not be exceeded without obtaining specialist advice – and not more than 3 I/M doses may be given in any 24-hour period. **Intramuscular olanzapine and intramuscular lorazepam must not be administered within 1 hour of each other.**

f. Olanzapine IM needs to be diluted before administration in 2.1ml water for injection. It is stable for up to 1 hour after reconstitution. The following table provides injection volumes for delivering various doses of olanzapine:

Dose (mg)	Volume of Injection (ml)
10	2.0
7.5	1.5
5	1.0
2.5	0.5

g. Lorazepam should be mixed 1:1 with water before injecting. The following table provides injection volumes for delivering various doses of lorazepam **once diluted**:

Dose (mg)	Volume of Injection (ml)
4	2.0
3	1.5
2	1.0
1	0.5

h. The maximum dose of haloperidol is either 30mg orally or 18mg by intramuscular injection. Maximum doses will need to be adjusted if a combination of both routes is used.

The bioavailable equivalence of haloperidol being approximately 10mg oral: 6mg intramuscular.

These flowcharts and notes are taken from the Sussex Partnership NHS Foundation Trust's Rapid Tranquillization Policy that was approved in November 2009. For the latest version go to: www.sussexpartnership.nhs.uk/clinical/medication/docs/policies/?assetdet=33587

Physical health monitoring and remedial measures

Rapid Tranquillization – monitoring

After any parenteral drug administration, monitor the following:

Temperature
Pulse
Blood Pressure
Respiratory Rate

Every 5 – 10 minutes, for one hour, then half-hourly until patient is ambulatory.

If the patient is asleep or **unconscious**, the use of pulse oximetry to continuously measure oxygen saturation is desirable. A nurse should remain with the patient until they are ambulatory again.

ECG and haematological monitoring are also strongly recommended when parenteral antipsychotics are given, especially when higher doses are used. Hypokalaemia, stress, and agitation place the patient at risk of cardiac arrhythmias.

Remedial measures in rapid tranquillization

<i>Problem</i>	<i>Remedial measures</i>
Acute dystonia (including oculogyric crises)	Give procyclidine 5 – 10mg IM
Reduced respiratory rate (<10/min) or oxygen saturation (<90%)	Give oxygen; raise legs; ensure patient is not lying face down. Give flumazenil if benzodiazepine-induced respiratory depression suspected (see Guidelines for Use of Flumazenil page 98) If induced by any other sedative agent, ventilate mechanically .
Irregular or slow (<50/min) pulse	Refer to specialist medical care immediately.
Fall in blood pressure (>30mmHg orthostatic drop or <50mmHg diastolic)	Lie patient flat , tilt bed towards head. Monitor closely.
Increased temperature	Withhold antipsychotics (risk of NMS and perhaps arrhythmias). Check creatinine kinase urgently.

Guidelines for Use of Flumazenil

Guidelines for the use of flumazenil	
Indication for use	If respiratory rate falls below 10/minute after the administration of lorazepam, midazolam or diazepam.
Contra-indications	Patients with epilepsy who have been receiving long-term benzodiazepines.
Caution	Dose should be carefully titrated in hepatic impairment.
Dose and route of administration	<i>Initial 200mcg intravenously over 15 seconds - if required level of consciousness not achieved after 60 seconds then, Subsequent dose: 100mcg over 10 seconds</i>
NB, Children and adolescents 12-18 years of age as above. Children <12 years of age as 10mcg/kg (max. single dose 200mcg).	
Time before dose can be repeated	60 seconds
Maximum dose	1mg in 24 hours (one initial dose and eight subsequent doses).
Side effects	Patients may become agitated, anxious or fearful on awakening. Seizures may occur in regular benzodiazepine users.
Management	Side effects usually subside.
Monitoring	
• What to monitor?	Respiratory rate
• How often?	Continuously until respiratory rate returns to baseline level. Flumazenil has a short half life. Respiratory function may recover then deteriorate again.
Note: If respiratory rate does not return to normal or patient is not alert after initial doses assume sedation due to some other cause.	

POTENTIALLY VIOLENT/DANGEROUS PATIENTS

Before the interview if possible:

1. Get as much information as you can regarding risk factors.
 - a. Past history of violence - cross reference [Rapid Tranquillization Algorithms pages 105-110](#)
 - b. Sex - male
 - c. Age - 15-30
 - d. Affiliation to violent culture
 - e. History of fire setting/cruelty to animals
 - f. Psychiatric illness - schizophrenia and paranoid disorders
 - mania
 - severe depression with psychosis/suicidality
 - personality disorder
 - Drug/alcohol abuse
 - dissociative states
 - g. Physical illness causing mental disorder
 - temporal lobe epilepsy
 - delirium from any cause
 - dementia
 - learning difficulty

If the person is previously known to you it will still be important to know how they are now.

2. Be aware of who will be there - the risk could come from a relative, visitor, or another patient. This is especially important if you are visiting in the community when the risk posed by the location must also be considered.
3. If difficulty is anticipated make sure you have back up
 - on site request the presence of security/ police.
 - off site request police attendance.
4. Tell a responsible member of staff where you are going and what you are doing, and let them know afterwards that you have finished. *Discuss with them –what action they will take if you do not re-contact them - after how long should they make enquiries or for example alert the police if interview off site.*
5. Know how to raise the alarm
 - location of panic button
 - borrow personal screech alarm
 - on site telephone 2222 initiates emergency response
 - telephone 2222 for fire/police/ambulance
 - off site you or one of the visiting team should have the use of a mobile phoneThe police can sometimes provide two way radio contact.
6. Check interview room
 - remove heavy ashtrays, surgical instruments and other objects that could be used as weapons.
 - arrange the furniture, don't put yourself behind a desk in a corner, you are best seated by the door.
7. Attend to your dress
 - remove necklaces, bracelets and earrings from pierced ears
 - remove tie or scarf round neck
 - button up - non provocative

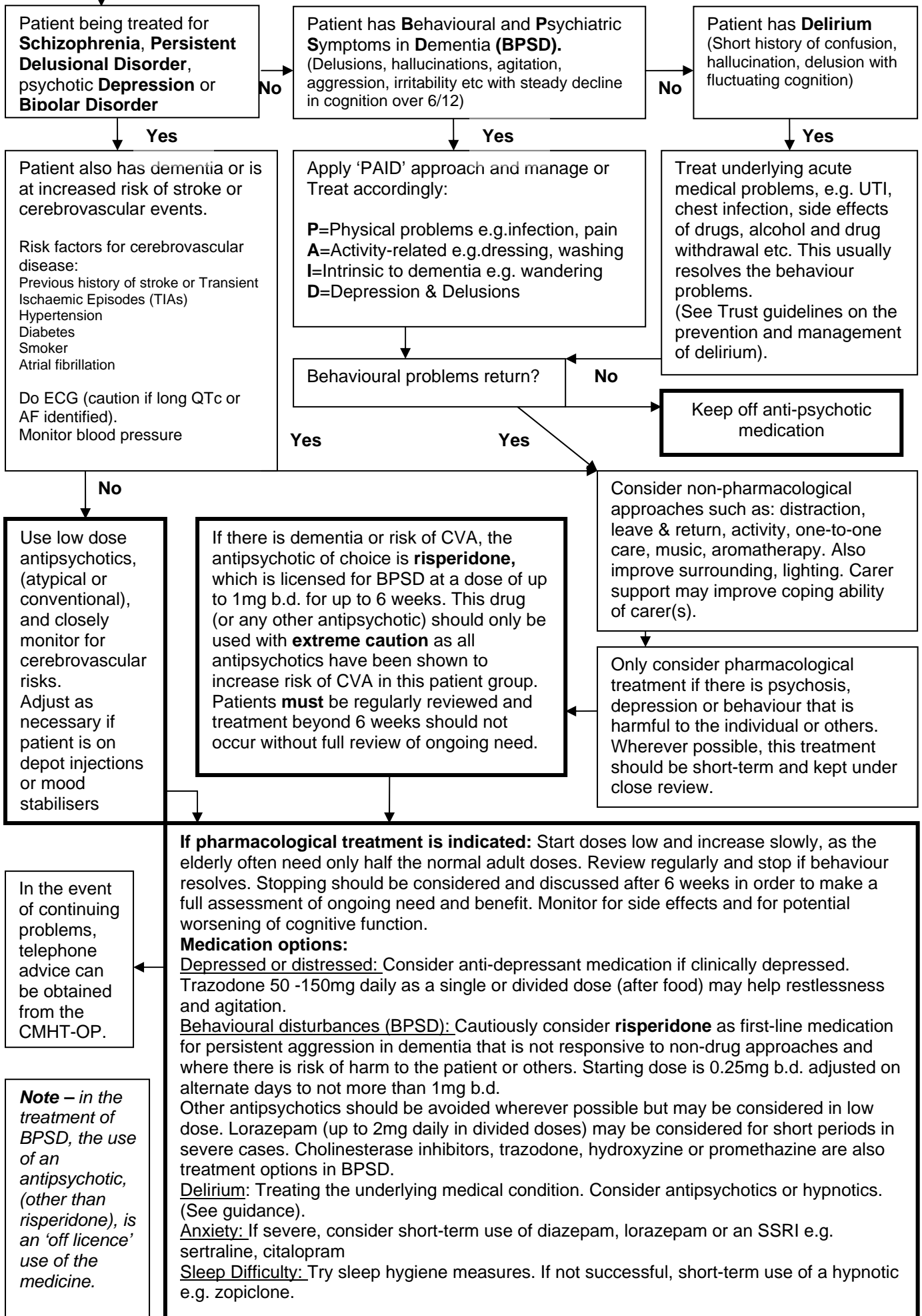
During the Interview

1. Leave the door open.
2. Put yourself between the patient and the door - but try not to make the patient feel hemmed in.
3. Do not move closer than arms length.
4. Do not turn your back.
5. Signal your presence and do not approach the patient from behind.
6. Remain calm, firm and courteous, be direct and honest, inform and reassure - do not argue or bargain.
7. Be alert to signs of imminent violence
 - smell of alcohol - appears intoxicated alcohol/drugs
 - dishevelled appearance
 - confused and disorientated
 - appears frightened
 - labile affect
 - increased muscle tension (clenching jaws, gripping chair, making fist, pounding table, pacing)
 - challenging posture and eye contact
 - escalating speech volume and use of profanities
 - direct threat

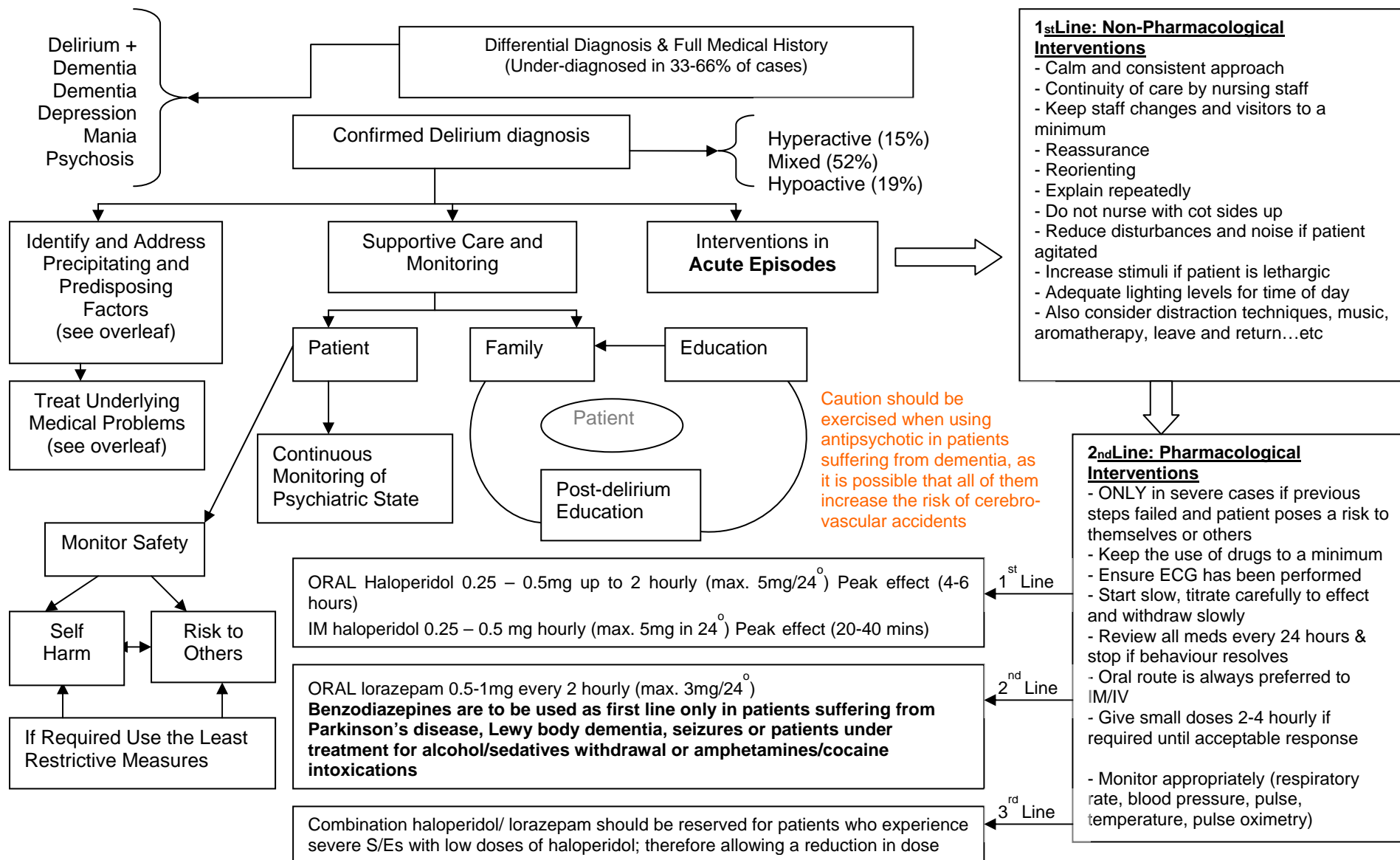
DO NOT HESITATE TO TERMINATE THE INTERVIEW AND/OR SUMMON ASSISTANCE AT ANY POINT WHERE YOU FEEL UNDER THREAT

MANAGING BEHAVIOUR PROBLEMS IN PATIENTS 65 AND OVER

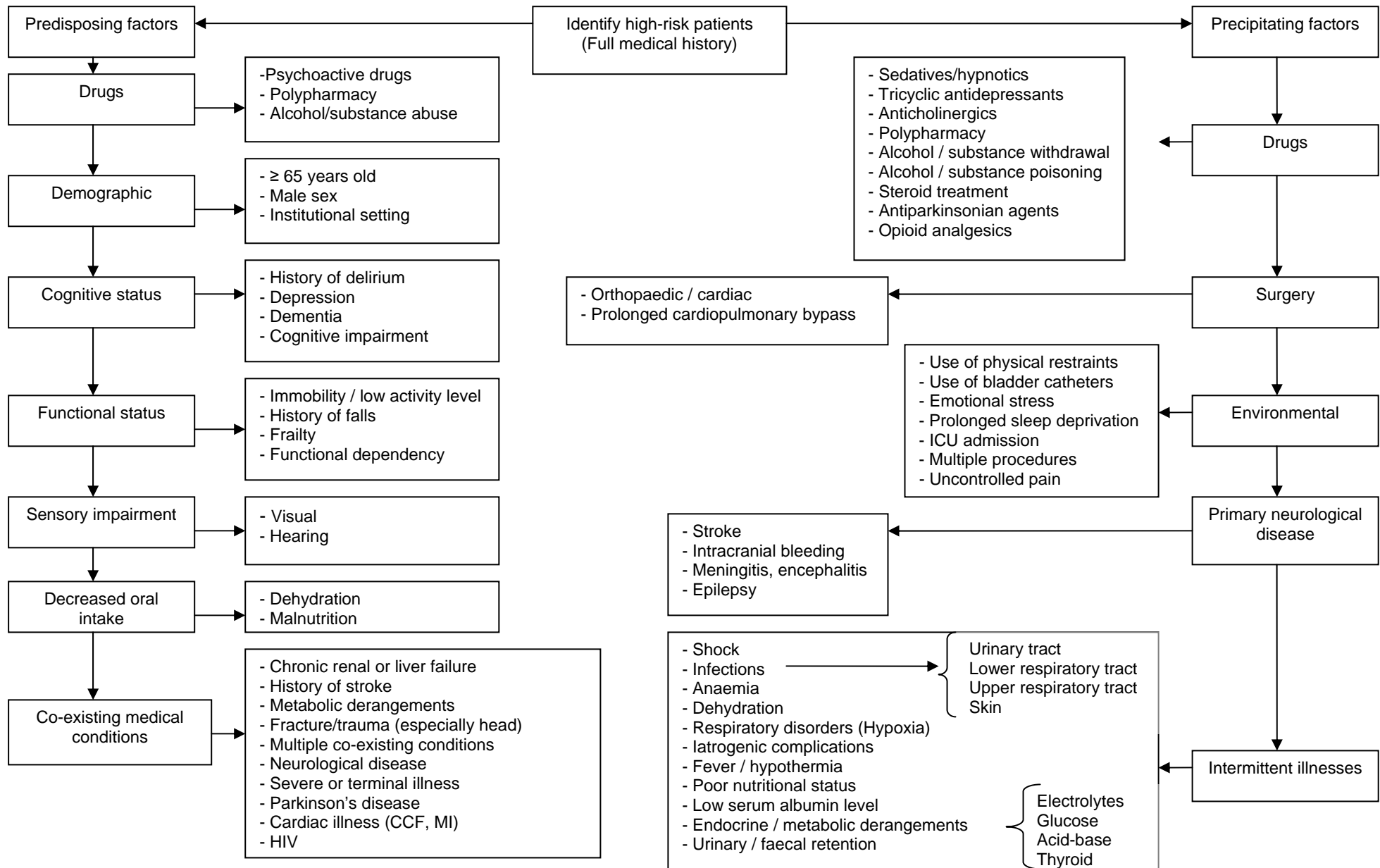
(Does not cover rapid tranquillisation of acutely disturbed)



Management of Delirium in Over 65s



Prevention of Delirium in Over 65s



OUTLINE OF THE MENTAL STATUS EXAMINATION

General Description a) Appearance – facial appearance, clean, scruffy, neglected, posture, scars.
b) Behaviour and psychomotor activity - agitated, stuporous, distracted etc.
c) Attitude toward examiner - suspiciousness, over familiarity, indifference etc.

Speech volume, speed, flow of speech, use of made up words & intelligibility

Mood a) Affect - fear, anxiety, aloofness, anger etc.
b) Mood - depression, elation
c) Appropriateness

Thought Content a) Process or form of thought - Flight of ideas, thought disorder etc.
b) Content of thought e.g. Delusions, suicide, harm to others etc.

Perceptual disturbances e.g. Hallucinations, illusions etc.

Obsessions and Compulsions

Cognitive State a) Alertness and level of consciousness
b) Orientation
c) Concentration and attention
d) Memory

Insight Risk a) Risk to self
b) Risk to others

ACUTE PSYCHOSIS

Acute psychotic states may present in casualty or develop unexpectedly in a general ward. Possibilities include acute organic reactions, severe depression, acute paranoid psychosis, schizophrenia and mania. Restless hallucinated patients are easily terrified or bewildered. For some patients the situation can be managed by using a calm approach and, after considering personal safety, interviewing in a side ward or cubicle. If this fails, seek help from the duty psychiatrist. ([See section on potentially violent/dangerous patients – page110.](#))

Acute organic reactions are the commonest psychoses in general wards and may be caused by:

- drugs used for treatment (cimetidine, anti-cholinergics)
- drug withdrawal (alcohol, barbiturates, benzodiazepines)
- underlying systemic disease (cardiac, renal, hepatic or respiratory failure)
- a local cerebral lesion.

On admission (or in casualty) common causes are drug abuse (alcohol, amphetamine, cannabis), head injury, epilepsy or meningeal irritation.

Management involves treatment of the underlying cause and withdrawal or reduction of as many drugs as possible. If sedation is required, see the [Rapid Tranquillization Algorithms –pages 105-110.](#)

Acute paranoid psychosis

Acute paranoid psychosis is a psychiatric emergency. The duty junior psychiatrist should be asked to attend. If possible no medication should be given - if necessary refer to the [“Rapid Tranquillization Algorithms”-pages105-110.](#)

Severe depression

Early psychiatric referral is important. ([See page 129](#))

Alcohol withdrawal

This should be suspected as a possible cause in patients with:

- unexplained collapse
- unpredictable or violent behaviour
- any otherwise unexplained GI symptomatology
- increasing agitation and tremor
- full blown toxic confusional states with tremor and visual hallucinations

Risks of alcohol withdrawal

- Wernicke's encephalopathy
- Delirium tremens
- Withdrawal fits
- Craving for alcohol
- Distressing agitation
- Aggressive behaviour

Treatment of alcohol withdrawal

N.B. - A special drug chart for Alcohol Detoxification Prescribing is available.

- Chlordiazepoxide in decreasing divided doses over 7 - 10 days, starting at 60 - 120mg/day, for both sedation and anticonvulsant action: re-increase dose if persistent withdrawal or delirium.
- In patients with signs of Wernicke's, 2 pairs of vitamins B+C (pabrinex IV) tds for 3 days followed by 1 pair once daily for 3-5 days.
- In patients with poor diet and signs of malnutrition, 1 pair of vitamin B+C (pabrinex IV) once daily for 3-5 days maintain water and electrolyte control.
- Avoid chlormethiazole.
- Carbamazepine or sodium valproate if persistent fits.

Follow- up

If receptive to advice about drink (or drugs) but in need of support, referral to specialist substance misuse agencies is advisable. **Substance Misuse Triage Service** will see the patient, assess risk, urgency/priority and motivation, and refer on to any of a number of specialist agencies (both NHS and non-statutory). **Early referral is strongly advised**, as ward-based assessment may be possible if adequate notice is given. Early intervention may considerably improve motivation to change, & reduce risks of future relapse.

Ring the Substance Misuse Triage Service at Clock Walk on 01243 870005 during office hours Mon-Fri.

Opiate overdoses

- These **may be medical emergencies**: hypotension, respiratory depression, coma, and death.
- Emergency management: naloxone, 0.8 - 2 mg IV every 2- 3 minutes to max. 10 mg.

Opiate withdrawal

- Increasingly common in A&E by itself or as complication of other presentations; half may have used IV.
- Distressing but not life-threatening per se.

Symptoms

- Nausea, vomiting, diarrhoea
- Restlessness, anxiety, sleeplessness
- Muscle, bone and joint pains
- Running eyes and nose, sweating, gooseflesh
- Fatigue, insomnia, craving (all may last longer)

Assessment of opiate withdrawal

- Check for signs of IV use: needle marks, abscesses, other infections: treat if needed
- See guidelines on HIV and hepatitis B/C status
- **Take a urine specimen** for toxicology (important also for later assessment of substitute prescribing)

Management of withdrawal

- If mild: chlorpromazine at 25 mg qds (or other low or medium dose antipsychotic) plus antidiarrhoeal e.g. co-phenotrope i-ii qds and NSAIDs for musculoskeletal aches/pains.
- If severe: Methadone 20 mg and observe **physical** withdrawal symptoms, then 10 mg more at hourly intervals till symptoms under control. Buprenorphine ([BNF sec. 4.10](#)) is very often used for moderate dependence/withdrawal in well motivated patients, and occasionally lofexidine can relieve withdrawal symptoms.
- **Do not issue methadone or buprenorphine, or make promises that other doctors will prescribe, unless a care plan has been fully discussed with the team who will be taking over the prescribing.**
- Concise details of management of opiate dependence are in a brief clinical guidelines sheet.

Advice from Clockwalk project **01243 870005 during office hours Mon-Fri.**

Follow-up

Refer as for Alcohol Follow-Up as above

BENZODIAZEPINES IN THE TREATMENT OF ANXIETY AND INSOMNIA

The prescribing of benzodiazepines is widespread. Tolerance and dependence to their effects is likely after the patient has been taking the drug for more than a few weeks. To avoid such problems developing, the following guidelines should be noted.

Major considerations

1. When treating anxiety and insomnia, benzodiazepines should be used for short-term relief (2-4 weeks) only where the anxiety or insomnia is severe, disabling or subjecting the individual to unacceptable stress.
2. Night sedation should be prescribed on the 'when required' section of the prescription chart. No more than two consecutive nights should be given without a break.
3. No patient should be discharged from hospital on a benzodiazepine for hypnotic or anxiolytic use unless they were admitted on them or prescribed with the advice of a psychiatrist.
4. The use and problems associated with benzodiazepines should be discussed fully with patients. Patient leaflets on the subject are available.
5. Where patients have been taking benzodiazepines for any length of time, withdrawal should be undertaken with care. The withdrawal syndrome can be severe.

Additional information

1. Consider alternative advice, for example, relaxation, avoiding caffeinated tea, coffee and fizzy drinks in the evening, and alcohol before bedtime, reassurance that 5-6 hours sleep is adequate in the elderly. Counselling can be considered.
2. Do not use alone for depression, anxiety associated with depression, phobic or obsessional states, or for chronic psychosis. Suicide may be precipitated in some, aggressive disinhibition in others, especially those with personality disorders.

If patients present with benzodiazepine dependence but with a more complex problem than usually encountered in primary general medical care, then refer to the Sector Community Mental Health Team (if significant mental health or depressive issues) or obtain phoned advice from the Bognor Substance Misuse Team (01243 869234) or the Chichester Substance Misuse Team on 01243 781981.

ANTIDEPRESSANT PRESCRIBING

Depression is a common condition in the general hospital setting, and has been shown to affect 12% of medical inpatients and 7% of surgical inpatients. It is particularly common in the elderly.

Treatment options for depression include social psychological interventions, as well as physical treatments including drugs and ECT.

In mild depression, antidepressants are not recommended as first line treatment.
See NICE Guidance 23

Considerations should also be given to a diagnosis of Bipolar Disorder, particularly Bipolar II where episodes of hypomania may go undetected. Asking the question "Do you ever get told 'you are getting too excited'" is a useful screen.

Indications for Antidepressants

A depressive illness may be present even if there seem reasonable causes for distress. Do not withhold antidepressants because depression seems "understandable". Be guided by persistent symptoms characteristic of depression, not apparent causality.

These symptoms include: -
persistent low mood
loss of interest or pleasure in almost all activities
loss of appetite and weight
sleep disturbance, insomnia or hypersomnia
loss of energy and concentration
feelings of worthlessness and guilt
recurrent thoughts of death or suicide

Several of these symptoms should be present most of the time for at least two weeks.

Pre-treatment Advice

Before commencing an antidepressant a patient should be forewarned that the drug does not produce immediate mood elevation, and may take several weeks to take effect and once effective will need to be taken for a further six months to reduce the risk of relapse. It is also helpful to reassure the patient that these drugs are not "addictive". Misunderstanding of these two issues has been shown to be common causes of non-compliance.

Patients should be closely monitored on initiation for effectiveness and side effects, particularly as side effects may be the cause of continuing problems. Patients (especially those aged 25 years and under) should be asked directly about suicidal ideation and intent to harm particularly during high-risk periods such as initiation of and changes to medication.

First line treatment

Selective Serotonin Re-uptake Inhibitors (SSRIs) are safe, effective antidepressants, which are generally well tolerated. Typical side effects include nausea and diarrhoea or constipation, although these are often transient in the first few days of treatment. If nausea occurs and is not tolerable, this can be reduced by temporarily decreasing the dose to half a tablet per day for one week before returning to full dosage. Anxiety, headache and sexual dysfunction may also occur. Hyponatraemia has been associated with all antidepressants but is reported most commonly with SSRIs

Consider fluoxetine and citalopram as first line treatment due to them being cheap as well as safe, effective and generally well tolerated.

Citalopram has a low tendency to cause drug interactions, has been best studied in the elderly and is well tolerated with relatively low incidence of sexual dysfunction.

Dosage – start at 20mg each morning, increasing if needed to 60mg (40mg elderly) daily.

Fluoxetine and its active metabolite nor-fluoxetine have a long half-life. Although fluoxetine carries less risk of adverse events after discontinuation, the long half-life means extra care has to be taken when changing from fluoxetine to other antidepressants, including other SSRIs and the tricyclic antidepressants.

Dosage – start at 20mg each day, increasing after three weeks if necessary to a max of 60mg (40mg elderly) daily.

Second line treatment

1. Other SSRIs

Sertraline is more sedative, (although this effect is mild compared to traditional tricyclic antidepressants), has a moderate interaction potential with drugs that are metabolised by CYP450 2D6 and is associated with a higher incidence of sexual dysfunction than other SSRIs. It is marginally more expensive than other SSRIs, which becomes significant if higher doses are used.

Dosage – 50mg daily, increasing if necessary by 50mg increments to a maximum of 200mg daily.

Paroxetine has a high interaction potential with drugs that are metabolised by CYP450 2D6, is associated with a moderate incidence of sexual dysfunction and a greater incidence of withdrawal problems due to its shorter half life.

Dosage – 20mg daily, increasing if necessary by 10mg increments to a maximum of 50mg (40mg elderly) daily.

2. Mirtazapine

An antidepressant active both on central noradrenergic and serotonergic transmission. Well tolerated. Some sedative side effects, so given as night-time dose, but can cause morning somnolence. Can cause significant weight gain, so weight should be regularly monitored. Can cause reversible agranulocytosis (See BNF). Dosage: 15-45mg at night.

Third Line treatment

Seek specialist advice

1. Newer generation tricyclic antidepressants, e.g. lofepramine

Lofepramine is a good, cost effective choice as an alternative antidepressant. It has a similar side effect profile to traditional tricyclic agents, but is less sedating and is considerably safer in overdose. Postural hypotension and constipation remain potential problems.

2. SNRI (Serotonin and noradrenaline re-uptake inhibitor) venlafaxine

Venlafaxine see MHRA advice.

Monitor blood pressure, can cause hypotension and hypertension at higher doses. Nausea, insomnia and nervousness can occur.

Dosage 75mg M/R capsule daily, increase after at least two weeks to 150 mg daily. Max dose 225mg.

3. Tricyclic antidepressants, e.g. amitriptyline

These are significantly cheaper than some newer antidepressants, but this should be balanced against:

- A wide range of unpleasant side effects, e.g. dry mouth, urinary problems, constipation, dizziness and sedation, which may reduce compliance.
- Significant toxicity in overdose.
- The need to titrate the dose up over several weeks, potentially leading to more consultations.

It is recommended tricyclic agents should NOT be used in the following group without specialist advice:-

- Elderly patients, especially if cognitively impaired.
- Patients who drive or operate machinery due to effects on psycho-motor function (current DVLA guidelines confirm this).
- Patients who are considered to be at risk of attempted suicide.

- Patients where compliance with medication may be a problem.
- Any patient with heart disease, prostatism, glaucoma.

If tricyclic agents are chosen, side effects may be reduced by commencing at a lower dose (25 - 50mg per day) and building up to full therapeutic doses (125 - 150mg per day) over several weeks. This is particularly important in older patients.

There is evidence that dosage regimes of 75mg per day and below are ineffective in the treatment of depression. If the drug is not tolerated at full doses it is advisable to change to an alternative antidepressant agent.

Dosulepin (dothepin) is not recommended for routine use and should be initiated only by a mental health specialist.

Compliance

One of the major factors contributing to non-compliance is treatment related side effects.

Tricyclic antidepressants are frequently selected for their sedative properties in depressed patients complaining of anxiety or insomnia. While this may be helpful in the short term, once the depressive illness has lifted, the patient may be reluctant to accept daytime drowsiness, reduced quality of sleep, and other tricyclic side effects for many months. In such patients the combination of a non-sedative antidepressant, e.g. citalopram, with the short-term use (2-3 weeks) of a benzodiazepine may be a more effective strategy. The combination of an SSRI and tricyclic antidepressant, however, is potentially toxic and is not recommended for this purpose.

Antidepressants, particularly SSRIs, show an association with sexual dysfunction which may be unacceptable when a patient responds to treatment and returns to usual daily living. This effect is lowest with citalopram and mirtazapine.

Non-response to treatment

If there is no response to the drug after 4-6 weeks of treatment at full therapeutic doses, the patient should be reassessed to:-

- i) Confirm the diagnosis of depression is correct.
- ii) To ensure the patient is fully complying with medication.
- iii) To exclude other risk factors that may be interfering with treatment, e.g. heavy alcohol consumption.

Second line treatment

A second line antidepressant may be required for:-

- poor tolerance of drug side effects
 - poor therapeutic response
- I. For intolerability of anticholinergic side effects or over sedation on a TCA, consider changing to an SSRI.
For sexual dysfunction on either TCAs or SSRIs consider lofepramine or one of the newer agents, e.g. mirtazapine.
For persistent and intolerable nausea on an SSRI consider lofepramine, mirtazapine or a TCA.
 - II. For suboptimal or no response to two first line antidepressants at full therapeutic doses for an adequate period of time (minimum of 4 weeks in normal circumstances) an antidepressant such as venlafaxine can be considered especially for more severe depression. However venlafaxine should not be used if there is uncontrolled Hypertension and once initiated blood pressure (BP) should be monitored and if a substantial increase in BP is seen the dose should be reduced or discontinuation considered. Patients should also be monitored for signs and symptoms of cardiac dysfunction. Doses of venlafaxine at or over 300mg/day should only be prescribed under the supervision or advice of a Specialist Mental Health Medical Practitioner.

Switching Antidepressants

If changing to a different class of antidepressants and high doses has been achieved, it is advisable to phase out the first drug over a period of a few weeks, especially with tricyclic agents, SNRIs and some SSRIs to minimise withdrawal phenomena. (See Discontinuation section next page)

No drug washout period is required between tricyclic agents and SSRIs, but is essential if MAOIs have been or will be used. (Please Refer to BNF for guidelines).

Time course for treatment

Once the patient has made a full recovery, treatment should be continued, at full doses, for a minimum of six months in younger patients, and two years in older patients. This requires careful explanation to patients, emphasising the increased risk of relapse in discontinuing antidepressants early.

Discontinuation

Once an adequate treatment period has elapsed, medication can be discontinued, phasing out over several weeks. Even with the SSRIs single tablet dosage, this can be achieved by changing to alternate day dosing.

Abrupt withdrawal of antidepressants may result in a discontinuation syndrome, characterised by dizziness, nausea, flu-like symptoms, agitation and sleep disturbance. This is a particular risk with TCAs, paroxetine and venlafaxine. It occurs less commonly after abrupt withdrawal of fluoxetine due to its long half-life and active metabolites.

Prophylaxis and long term treatment

In patients who have suffered repeated episodes of depression the risk of a further episode can be significantly reduced by long-term prophylactic treatment. This is usually advised if two previous episodes have occurred within five years or a total of three lifetime episodes have occurred. Treatment should be at full therapeutic doses as there is no evidence that sub-therapeutic doses exert this protective effect.

Lithium should not be introduced without seeking specialist psychiatric advice.

Seeking specialist advice

The psychiatric team are happy to provide diagnostic and treatment advice on any depressed patient causing concern. However, the following would be useful indications for referral to a psychiatrist:

- Where the diagnosis proves difficult, e.g. where coexistent physical disease may mask or mimic symptoms or where cognitive impairment or other psychiatric illness exists.
- Patients presenting with severe agitation, psychotic symptoms, suicide risk or self-neglect, especially where it is considered psychiatric inpatient care may be necessary.
- Failure to respond to adequate treatment, or where adverse effects make treatment choices difficult.
- Where the patient may benefit from psychological therapies not available in a primary care setting.
- When considering alternative antidepressant regimes, e.g. MAOIs, combination therapies, high dose venlafaxine.
- Where there is suspicion of Bipolar disorder

SUICIDAL RISK – VARIABLES TO BE CONSIDERED IN ASSESSING SELF HARM

Variables	Higher risk	Lower risk
Age	Younger	Older
Sex	Male	Female
Civic status	Separated, divorced, widowed	Married/partnered
Living arrangements	Living alone no fixed abode	Others at home
Employment status/ type	Unemployed, retired, Doctors,	Employed
Physical health	Poor	Good
Mental health	Mental illness, especially depressive disorders, schizophrenia, chronic sleep disorders. Past forensic history/ recent police involvement/charges	Good
Substance abuse	Alcoholism, illegal drug abuse. Currently intoxicated- more impulsive but assessment may be difficult or impossible	None
Previous overdoses	Overdose taken (or other self- destructive gesture/attempt)	None
Circumstances related to current self harm	Self harm planned; patient alone at time eg preparation of will, suicide note; patient unlikely to be found shortly after overdose; steps taken to avoid others knowing of self harm; Patients belief in whether what they had done could kill them (this may not be the same as the actual medical risk) Availability of methods eg guns in the house, access to poisons/drugs All drugs in possession taken; Self harm undertaken as determined attempt to end life; Suicide note left where unlikely to be found until after death.	Self harm impulsive; others present or near at time; patient likely to be found shortly after overdose; steps taken so that others know of self harm; patient tells someone of self harm Other drugs available, but not taken; Self harm undertaken to relieve feelings or to draw attention to distress; Suicide note left in place where likely to be found shortly after self harm.
Precipitating events	Unchangeable	Changeable
Support for future	None, poor	Reliable, good
Mental state	Depressed, pessimistic about future no plans or hope for the future	Not depressed optimistic about future plans for future, suggesting patient unlikely to repeat act

STATUS EPILEPTICUS

Status epilepticus may be defined as a generalised seizure lasting more than 30 minutes or several distinct seizures without restoration of consciousness. In practice, however, convulsions persisting more than five minutes warrant treatment.

Approximately 50% of cases occur in patients with chronic epilepsy, usually on antiepileptic drug withdrawal, or during intercurrent illness. About 25% are associated with acute neurological or metabolic disorders, including drug or alcohol abuse, CVA, encephalitis or tumour. In about 25% a cause may not be established. Some of these may have pseudo status, which may be suspected if the patient appears to be aware while convulsing, has previous hysterical illness or recovers abruptly between convulsions.

Initial Management

1. Remove false teeth, turn to semi-prone position and prevent the patient injuring him/herself. Administer high flow oxygen.
2. Give lorazepam 0.1mg/kg (diluted 1:1 with normal saline over 2 minutes) or diazepam 10-20mg IV (0.15-0.25mg/kg) at a rate of 5mg per minute. Repeat once after 3-5 minutes if seizures continue, watching for respiratory depression.
3. Take blood for urgent urea, electrolytes, calcium, glucose and FBC. Put a drop of blood on a BM stick. Save blood for anticonvulsant levels, alcohol, and a toxicology screen.
4. If the BM stick suggests a low blood glucose give 50% glucose 25mls IV. Give 2 pairs of IV pabrinex 8 hourly if alcohol is a possible cause.
5. If the patient is not known to be taking phenytoin, or if it has been recently withdrawn, follow the diazepam immediately by IV phenytoin (otherwise seizures may recur when diazepam wears off) at 15-18mg/kg, no faster than 50mg/minute. Only give as the neat solution, or diluted in 0.9% saline, through a peripheral vein, (see Injectable Medicines Policy for more details- Staffnet – Departments/St. Richard's Hospital/Paharmacy/Policies). Monitor ECG.
6. If the patient is definitely taking a standard dose of phenytoin and is compliant give phenobarbitone as stated below.
7. Once seizures are controlled, establish maintenance therapy, using nasogastric tube if required.

Drug Resistant Status Epilepticus

1. Transfer the patient to intensive care and refer to an anaesthetist and neurologist. Arrange an urgent phenytoin level and EEG.
2. In the presence of an anaesthetist phenobarbitone 10mg/kg IV diluted 1 in 10 with water for injection at 100mg/min (700mg over 7 minutes in an adult, with a maximum of 1000mg).

Ensure that any existing antiepileptic drugs are not omitted. Maintenance dose of phenytoin is 100mg tds (oral or I.V), phenobarbitone is 60-120mg per day.

Continued fitting requires consideration of thiopentone or lignocaine infusions.

Diagnosis of cause

Many patients will require a CT scan and lumbar CSF analysis to exclude meningitis and encephalitis or other intracranial lesion.

NEUROLOGY REFERRAL GUIDELINES

Neurosurgical referrals

Emergency neurosurgical advice is obtainable from the on call Neurosurgical registrar at Southampton General Hospital.

A web based referral form is available on www.neurorefer.co.uk - clicking on Southampton.

Please note for suspected brain tumours the link for **Neuro-oncology** must be selected. The referral form can be sent to Debbie.adams@suht.swest.nhs.uk or faxed to 02380 794148 for the attention of Debbie Adams. Any further queries to Debbie Adams on 02380 796596 or in the event of a clinical emergency, to the on-call registrar on bleep 2551.

In Suspected tumours the neurosurgeons require a CD-ROM of the CT or MR films (which currently may need to be sent separately) to be considered at the MDT meeting. The im-link images are not sufficient for this purpose.

In-Patients

1. Ring through the referral to Neurology Secretary on extension 5227. Ward referrals are normally seen on Monday pm or Thursday pm.
2. More urgent advice may be obtained by talking to Dr Hammans either through St Richard's secretary on extension 5227 on Mondays, Wednesdays, Thursdays or Southampton secretary (02380 796780 - Tuesdays and Fridays) or by air call.
3. In Dr Hammans' absence advice can be given by the on call Southampton neurology registrar (#5 137).
4. Obviously neurosurgical conditions (e.g. subarachnoid haemorrhage, head injury) should be referred directly to the on call neurosurgical team in Southampton. If in doubt, ask Dr Hammans' advice.

Outpatients

A neurological outpatient appointment should be requested by a brief written referral to Dr Hammans.

TRANSPLANT PATIENTS

Patients who are immunosuppressed following a transplant may be admitted acutely and may not be able to take or absorb their immunosuppressants.

In addition to immediate management, it is essential that they do not omit a single dose of immunosuppression, which should be given intravenously if necessary. If such drugs are not available, liaise with their supervising hospital (e.g. Harefield) and get drugs delivered by courier if necessary.

LUMBAR PUNCTURE (CONSIDERATIONS BEFORE ATTEMPTING)

Lumbar puncture (LP) is potentially dangerous and should be carried out only in the presence of definite clinical indication, in the absence of any contra-indication, and if necessary after CT scan exclusion of a space occupying intracerebral lesion. Where there is doubt, contact a neurologist or neurosurgeon for advice.

Indications for lumbar puncture

1. To obtain CSF to diagnose:
 - a. Infection - meningitis or encephalitis.
 - b. Subarachnoid haemorrhage, when there is clinical suspicion and the CT scan is negative.
 - c. Guillain-Barre.
 - d. Malignant meningitis.
2. To introduce contrast medium, antibiotics or antimitotics.
3. To measure CSF pressure or absorption, and then only after the presence of a mass has been excluded.

CT scan is normally available for urgent cases during the daytime and early evening. At night, individual cases should be discussed with the Radiologist.

If bacterial meningitis is the likely diagnosis, **treatment with antibiotics should not be delayed.**

Contra-indication to lumbar puncture

1. Any possibility of 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.
2. Any clinical suspicion of raised intracranial pressure (except where this is due to acute bacterial meningitis when no pressure gradient across the tentorium or foramen magnum should exist).
3. Any possibility of intra-spinal mass lesion.
4. Infection in lumbar region.
5. Anticoagulation or coagulation defect.

SUPRAPUBIC CATHETER INSERTION – MINIMISING THE RISKS

Minimising risks of suprapubic catheter insertion (adults only)

The National Patient Safety Agency (NPSA) has been notified of three incidents of death and seven causing severe harm from suprapubic catheter placement between September 2005 up to June 2009, nine of which involved bowel perforation. We know that many more incidents have not been reported, as a survey of clinicians suggested higher rates of harm. The NPSA has issued guidance for organisations to make the procedure safer, including training and access to equipment such as ultrasound. We have asked your organisation to take actions to minimise the risks associated with this procedure. As clinicians, there are six questions you can ask to keep your patients safe:

Question Guidance

1. Does this procedure need to be done?

- Insertion of suprapubic catheter carries a risk to the patient.
- Indications for the procedure are: the relief of urinary retention where urethral route is contraindicated or not technically possible.
- Record in patient notes why this procedure was done and any problems.

2. Am I competent to do this?

- You should not undertake this procedure if not competent.
- You need to be trained in the procedure.
- You need to be familiar with local equipment and guidelines.
- Senior supervision should be available, if needed.

3. Does this need to be done now?

- Emergency procedures and those performed out of hours present more risk.
- Seek advice from the on-call urology team and consider other options, e.g. fine needle aspiration, as an interim measure.

4. Is it the right procedure for this patient?

Absolute contraindications:

- non-palpable bladder;
- non-visualisable distended bladder by ultrasound.

Relative contraindications:

- coagulopathy (until the abnormality is corrected);
- prior abdominal or pelvic surgery (potential bowel adherence to the bladder of anterior abdominal wall. In such cases you should consider requesting a urological surgeon to perform an open cystostomy;
- pelvic cancer with or without radiation (increased risk of adhesions).

5. Have I got access to an ultrasound?

Ultrasound should be used wherever possible to visualise the bladder and guide insertion of the catheter.

6. Do I know what to look for in the case of bowel perforation?

- Monitor patients carefully.
- Urology team should carry out the first change of catheter.
- Have a high index of suspicion for signs of bowel perforation including:
 - patient has abdominal pain;
 - patient has signs of localised peritonitis;
 - patient is systemically unwell.

PARENTERAL / ENTERAL NUTRITION

Appendix 1

Nutrition Screening

Within 48 hours of admission all patients are screened for nutritional risk as part of the nursing assessment, see **ward** 'Nutrition Support Guidelines for Adults in Hospital'.

Nutritional risk should be assessed using the MUST screening tool (from June 2009).

Enteral Nutrition

Refer all patients requiring enteral feeding, or for whom enteral feeding is to be considered to the Dietitians (ext 5201) for nutritional assessment, calculation of nutritional requirements and enteral feeding regimen.

If the Dietitian is unavailable and enteral feeding is to be initiated, and there is no risk of refeeding syndrome (see below) the starter regimen for Nasogastric or PEG feeding should be implemented. The feed should be started at 25ml/hr of Nutrison for 20hrs daily with 4hrs rest. The patient is unlikely to meet fluid requirements until feed established, therefore consider IV fluids.

Refeeding syndrome

Refeeding syndrome can affect patients whether orally, enterally or parenterally fed. This syndrome is characterised by a reduction in phosphate, potassium and magnesium on commencement of artificial/oral nutrition. People who have eaten little or nothing for more than 5 days should have nutrition support introduced at no more than 50% of requirements for the first 2 days. Feeding rates can be increased to meet full requirements if clinical and biochemical monitoring reveals no refeeding problems (www.nice.org.uk)

Patients at high risk of developing refeeding syndrome include:

Pt's with one or more of the following	Pt's with two or more of the following
BMI less than 16kg/m ²	BMI less than 18.5kg/m ²
Unintentional weight loss greater than 15% within the last 3-6 months	Unintentional weight loss greater than 10% within the last 3-6 months
Little or no nutritional intake for more than 10 days	Little or no nutritional intake for more than 5 days
Low levels of potassium, phosphate or magnesium prior to feeding	A history of alcohol abuse or drugs including insulin, chemotherapy, antacids or diuretic

Patients are at severely high risk if they have a BMI of less than 14 **AND** negligible intake of greater than 15 days.

Feed should be commenced at 10ml/hr of Nutrison x 20hrs with 4hrs rest until dietetic review.

Blood biochemistry to include potassium, magnesium, calcium and phosphate should be checked prior to feeding and monitored daily.

Patients at risk should be given a daily 200-300mg dose of oral thiamine, vitamin B co strong 1 or 2 tablets three times a day (or, if necessary full dose daily intravenous vitamin B preparation e.g.

Pabrinex), **and** a balanced multivitamin and trace element supplement e.g. Sanatogen A-Z Complete. These should be administered immediately and for the first 10 days of feeding.

Supplement potassium, phosphate and magnesium from day 1 of feeding, unless prefeeding levels are already high. These bloods should continue to be monitored daily for the first 10 days of feeding.

Likely requirements:

- potassium – 2-4mmol/kg/day
- phosphate – 0.3-0.6mmol/kg/day
- magnesium 0.2mmol/kg/day IV OR 0.4mmol/kg/day PO

Patients who have not eaten for 5 days or more with none of the above risk factors can be commenced on Nutrison at 25ml/hr x 20hrs with 4hrs rest and referred to the Dietitian (ext 5201).

The patient is unlikely to meet fluid requirements until feed established, therefore consider IV fluids.

Discharge with enteral feed

Contact the Hospital and Home Enteral Feeding Dietitians (ext 1776) **as soon** as a date or destination for discharge is known, to enable adequate training of patient/carer and the ongoing supplies of feed and ancillaries to be set up. **At least two working days notice is required to set up the home delivery system for a patient.** The patient will require a 7-day supply of feed and ancillaries upon discharge.

Accidental removal of PEG

The stoma usually begins to heal within a couple of hours of accidental removal, so please act quickly. If the PEG tube has come out within 6 weeks of the initial placement, refer the patient back to Endoscopy at the CTC and do not attempt reinsertion with a balloon Gastrostomy.

If the patient has attended A&E, they should have bought their spare balloon Gastrostomy tube with them. Please insert the balloon replacement Gastrostomy as per instructions. Please inform the Home Enteral Feeding Dietitians (ext 1776) of any community patients who have attended A&E with the accidental removal of their gastrostomy tube.

Contact the Home Enteral Feeding Dietitians (ext 1776) for advice.

Parenteral Nutrition

The Nutrition Support Dietitian and Principal Pharmacist will assess patients requiring central or peripheral parenteral nutrition. They should be involved with the daily care of all parenterally fed patients as therapy is expensive and potentially dangerous. Please refer any patients where parenteral nutrition is being considered at the earliest opportunity by contacting Dietitian on ext 5201 or bleep 075 and the pharmacist on ext 3346 or bleep 191. At weekends and out of hours, please contact the on call pharmacist (via switchboard).

- To ensure patients are safely fasted prior to their anaesthetic or sedation.
- To ensure that patients are adequately hydrated prior to their anaesthetic.
- To enhance patients' post-operative recovery.

This protocol has been based on recommendations from the Association of Anaesthetists of Great Britain and Ireland (2001) who base their guidelines on those from the American Society of Anaesthesiologists (ASA).

These guidelines suggest: -

- 6 hours for solid food, infant formula, or other milk
- 4 hours for breast milk
- 2 hours for clear non-particulate and non-carbonated fluids **and chewing gum** *Children can have unlimited amounts of clear fluids up to 2 hours before
- Regular medication taken orally should be continued preoperatively unless there is advice to the contrary. Up to **30 ml water** may be given orally to help patients take medication. - This particularly applies to Beta-Blockers, diuretics and hypertension therapy
- Patient should be reviewed if on the following: clopidogrel, aspirin or Ace Inhibitors
- **Warfarin** guidance to be sought from Consultant Haematologist who will individually assess each patient
- Diabetics should be advised individually

If the operation is cancelled or postponed please could anaesthetists and theatre staff ensure **all** wards are informed immediately, please inform patients that they should drink and eat straight away unless otherwise clinically indicated.

Therefore the protocol for St. Richards Hospital is: -

Morning Lists suggested times may vary

All patients will start their fast as if they were first on the morning list at 08.30. This will allow for any alterations to the operating list.

Light food up to 02.30
Clear fluids up to 06.30
Nil by mouth from 06.30

Afternoon Lists suggested times may vary

All patients will start their fast as if they were first on the afternoon list at 13.30. This will allow for any alterations to the operating list.

Light food up to 07.30
Clear fluids up to 11.30
Nil by mouth from 11.30

Exceptions

- Any specific surgical conditions requiring the patient to be fasted for longer or who have specific pre-operative preparations.
- On assessing the patient the anaesthetist requests differently. This then must be documented in the patient's medical notes.

N.B. Any patient who has been without fluids for longer than five hours should be considered for an intravenous infusion or allowed a drink if surgery is not going to happen for at least two hours.

Local anaesthetic

Patients undergoing a procedure that requires a local anaesthetic without sedation do not need to follow **Nil by Mouth Protocol**, but should the anaesthetist need to proceed to a general anaesthetic the operation may need to be postponed to another day and this should be explained to the patient.

PSYCHIATRIC REFERRALS FROM ST RICHARD'S MEDICAL STAFF TO SUSSEX PARTNERSHIP NHS TRUST

Appendix 3

Patients under 18

Referral should be made to the Child and Adolescent Service by:

Fax: 01243 815499

Phone: 01243 815514

(for discussion only – Emergency referrals need to be faxed to the number above)

All children should be admitted under paediatricians.

Patients aged 18-64

Working Age Mental Health Services are sectorised and referrals (apart from deliberate self-harm) should be addressed to the relevant team, stating the patient's GP and practice name.

Bognor and Pagham

The Bedale Centre
1 Glencathara Road
Bognor Regis
Tel: 01243 841041
Fax: 01243 623727

Chichester, Southbourne and Chapel Street Clinic the Manhood Peninsula

Chapel Street
Chichester PO19 1BX
Tel: 01243 623400
Fax: 01243 623401

Midhurst, Arundel and Pulborough

The Old Court House Grange Road
Midhurst GU29 9NT
Tel: 01730 811300
Fax: 01730 817512

If you are not sure which team to refer to, enquiries can be directed to:

Julie Coates at Centurion Unit – phone: 01243 791908

Please give the patient's name, age, address, GP and surgery and you will be directed to the correct team.

Deliberate Self-Harm (including overdoses)

If assessed by A&E and do not require medical admission but non-urgent psychiatric follow up is needed then refer to the appropriate community team.

- ❖ Urgent referrals should be made to the duty psychiatric doctor on mobile 07949 247263. Out of hours this may be answered by a senior nurse practitioner.

If admitted to St Richard's:

If non-urgent psychiatric follow up is needed then refer to the appropriate community team.

- ❖ If psychiatric assessment is urgent then referrals should be made to the duty psychiatric doctor on 07949 247263. Out of hours this may be answered by a senior nurse practitioner.

You should ascertain that the patient will be fit to interview and not still intoxicated by an overdose or alcohol.

Emergency

Referrals should be made to the duty psychiatrist doctor on 07949 247263. Out of hours this may be answered by a senior nurse practitioner.

Patients aged 65 and over

Ward referrals should be made to the Older Persons mental health liaison team by:

Phone: 01243 788122 ext. 3387 (leave ansaphone message if no reply)

Fax: 01243 831758

Pager: 0765 9533055 (urgent referrals only)

A/E referrals and out of office hours:

Referrals should be made to the duty psychiatric doctor on 07949 247263. Out of hours this may be answered by a senior nurse practitioner.

The Mental Health Act applies only to those people who have or are suspected of having a mental disorder (Mental Illness, Severe Mental Impairment, Mental Impairment or Psychopathic Disorder).

It does not confer power to treat medical conditions even though a person is suffering from a mental disorder, unless the medical condition is the cause of the mental disorder.

The Mental Health Act does not cover people whose sole problem is dependence on alcohol or drugs but may include them if their mental state warrants it.

The Mental Health Act has separate provisions for the assessment and detention of persons in the community and those already admitted to hospital. In this context, **admitted** means having given informed consent to admission and been through an admission process. In the case of persons admitted to hospital, should there be a necessity to detain in order that a Mental Health Act assessment should take place, then it is appropriate to proceed under Section 5(2) - see below. All other persons within a hospital, including those in Accident and Emergency, are treated in the same way as if they were in the community at large, and their physical presence in a hospital environment in no way alters the process of assessment and application for admission to hospital.

Duty of Care

If you believe someone is at grave personal risk or is placing others at such a risk, and you have good reason to believe that they do not have capacity, you have a duty of care to prevent them carrying out that risky behaviour.

Under The Mental Capacity Act, you may use 'reasonable force' to prevent such actions. This would include detaining someone whilst you sought a Mental Health Act assessment and might also include medicating someone by short acting injection, against their will.

You are much more likely to end up before the courts for letting someone go, who you have assessed to be at grave risk, than if you act to keep them safe.

Section 136

Hospitals and especially A & E departments are Public Places. Under Section 136 of the Mental Health Act the police may remove someone 'mentally disordered in a public place' to a place of safety, i.e. police station for further assessment. This section can be used to involve the police if you are worried about someone who is trying to leave or who is causing a disturbance and you suspect is mentally disordered. This section is invoked by the police and not by doctors - confers no power to treat. Note: if a person who is clearly mentally disordered is happy to stay within the hospital environs for the purpose of a Mental Health Act assessment, there is no need to invoke Section 136.

Section 5 (2) (duration 72 hrs)

The Responsible Clinician (RC) of a patient who is admitted to any hospital may use this seventy-two hour order to hold a patient pending assessment for admission under a treatment section (3) or an assessment section (2). Section 5(2) does not confer the power to treat. If treatment is absolutely and immediately necessary it can only be given under the Mental Capacity Act. The Responsible Clinician in this case is the Consultant responsible for the care of the patient and unlike the situation pertaining to junior doctors in psychiatry; this power cannot be delegated to junior medical staff in a general hospital.

Section 2 (duration 28-days.)

Admissions for assessment followed by treatment - - requires Approved Mental Health Practitioner (AMHP), Section 12 Approved Doctor and another Registered Doctor not under the same management.

Section 3 (duration six months)

- Admission for treatment where the diagnosis is clear or already known. Requires the same three people as Section 2.

Note

Although best practice suggests the second doctor should have prior knowledge of the patient or also be Section 12 approved, in practice this is rarely possible and a registered junior hospital doctor (F2 and above) can legally sign the papers.

Section 4 (duration 72 hours)

Emergency admission for assessment any Registered Medical Practitioner and an Approved Mental Health Practitioner. The intention must be to convert to a Section 2 for assessment with the seventy-two hours.

Should be used very rarely and only to avoid unreasonable delay.

Consent to treatment

Myth: if a patient is mentally impaired, the next of kin can sign a consent form on his behalf.

Under English law, in relation to patient's aged 16 and over, no one can give consent on behalf of another, i.e. only the patient can sign his consent form. It cannot be completed by a spouse, son/daughter or doctor on their behalf.

Mental Capacity

The law assumes people to have capacity

To judge if a patient has mentally capacity to give consent one must make decisions about the following questions:-

Is there an impairment of or disturbance in the functioning of the person's mind or brain?

If the answer to this is **yes** then.....

Is the person able to understand information related to the decision?

Are they able to retain information related to the decision?

Are they able to use or weigh the information whilst considering the decision?

Are they able to communicate their decision by any means?

If the answer to any of these questions is **no** then the person does not have capacity. You must then decide if the person might regain capacity in a reasonable time or if the treatment must take place too urgently to await that event.

If the person has made an "Advance Directive" when capacitous and this is pertinent to the current situation then it is as binding as a current capacitous decision and cannot be over ruled

If a patient is unable to give consent due to mental incapacity, a doctor should:

- act in patient's best interests
- record in notes why patient is unable to understand or sign
- record why procedure is necessary
- record views of NOK/family (signature not necessary)
- preferably have record of second medical opinion

If patient refuses consent:

- if not mentally incapacitated - cannot proceed
- if mentally incapacitated - can proceed as above

If incapacitated patient refuses treatment it may be necessary to seek court approval to proceed with procedure

Mental Health Act not relevant for medical procedures - only allows compulsory treatment of mental disorder

<http://www.dca.gov.uk/legal-policy/mental-capacity/mibooklets/guide3.pdf>

Mental Capacity Act

Please refer to WSHT staff net for the up to date information – it can be found in the Patient Safety section under Adult Protection

<http://www.westernsussexhospitals.nhs.uk/clinical-resources/patient-safety/adult-protection/mental-capacity-act/>

Consent Policy

Please refer to the Trusts' Policy, which can be found in the Clinical Policies section of Staff net.

<http://www.westernsussexhospitals.nhs.uk/clinical-resources/clinical-policies/>

The Trust has a well-developed “fair blame” culture of reporting untoward clinical incidents and all staff are encouraged to advise the Legal Services or Consumer Relations Departments on Extensions 3125, 3481, 3128 or 2584 of any incident involving a patient’s care that could lead to a complaint or litigation. If you are uncertain of the procedure, consult with a senior colleague or ask the above departments for advice. Quick reporting of an incident enables management to take early action in investigation and liaison with a patient or relatives.

The points to follow are:

- Consult a senior colleague or the Consumer Relations/Legal Services Departments about any untoward clinical incident or complaint;
- Death or serious injury to be reported immediately to the Consultant;
- Make sure a potential complaint or claim is reported so that early action can be taken;
- Complete an incident report form electronically using the web-based Datix incident report form, available on the intranet.
- Record facts, not opinions;
- Quick reporting leads to better results.

DEATH CERTIFICATES (GUIDANCE ON COMPLETION OF)

Where it is not possible to complete a Death Certificate, the death should be reported to HM Coroner as soon as possible. Such deaths would normally include known or suspected cases shown in Box 1.

Box 1 - Indications for reporting deaths to the Coroner

Trauma and other forms of accidental death
Post fracture deaths
Homicide
Industrial injury
Neglect
Suicide
Death related to a medical or surgical procedure
Drug related deaths, including suspected drug abuse

It is advisable to inform HM Coroner about deaths that occur within 24 hours of admission to hospital. The Coroner’s Office may be contacted from Monday to Friday, between 0800 hours and 1600 hours on Chichester 01243 520217.

If there is any doubt about the need to report a death to HM Coroner, then please contact the Coroner’s Officer or HM Coroner (telephone 01243 520217). They are always pleased to provide advice.

SPECIALTY	CONSULTANT	Grade	BLP
GENERAL MEDICINE			
Elderly Medicine	Dr Dewhurst/Dr Ivatts	ST3 ST1 ST1 F1 F1	218 136 124 143 265
Orthogeriatrics		ST3 F1	273 013
Gastroenterology	Dr Stone/Dr Fraser	SpR SpR ST2 F2 F1 F1	221 040 113 335 109 367
Elderly Medicine	Dr Griffin	ST1 F1	137 105
Rheumatology Donald Wilson House	Dr Ridley/Dr Menon Dr Rice-Oxley	SpR F2	377 138
Elderly Medicine	Dr Holman	ST3 ST1 ST1 F1 F1	193 166 210 157 045
Respiratory Medicine	Acute Rehabilitation Dr Ross/Dr Tate/ Dr Whitehouse	ST3 ST1 F2 F1	111 183 187 110
Diabetes and Endocrinology	Dr Laji/Dr Bosman	F1 ST3 ST1 F1	042 112 205 107
Medical Assessment Unit	Dr Haigh/Dr Kane	SG Tst Dr (SHO) ST1 ST1 F2 F1 F1	280 366 123 334 336 108 044

SPECIALTY	CONSULTANT	Grade	BLP
Cardiology	Dr Reid/Dr Murphy/ Dr Wong	SpR ST3 ST3 ST2 ST1 F1 F1	114 337 275 206 269 043 106
Haematology	Drs Bevan, Stross and Janes	F2	220
Neurology	Dr Hammans	AS	
MICROBIOLOGY	Dr Greig/Dr Jerwood	SpR	
HISTOPATHOLOGY	Dr Conroy, Dr Umar	SpR SpR	
GENERAL SURGERY		AS	154
Vascular Team	Mr Hafez/Mr Beattie Mr Allen Mr Allen Mr Hafez Mr Beattie	ST3 ST1 Trust Dr F1 F1 F1	373 225 344 020 021 251
Colorectal Team	Mr Harris Mr Simson Mr Simson Mr Harris Mr Cripps	SG ST3 ST3 F1 F1 SpR ST1 F1	262 350 028 068 390 349 022 056
Upper GI/Breast Team	Mr Bowyer/Mr Slater/Ms Sotheran Mr Bowyer Mr Slater	SpR (pt) Trust Dr F1 F1	209 338 077 389
UROLOGY	Mr Britton, Mr Carter, & Mrs Venn	SpR F2 F1	267 360 208
ORTHOPAEDICS	Mr Moss	Tst Dr (SpR) Trust Dr Tst Dr (HO)	207 030 024

SPECIALTY	CONSULTANT	Grade	BLP
ORTHOPAEDICS	Mr Taylor	Tst Dr (SpR)	413
		F2	029
		Tst Dr (HO)	025
	Mr Moss/Mr Taylor	Trust Dr	172
	Miss Burgert	ST3	184
		F2	023
		F1	230
	Mr Cavanagh	Tst Dr (SpR)	145
		ST1	031
		F1	259
Mrs Kendall	Trust Dr (SpR)	156	
	ST1	255	
	F1	374	
Mr Hill	ST3	171	
	F2	305	
	F1	259	
	AS	#5 237	
	AS	#5 395	
	AS	#5 886	
	AS	#5 504	
	On-call SHO/HO	150	
	On-call Middle Grade	155	
MAXILLOFACIAL SURGERY	Messrs Macpherson, Pratt and Wilson	AS	
		SG	
		Tt Dr (SG)	#5 671
		SpR	135
		ST3	074
		SHO	332
		SHO	333
		SHO	046
		SHO	097
		F2	027
	On-call SHO	340	
ORTHODONTICS	Mr Hall, Miss Clark	SpR (pt)	

SPECIALTY	CONSULTANT	Grade	BLP
OBSTETRICS AND GYNAECOLOGY	Mr Beynon, Mr Hooker, Mr Ibrahim, Mr Simons, Mr Jolly, Miss Tipples Mr Simons Mr Ibrahim Mr Beynon/Mr Jolly Mr Hooker	SG	
		SpR	036
		SpR	162
		SpR	089
		SpR	189
		Clin Fell (SpR)	035
		Clin Fell (SpR)	087
		Clin Fell (SpR)	163
		ST2	100
		SHO	032
		F2	033
		F2	078
		On-call SpR	341
		On-call SHO	375
		PAEDIATRICS	Drs Lamont, Taylor, Candy, Linney, Remorino
Trust Dr	371		
Trust Dr			
SpR	058		
SpR	204		
SpR	293		
SpR	277		
ST1	037		
Trust Dr	098		
SHO	231		
ST1	039		
ST1	215		
F2	130		
F2	038		
ANAESTHETICS	Drs Dagleish, Turner, Carter, McHale, Smith, Kendall, McDonald, Hill, Soppitt, Bentley, Shankar, Margarson, Prosser, Dickens		
		On-call SHO	007
		On-call Senior SHO/SpR	008

SpR = Specialist Registrar
AS = Associate Specialist
CRF= Clinical Research Fellow
SG = Staff Grade
Tst Dr = Trust Doctor

