A guide to acute oncology emergencies

1st Edition

London Cancer

October 2012
Foreword

These guidelines are based on the guidelines for acute oncology services (11th edition) produced by Barts Health NHS Trust. They were agreed, and a decision made to adopt them for the whole of London Cancer until further notice, was taken at the London Cancer Acute Oncology Expert Reference Group meeting on Tuesday 30th October 2012.¹

The London Cancer ERG recognises that to produce properly generic, ICS-wide guidelines would be a significant undertaking at this stage. It may decide that this is necessary in future. In the absence of national guidelines, it is felt to be expedient to adopt – at least provisionally – an existing set of high-quality guidelines that has already been ratified for use within a large part of the ICS.

The ERG recognises that guidelines are currently being developed by the UK Oncology Nursing Society (UKONS), and these will be reviewed and considered for adoption when they have been published.

Some of the policy and guideline documents that are referenced in these guidelines (e.g. on pages 15-16) originate within Barts Health NHS Trust; others were developed on a Network-wide basis by the North East London Cancer Network; and others were developed to cover the whole of London. We have taken a decision not to ‘re-badge’ these documents. Regardless of which organisation’s branding they bear, the clinical content is still applicable ICS-wide, and they should be considered part of the overall AOS guidelines that have been agreed for use across London Cancer.

In the very few instances in this document where specific local provision is described (such as the naming of a specific consultant), we have added a note to clarify the fact that other organisations should, in these circumstances, apply their own local arrangements.

¹ The minutes of this meeting are available on the London Cancer website or can be made available upon request.
CONTENTS

1) NEUTROPENIC SEPSIS 4

2) UNCONTROLLED NAUSEA AND VOMITING 15

3) EXTRAVASATION INJURY 15

4) ACUTE HYPERSENSITIVITY REACTIONS INCLUDING ANAPHYLACTIC SHOCK 15

5) UNCONTROLLED MUCOSITIS 15

6) COMPLICATIONS WITH VENOUS ACCESS DEVICES 16

7) UNCONTROLLED DIARRHOEA 17

8) HYPMAGNEAEMIA 18

9) ACUTE SKIN REACTIONS 19

10) ACUTE RADIATION PNEUMONITIS 22

11) ACUTE CEREBRAL/ OTHER CNS OEDEMA 23

12) PLEURAL EFFUSIONS 24

13) PERICARDIAL EFFUSION 25

14) LYMPHANGITIS CARCINOMATOSIS 26

15) SUPERIOR MEDIASTINAL OBSTRUCTION INCLUDING SVCO 27

16) ABDOMINAL ASCITES 28

17) HYPERCALCAEMIA 29

18) SPINAL CORD COMPRESSION 31

19) CEREBRAL SPACE OCCUPYING LESION. 34

20) MANAGEMENT OF FITS 35
1) Neutropenic sepsis

**Flowchart for Management of UNWELL patient**
(On treatment or have received treatment within the last 3 weeks)

**Febrile ONCOLOGY patient or UNWELL**
Temperature > 38°C (on 2 occasions, 2 hours apart)  
or  
Temperature > 38.5°C single reading

**Urgent:**  
FBC/UE/LFT/GLUC/CULTURES  
AT LEAST 4 HRLY BP/PULSE/O2/UO/FLUID BALANCE

If patient lives >1 hour away, advised to attend local A&E or hospital nominated for shared care—to follow SBH guidelines as basis

If observations stable, and neutrophils > 1, then discuss with ONC SpR re antibiotics. Pt may still need admission, but oral antibiotics or close (4hourly) observation may be recommended.

**If unwell e.g. rigors, hypotension BP < 120 systolic, or 10mmHg less than normal, hypovolaemic, oliguria < 35 ml/min, confusion, hypoxic)**  
OR if neutrophils < 1  
START ANTIBIOTICS AND FLUIDS WITHIN 1 HOUR AND INFORM OUTREACH TEAM/ITU URGENTLY.  
IF PLATELETS GREATER THAN 50 AND NO BLEEDING, START PROPHYLACTIC CLEXANE.  
DISCUSS WITH CONSULTANT RE ITU/INOTROPES

**SEPTIC SCREEN**  
1. Coagulation, group and save  
2. CXR  
3. Catheterise if inaccurate fluid output measurement  
NO SIDE ROOM  
NO PARACETAMOL  
DAILY FBC/UE RESULTS BEFORE 10AM

**FIRST LINE EMPIRICAL THERAPY**  
Low risk (no prophylaxis, non-intensive chemotherapy protocol)  
IV co-amoxiclav 1.2g 3x/day I (add iv amikacin if haemodynamically unstable or PAR score 5 or more)  
If allergic to penicillin use iv levofloxacin 200mg 2x/day  
High risk (received antibiotic prophylaxis or intensive protocol)  
IV piperacillin/tazobactam 4.5 g 3x/day and amikacin 15mg/kg - if allergic to penicillin use meropenem  
• If there were anaphylaxis to penicillin (not just rash) use ciprofloxacin and amikacin and vancomycin  
• MAINTAIN BP SYSTOLIC/PULSE/O2 SATS ABOVE 92% OUTREACH.

Fever worsening at 48 hours or becoming haemodynamically unstable – consider 2nd line antibiotic s – imipenem 500mg 4x/day (add amikacin if already on imipenem)
1. Recognition

The early recognition of overwhelming sepsis in oncology patients is essential to ensuring a good outcome. Younger patients and patients on steroids in particular may be very deceptive and look quite well despite basic observations being quite abnormal. Once overwhelming sepsis is established a situation develops in which oxygen consumption at tissue level rises which can not be met by the circulation. This eventually shows as tachycardia, hypotension, hypoxia and increased respiratory rate (tachypnoea). Not all features are present initially but they generally all appear as the situation deteriorates. This is known as the systemic inflammatory response syndrome or SIRS. It is mediated by cytokines and the end result is independent of the initial insult. Classically, it is associated with Gram negative septicaemia although this is not always the case and fungi, protozoal or viral infections may precipitate it.

2. Administration of Antimicrobials

The prompt administration of appropriate antibiotics is essential. A local policy will guide the initial blind management of sepsis – it will normally include a broad spectrum agent (usually an ureidopenicillin e.g. Tazocin or a 3rd / 4th generation cephalosporin e.g. ceftazidime , ceftriaxone with or without an aminoglycoside. Whilst blood cultures should be taken initially it must be appreciated that it will take 24-48 hours to get a result and treatment should start immediately – modification in the light of culture results may then be considered.

3. Initial Observations

A patient who develops any of the following should be assessed carefully:

- **Fever**
  - thermometer

- **Tachycardia**
  - manual count or pulse oximeter

- **Hypoxia**
  - pulse oximeter- if suggested confirm with arterial blood gas

- **Tachypnoea**
  - manually count

- **Hypotension**
  - sphygmomanometer/Dynamap

- **Urine output**
  - measure regularly, if normal CVP and BP then consider catheterization.

Fever is normally the alerting sign but patients may present with hypothermia or confusion. If any of these occur the other signs should be looked for. The fact that a patient is not hypoxic – despite tachypnoea or is passing urine – despite hypotension is not a sign that things are all right.

Certain drugs may mask these signs- e.g beta blockers will reduce tachycardia allowing hypotension to develop more easily. Steroids and NSAIDs may affect temperature regulation leading to a minimal rise in temperature that would otherwise be easy to ignore.

4. Initial laboratory Observations-FBC, Cr, glucose, electrolytes, venous blood gas and lactate.

These should include an emergency full blood count (risk is much higher if neutropenic, if a central line is required the platelet count needs to be known.

Urea and electrolytes- the most important are K+, U, Creatinine and Na. The venous bicarbonate is useful as it can indicate ongoing tissue acidosis.

A coagulation screen is not required but should be considered if thrombocytopenia is unexpected or in the presence of renal impairment.


Glucose- a capillary glucose is a useful screening tool but blood venous glucose should always be carried out if this is abnormal or the patient is a known diabetic. In patients not known to be diabetic steroids may allow diabetes to develop.

An arterial blood gas should be performed in patients with unexpected hypoxia on oximetry especially if there is no response to moderate amounts of oxygen (Fi O₂ 28-40%). This will also tell you if there is a degree of acidosis.

If there is poor peripheral perfusion, then the oximeter may underestimate the Pa O₂ then arterial blood gas will be necessary. Caution regarding this in terms of platelets- consider transfusion if <20.

Tissue oxygenation can be assessed by using a venous blood gas; a lactate level should be measured – a lactate level of > 4mmol/l suggests tissue acidosis this must be presumed due to the sepsis process unless another cause (e.g. metformin) can be found. Tissue acidosis is best managed in the first instance by fluid resuscitation. The finding of this in otherwise relatively well patients is significant as it suggests that metabolic decompensation is not far away.

The ScO₂ – sampled from a central vein is a useful measure of oxygen extraction. It is normally around 70%. A high level indicates inadequate oxygen extraction – due to shunting at tissue level – it may be helped by noradrenaline (assuming no role for further fluid resuscitation). A reduced level (<60%), suggests inadequate oxygen delivery it suggests that inotropic support (dobutamine or enoximone) may be needed in the absence of an adequate response to fluid resuscitation.

5. Oxygen therapy

Maintaining arterial oxygen levels is essential to alleviating tissue hypoxia. The pulse oximeter is a useful screening tool. It detects the level of O₂ in the periphery. A low level (<93%) should act as a warning. Administration of supplemental O₂ by nasal cannulae 2l/min= 24%) is a reasonable start. If there is no response use humidified O₂ start at 35% and then increase to 40% and then 60%. Any further increase will require a rebreathing bag. If this is successful consider formal arterial gas if more than 28% is required.

Concerns about the risk of type 2 respiratory failure should not deter the use of oxygen in this emergency situation.

It is important to monitor respiratory rate – maintenance of reasonable oxygenation with a rapid respiratory rate (> 40/min) may not be sustainable. ITU review for consideration of assisted ventilation should be considered.

6. Fluid Resuscitation

The initial management of hypotension in the presence sepsis is to use fluid resuscitation. Hypotension in sepsis can be thought of having 2 components.

1. Vasodilatation
2. Cardiac depression

In the initial phase of sepsis vasodilatation predominates- there is some cardiac compensation and this leads to hypotension with warm peripheries and tachycardia- the cardiac response may be blunted by drugs ( rate limiting e.g. beta blockers, verapamil, diltiazem, ibadivine), previous poor cardiac reserve due to previous myocardial damage in which case hypotension may be severe.

The principle of fluid resuscitation is to give a fluid challenge to raise the CVP transiently and see if this improves cardiac output which will be reflected in a rise in blood pressure the pulse rate may either rise or fall ( falls in pulse rate in some one who was tachycardic in response to fluid suggests previous underfilling).
Administration of fluid in a fluid challenge.

A. Patient has no central venous access

Examine patient – check JVP is not raised. Listen to chest for signs of pulmonary oedema.

Give 500 ml of 0.9% NaCl over 15 min. – an alternative is to use a plasma expander e.g. Gelofusine – these products are meant to stay within the vascular space as opposed to distributing themselves throughout the extra cellular fluid. In practice no advantage has been demonstrated and the use of 0.9% NaCl is simpler.

Observe the patient and check vital signs at end of infusion and then every 15 minutes.

If a satisfactory response has been achieved then give maintenance fluids to cover general anticipated fluid losses. Continue monitoring every 15 min for the first hour and then every 30 minutes for the second hour and then hourly.

If there is no response and JVP is not raised repeat the fluid challenge. A third fluid challenge is reasonable in the following circumstances otherwise CVP measurements are essential.

1. No active cardiac history
2. No evidence of fluid overload
3. Patient is not becoming more hypoxic

7. Using CVP monitoring

Patient has central access (temporary or Hickman/Groschong line).

Measure CVP

Ensure technique is standardised. Disconnect ‘bionectors’ as they cause misleading values. Caution with measuring CVP from Groschong line – it is valved and this causes misleading elevated values.

CVP should be measured from mid axillary line (marked) with patient lying flat.

If CVP is > 10 cm water - patient is close to maximally filled therefore limit fluid challenges to 250 ml only. If no response after first fluid challenge of 500 ml consider early inotropic support – the high CVP suggests the heart is unlikely to respond well to more fluid.

If CVP is < 10 cm water give standard fluid challenge as described in previous section. Recheck CVP after fluid challenge - it should rise by at least 2 cm water after fluid then fall slowly if the patient is still underfilled.

If at the end of first challenge CVP is > 10 then no further fluid challenge should be given – if BP has not been restored inotropic support is indicated.

If after 2 fluid challenges the CVP < 10 cm and no respiratory worsening (respiratory rate, oximetry) consider 3rd challenge.

If CVP < 5 cm after 2 challenges give 3rd challenge.

If after 3 challenges CVP < 5 cm and no response in CVP then consider further fluid or cautious inotropic support especially if respiratory worsening.

8. Inotropic Support

The use of inotropic support to improve oxygen delivery, maintain arterial blood pressure and therefore maintain essential organ perfusion is an established technique in the management of sepsis. Over-reliance on fluid resuscitation can lead to fluid overload and the development of pulmonary oedema. If the blood pressure does not rise in response to fluid resuscitation then acute renal failure is a risk following untreated hypotension. Several factors tend to lead to delayed inotropic use they include:
1. Failure to recognise that large amounts of fluid have been given with no response.
2. Fear of the use of these drugs by medical staff.
3. Reluctance to use them by nursing staff on the grounds of inexperience and policy.

The inotropic drugs can be divided into catecholamine and non-catecholamine drugs.

Catecholamines: Dopamine, Noradrenaline, Adrenaline, Dobutamine and Dopexamine
Non-catecholamines: Enoximone, Milrinone, Digoxin.

Following assessment of the patient the most common scenario is to find a patient with refractory hypotension and either a raised or normal CVP- the best starting drug is noradrenaline.

a) Noradrenaline (norepinephrine)

Role: vasoconstriction, inotrope
The prominent action is vasoconstriction, until this starts the beta action will lead to increasing tachycardia. Once vasoconstriction becomes effective then the blood pressure will start to rise and the pulse rate will fall. Noradrenaline does not prevent renal perfusion, on the contrary the rise in blood pressure improves renal perfusion. Noradrenaline should be administered via a central line as it is an irritant – there may be circumstances prior to insertion of a central line when the peripheral administration is required to raise a dangerously low blood pressure whilst central access is being obtained. In such a case a dilute strength should be used.

The drug should be prepared in line with current drug guidelines (4 mg/100 ml or 20 mg/500 ml.) The starting rate e.g. 3 ml/hour should be doubled every 15 minutes until the blood pressure starts to rise. Arbitrary ceilings for infusion rates are generally unhelpful – it is normal for the blood pressure to respond at doses between 0.05-0.5 mcg/kg min it is unusual for doses > 1 mcg/kg/min to be needed other than initially. Arrhythmias can occur at any dose and cardiac monitoring is mandatory.

Once the BP starts to rise then the dose should be increased more slowly e.g. 10% increase every 15 minutes. A target BP should be set e.g. Systolic 90 mmHg – 105 mmHg.

Once in the target range the instruction should be to reduce dose if the BP rises above the target e.g. reduce dose by 10% recheck BP in 15 min. If the BP is still too high the same action should be repeated. Likewise the dose should be increased if the BP is below the target range.

When the dose changes the CVP should be rechecked. Noradrenaline tends to raise the CVP and this may be an indication for the use of another inotrope especially if the pulse slows e.g. enoximone or dobutamine.

Setting the Target BP.

Systolic BP should be > 90 mmHg but if the patient were previously hypertensive then a higher level needs to be set as autoregulation of blood flow is impaired and the body will be expecting a higher BP, e.g. > 120 mmHg.

Specific Problems with Noradrenaline

1. Tachycardia. The reason for this may be one of several. In the initial phase before vasoconstriction takes place – the reason is the direct beta stimulation. Unfortunately until vasoconstriction occurs this will worsen as the dose increases but there will come a point when vasoconstriction occurs when the pulse rate will start to slow.

2. Multiple ventricular ectopic beats – this is a direct effect of noradrenaline on the heart – it may occur in patient’s who are underfilled or have electrolyte imbalances (esp low K or Mg) - try to reduce the dose of noradrenaline and correct as many imbalances as possible.
3. Atrial fibrillation – may occur at any point during noradrenaline administration – often if there is hypoxia – if it becomes established – then the drug of choice is amiodarone.

4. Peripheral Vasoconstriction and cold peripheries: this is relatively uncommon. It is much more likely if noradrenaline is used as a single inotrope – it occurs because peripheral blood flow through the skin is low partly because of low cardiac output- boosting this with the addition of another inotrope would help.

b) Enoximone

This phosphodiesterase 3 subtype inhibitor leads to venodilatation, lowering of CVP, increased inotrope and synergy with catecholamines. It is converted into a long acting metabolite. It may be given peripherally or centrally but requires CVP monitoring. The drug seems to have two phases of action – a vasodilating phase which causes hypotension and a drop in CVP – the hypotension may be off set by increasing the dose of noradrenaline and the administration of fluid if CVP falls excessively and an inotropic phase which begins 15-30 min after drug administration which often causes a rise in BP and a further fall in CVP. The initial dose is given as a loading dose and the response to it governs the subsequent infusion rate. An initial dose of 0.25 mg/kg/min is given over 15 min. Observations are made every 15 min. The patient will probably be on noradrenaline and may need an increase in dose. If after 15 min no effect is seen then give a further 0.25mg/kg/min and continue regular observations. It is unusual to need more than 1mg/kg /min. Once a CVP fall occurs normally 3-6 cm water – start maintenance rate (if 0.25mg/kg /min is all that is needed start at 2mcg/kg /min, if 0.5mg is required give 4mcg/kg /min if 0.75mg /kg required give 6mcg/kg /min.

Over 4-6 hours the CVP should continue to fall. If it falls to <2cm water stop infusion for 2 hours and restart at 25% dose reduction. If CVP > 10 cm water consider a dose increase or use diuretic.

The use of enoximone in combination with noradrenaline should lead to very high cardiac output with maintained warm peripheries.

9. The use of diuretics

In patients with low urine output it is tempting to give iv furosemide. There often drawbacks with this and by and large it should be avoided. If the BP is low and urine output is low then this implies poor renal perfusion and correction of blood pressure with a fluids and/or vasopressor e.g. noradrenaline is indicated first.

The situation where as small dose of furosemide is useful is one where BP is restored, CVP is high and urine output is low – here a small dose of 20mg iv furosemide may lead to a sustained rise in urine output and fall in CVP.

10. The use of corticosteroids

These remain controversial but 50mg of hydrocortisone 4x/day iv in patients with established sepsis can lead to lowering of noradrenaline requirements and may reduce mortality. It should normally given for 5 days and started as early as possible.

11. The use of insulin

Good glucose control is useful and after the initial 48-72hour period aiming for glucoses of 4-7mmol/l may be helpful if it can be achieved with good monitoring to avoid hypoglycaemia.
Summary of Points

1. Identify patients early.
2. Give antibiotics promptly.
3. Carry out timely fluid challenges but stop when they do not work and use inotropes.
4. Check electrolytes.
5. Titrate noradrenaline to CVP and blood pressure- add in enoximone.
6. Avoid unnecessary diuretics.
7. Give steroids and monitor glucose.
8. Keep a close eye on fluid balance, oximetry.
Stopping Antimicrobial Therapy
Management Review of Patients with Febrile Neutropenia on Antibiotics

24 hours

Afebrile
- Continue with 1st line antibiotics

Febrile
- Well
- Unwell or High risk
  Multidisciplinary reassessment to consider:
  - Further investigation for focus
  - Empiric 2nd line antibiotics
  - Continuing treatment

If Culture positive:
- Change antibiotics according to sensitivities

48 hours & 24 hourly thereafter

Afebrile
- Consider stopping antibiotics if well, culture negative and rising neutrophil count

Febrile

Culture positive
- Consider changing IV antibiotics to oral if patient is clinically well

Culture negative
- Patients discharged on oral co-amoxiclav (ciprofloxacin in penicillin allergic patients) until temperature <38°C for 48hrs
- Culture negative
  - High-risk or unwell:
    Multidisciplinary reassessment to consider:
    - Further investigation for focus
    - Empiric 2nd line antibiotics
    - Continuing treatment

In those patients not already on antifungals, consider adding antifungals at 96 hours if the patient is unwell.

Duration of antibiotics in special circumstances

Line infection; culture positive or negative with response to antibiotics:
Treat for 10 days

Line infection with line removal:
Culture negative – stop antibiotic treatment according to clinical circumstances
Culture positive – consider further treatment depending on organism
**Culture Positive**

If an organism has been cultured from the blood, in most situations at least 7 days treatment with an apparently effective antibiotic is required. Organism-specific situations will be dealt with when this arises e.g. *S. aureus* or *Candida spp*.

This may be with a suitable oral alternative or with outpatient intravenous antibiotics if the patient is otherwise well. In cases with an identified pathogen, antibiotic therapy should be continued until cultures become sterile, with at least 3 days without fever and clinically stable.

**Culture Negative**

Recovery from neutropenia is the most important factor in influencing duration of antimicrobial therapy. IV therapy can be stopped if the neutrophil count is $> 0.5 \times 10^9/\text{l}$ and the patient is well and has been afebrile for at least 24 hours.

If the patient is not 100% clinically stable or their count has not regenerated to $> 0.5 \times 10^9/\text{l}$ it may be appropriate to step down to an oral antibiotic to complete a 7 day course of antibiotics as an outpatient. Microbiology advice is recommended.

Stopping antibiotics in patients who are still neutropenic should be discussed with a senior member of the team. In continuing neutropenia, if the fever resolves, the initial regimen (or suitable oral regimen) can be used to complete a 7 day course.

Prophylactic antibiotics may be restarted if required.
Sepsis / Severe Sepsis Screening Tool

**Are any 2 of the following present and new to the patient?**
- Heart rate >90 min⁻¹
- Respiratory rate >20 min⁻¹
- Acutely altered mental status
- Hyperglycaemia (glucose>6.6mmol/L) (unless diabetic)
- Temperature >38.3 or <36.0°C (N.B. steroid therapy)
- White cells <4 or >12 g/L (N.B. Neutropenia)

If yes, patient has SIRS

**Any signs or history suggestive of a new infection? e.g.**
- Pneumonia
- UTI
- Abdo pain/ diarrhoea/ distension/ urgent laparotomy
- Meningitis
- Cellulitis/ septic arthritis/ fascitis/ wound infection
- Endocarditis
- Catheter (incl central venous) infection

If yes, patient has SEPSIS

**Any new signs of organ dysfunction?**
- SBP <90mmHg or MAP <65 mmHg or SBP <40mmHg below normal
- New or increased O₂ requirement to maintain SpO₂>90%
- UO <0.5 ml/kg/hr for 2 hrs or Creatinine >177 mmol/l
- Bilirubin >34 mmol/l
- Platelets <100 (may already be lowered)
- Lactate >2 mmol/l
- Coagulopathy: INR>1.5 or aPTT>60s

If NO:
Treat for SEPSIS:
- Oxygen
- Blood Cultures
- IV antibiotics
- Fluid therapy
- Hourly observations and PAR Score
- RE-assess for SEVERE SEPSIS hourly

If YES:
The patient has SEVERE SEPSIS
Start Severe Sepsis Care Pathway
### Severe Sepsis Care Bundle – First Hour Duties

<table>
<thead>
<tr>
<th>Severe Sepsis Care Bundle – First Hour Duties</th>
<th>Achieved Y / N</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Oxygen:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Start with High Flow (15L via Non-rebreath mask and titrate down)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Target Saturations &gt;94%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2. Fluid Resuscitation:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Give boluses of 0.9% saline (500mls) over 15 minutes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Observe response &amp; repeat as necessary until hypotension / organ dysfunction is improved <strong>(up to max 1.5 – 2 litres then call senior / ICU)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- If CVC present, measure CVP and Use rule of 2 – 5 (see point 3b on reverse)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3. Blood Cultures:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Take at least 2 sets, including at least one from a fresh venepuncture.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Culture any vascular access devices in situ &gt; 48 hours.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Request other cultures / swabs / imaging as appropriate</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4. IV antibiotics:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- as per Trust / Local Guidelines.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Prescribe and ensure they are given immediately.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>5. ABG to measure Lactate:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- venous sample is OK if respiratory status stable.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Send FBC, U+E, Clotting.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- If CVC present – check SvO2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Repeat lactate measurement after 1st hour duties completed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Arrange transfusion if Hb &lt;7</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>6. Commence hourly fluid balance:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Consider catheterisation to achieve this (check platelets 1st)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Date:**

**Time commenced:**

**Time bed on GHF / ICU requested:**

**Discuss with Consultant. Consider prognosis.**

**Arrange**

+ / - early Critical Care review (if appropriate for ICU)

All 1st hour goals completed?  Yes ☒  No ☐ (give details in medical notes)

**Time:**

**Name:**

**Signature:**

**Role:**
The policy documents for 2, 3, 4 and 5 can all be found on the intranet by going to:

2) **Uncontrolled nausea and vomiting**

You can find the current policy on the intranet at:


3) **Extravasation injury**

You can find the current policy on the intranet at:


4) **Acute hypersensitivity reactions including anaphylactic shock**

You can find the current policy on the intranet at:


5) **Uncontrolled mucositis**

You can find the current policy on the intranet at:

6) Complications with venous access devices

The policy documents can be found on the intranet by going to:

Cancer Home Cancer guidelines

Then click on the policy title.

1. Prevention of infection and management of long-term tunnelled central venous catheter and ports

You can find the current policy on the intranet at:

http://bltintranet/Policiesandguidelines/Prevention%20of%20infection%20and%20management%20o.pdf

2. Guidelines for the use and management of cuffed tunnelled central venous catheters (hickman/groshong).

You can find the current policy on the intranet at:


3. Implantable port CVCs

You can find the current policy on the intranet at:


4. PICC catheters

You can find the current policy on the intranet at:


5. Prevention of central venous catheter and peripheral cannula related infection.

You can find the current policy on the intranet at:

http://bltintranet/hrservices/Learninganddevelopment/Coursesanddates/Clinical/Acute/documents/cardiovascular2/Prevention%20of%20central%20line%20infections.pdf
7) Uncontrolled diarrhoea

**EVALUATE**
- Obtain history of onset and duration of diarrhea
- Describe number of stools and stool composition (e.g., watery blood in stool, nocturnal)
- Assess patient for fever, dizziness, abdominal pain/cramping, or weakness (e.g., rule out risk for sepsis, bowel obstruction, dehydration)
- Medications profile (e.g., to identify diarrheagenic agents)
- Dietary profile (e.g., to identify diarrheagenic agents)

**COMPPLICATED**
- CTC grade 3 or 4 diarrhea or grade 1 or 2 with one or more of the following signs or symptoms:
  - Cramping
  - Nausea/vomiting (≥ grade 2)
  - Decreased performance status
  - Fever
  - Sepsis
  - Neutropenia
  - Frank bleeding
  - Dehydration

**UNCOMPROMICATED**
- CTC grade 1-2 diarrhea with no complicating signs or symptoms

**ADDED RISK FACTORS**

**MANAGEMENT**
- Stop all lactose-containing products, alcohol, and high-osmolar supplements
- Drink 8-10 large glasses of clear liquids a day (e.g., Gatorade or broth)
- Eat frequent small meals (e.g., bananas, rice, applesauce, toast, plain pasta)
- Instruct patient to record the number of stools and report symptoms of life-threatening sequelae (e.g., fever or dizziness upon standing)
- For grade 2 diarrhea, hold cytotoxic chemotherapy until symptoms resolve and consider dose reduction

**TREATMENT**
- Administer standard dose of loperamide; initial dose 4 mg followed by 2 mg every 4 hours or after every unformed stool
- Consider clinical trial

Reassess 12-24 hours later

**Diarrhea resolving**
- Continue instructions for dietary modification
- Gradually add solid foods to diet
- Discontinue loperamide after 12-hour diarrhea-free interval

RT-induced: Continue loperamide

**Persistent diarrhea (NCI grades 1-2)**
- Administer loperamide 2 mg every 2 hours
- Start oral antibiotics
- Observe patient for response

RT-induced: Oral antibiotics not generally recommended

Reassess 12-24 hours later

**Diarrhea resolved**
- Continue instructions for dietary modification
- Gradually add solid foods to diet
- Discontinue loperamide after 12-hour diarrhea-free interval

RT-induced: Continue loperamide

**Persistent diarrhea (NCI grades 1-2)**
- No fever, dehydration, neutropenia, and/or blood in stool

**EVALUATE IN OFFICE/OUTPATIENT CENTER**
- Check stool workup (blood, fecal leukocytes, Clostridium difficile, Salmonella, Escherichia coli, Campylobacter, infectious colitis)
- Check CBC and electrolytes
- Perform abdominal exam
- Replace fluids and electrolytes as appropriate
- Discontinue loperamide and begin second-line agent
  - Octreotide (100 to 150 µg SC TID with dose escalation up to 500 µg TID)
  - Other second-line agent (e.g., vancomycin or opium)

RT-induced: Continue loperamide or other oral agent; no workup required

**ADMIT TO HOSPITAL**
- Administer octreotide (100 to 150 µg SC TID or IV [25-50 µg/hr] if dehydration is severe with dose escalation up to 500 µg TID)
- Start intravenous fluids and antibiotics as needed (e.g., fluorescein alone)
- Stool work-up, CBC, and electrolyte profile
- Discontinue cytotoxic chemotherapy until all symptoms resolve; restart chemotherapy at reduced dose
8) **Hypomagnesaemia**

Occurs in particular with Tacrolimus and Cyclosporine.

**Grades of Severity of Hypomagnesaemia:**

*National Cancer Institute – Common Toxicity Criteria Version 3*

<table>
<thead>
<tr>
<th>Grade</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Within normal limits</td>
</tr>
<tr>
<td>1</td>
<td>&lt; LLN - 1.2 mg/dL or &lt; LLN - 0.5 mmol/L</td>
</tr>
<tr>
<td>2</td>
<td>&lt; 1.2 - 0.9 mg/dL or &lt; 0.5 – 0.4 mmol/L</td>
</tr>
<tr>
<td>3</td>
<td>&lt; 0.9 – 0.7 mg/dL or &lt; 0.4 - 0.3 mmol/L</td>
</tr>
<tr>
<td>4</td>
<td>&lt; 0.7 mg/dL or &lt; 0.3 mmol/L</td>
</tr>
</tbody>
</table>

*Abbreviation: LLN = lower limit of control*

**Drug name**

Magnesium gluconate

500 mg contains 27 mg of elemental Mg

**Adult dose**

500 – 1,000 mg orally three times daily

**Contraindications**

Documented hypersensitivity, heart block, myocardial damage, hepatitis

**Interactions**

- Concurrent use with nifedipine may cause hypotension and neuromuscular blockade.
- Mg may worsen neuromuscular blockade seen with aminoglycosides, tubocurarine, vecuronium, or succinylcholine.
- Mg may increase CNS effects and toxicity of CNS depressants, betamethasone, or ritodrine.

**Pregnancy**

Safe in pregnancy

**Precautions**

2. May alter cardiac conduction leading to heart block in digitalized patients.
3. Monitor respiratory rate, deep tendon reflex, and renal function when administered parenterally.
4. Caution when administering Mg dose, as it may produce significant hypertension or asystole.
5. Diarrhoea is the most common adverse effect.
9) Acute skin reactions

Summary of intervention for acute radiotherapy induced skin reactions in cancer patients (A clinical guideline recommended for use by The College of Radiographers, 2001)

Introduction

This is a summary of the main findings from the literature review, to develop a clinical guideline for acute radiotherapy induced skin reactions in cancer patients.

Many patients have fears and anxieties around skin reactions from radiotherapy. The literature suggests that education regarding the care of early radiation skin reactions should be an essential part of the management process for patients undergoing radiotherapy. Patients should be given information about skin reactions and self care strategies.

According to the literature:

- A variety of practices are used in the UK for skin care.
- Differing advice is given to patients.
- Uncertainty exists around what topical agent or dressings should be used.

The literature advises that since radiation skin changes cannot be prevented, the goal for the patient is to delay onset of symptoms. Therefore avoid factors that exacerbate the inevitable radiation damage. The aim of any care strategy should be to minimise symptoms and to promote comfort for as long as possible.

Patient information

Patients should be given both written and verbal information, which specify:

- How and why skin reactions occur.
- When they are likely to appear.
- What they will look and feel like.
- How they will be treated.
- Where the reaction is likely to occur.
- Self care strategies.
- Risk factors.

Incidence

- Incidence of skin reactions has not been quantified.
- Treatment areas commonly cited as having a higher incidence are those of head and neck, breast and chest wall fields, and areas containing skin folds.

Minimising acute skin reactions

The literature gives the following recommendations for reducing irritants to irradiated skin:

<table>
<thead>
<tr>
<th>Sun exposure</th>
<th>Protect from direct sun exposure: cover or shade area.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical irritants</td>
<td>Minimise friction: wash or shower gently; avoid using a washcloth; pat dry with a soft, clean towel; wear loose fitting, soft clothing. Avoid shaving or shave causing as little trauma to skin as possible.</td>
</tr>
</tbody>
</table>
### Mechanical irritants (cont.)

Avoid scratching.
Avoid rubbing vigorously and massaging.
Avoid use of adhesive tape in treatment field.

### Chemical irritants

Use mild soap and rinse thoroughly.
Apply only recommended substances.
Avoid use of deodorants.
Use mild detergent to wash clothing.

### Thermal irritants

Use tepid water.
Avoid exposure to temperature extremes.
Avoid application of ice packs or heat (e.g. heating pad, hot water bottle, sun lamp).

### Management

<table>
<thead>
<tr>
<th>RTOG 0: No visible change to skin</th>
<th>Aqueous cream to delay onset of skin reactions. Wash skin during therapy.</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTOG 1: Faint or dull erythema</td>
<td>Advise patient to use aqueous cream frequently to soothe and moisturise.</td>
</tr>
<tr>
<td>RTOG 2a: Tender or bright erythema</td>
<td>Advise your patient to apply aqueous cream. Hydrocortisone 1% may be used sparingly on itchy or very sore areas. If the skin breaks they should discontinue the cream and ask for further advice.</td>
</tr>
<tr>
<td>RTOG 2b: Patchy moist desquamation, moist oedema</td>
<td>Dress the moist area with hydrogel, hydrocolloid or alginate dressing. Aqueous cream can still be applied to other parts of the field.</td>
</tr>
<tr>
<td>RTOG 3: Confluent moist desquamation</td>
<td>Dress with hydrogel, hydrocolloid, or alginate dressing suitable for the amount of exudates. Take a swab if there are any signs of infection.</td>
</tr>
</tbody>
</table>

### Skin types

All patients develop radiation induced skin reactions in the same way regardless of ethnic origin. Variations in the degree of reaction may depend on individual responses to treatment related to risk factors as listed previously.
**Influencing factors**

There are various factors that influence how people react to radiotherapy. These are:

- Intrinsic factors to include demographic or disease-related characteristics, such as age, hormonal status, infection, ethnic origin and co-existing disease.
- Extrinsic factors are treatment-related and influence delivery of therapy. They include treatment dose, volume, fractionation, adjuvant chemotherapy, site of treatment and energy.
- The goal of management is to identify the degree of risk and adopt strategies to delay onset of skin reactions.

**Assessment of radiation skin reactions**

It is essential to assess the patient's potential for skin reactions prior to commencement of treatment, and to review the condition of the skin on a regular basis.

- Different assessment tools exist.
- Radiotherapy departments should have an agreed review process that incorporates assessment and monitoring of skin reactions using an agreed scoring criteria such as RTOG/EORTC.
- Skin reactions should be graded and recorded regularly by an appropriately trained member of the multidisciplinary team.
10) Acute radiation pneumonitis

Radiation pneumonitis is an inflammation of the lungs resulting from radiotherapy which occurs in between 5-15% of patients undergoing radiotherapy to the thorax. The risk of pneumonitis is related to the volume of normal lung irradiated and the dose of radiotherapy delivered. Therefore it is most likely to occur with radical (potentially curative) treatments for lung and oesophageal cancer but can also occur following treatment for breast cancer and lymphoma.

Symptoms usually arise within the first 90 days of radiotherapy treatment (acute effects of radiation) but can occur later than this during the development of lung fibrosis. The chance of radiation pneumonitis is increased by the concomitant use of chemotherapy and is more likely to occur in patients with pre existing lung disease e.g. COAD.

The symptoms of radiation pneumonitis can mimic that of lung cancer itself but must always be considered as a differential diagnosis in patients receiving radiotherapy to the thorax.

These include:
- Shortness of breath on exercise
- Chest pain,
- Cough
- Low grade fever.

In some cases there are no symptoms but the diagnosis is made on CXR appearances and following high resolution CT. There may be accompanying signs of inflammation in the blood tests such as raised white count and ESR.

Treatment:

Steroids Prednisolone 30mg daily until symptoms subside then slowly reduce the dose. The majority of patients recover with treatment but may be left with pulmonary fibrosis on their CXR which will be permanent. It is important to note that many patients receiving radiotherapy to the lung will have abnormal radiology subsequently and this does not necessarily indicate recurrent disease. The radiology should be interpreted in the context of clinical symptoms and by clinicians experienced in interpreting imaging post radiotherapy.
11) Acute cerebral/ other cns oedema

1. Clinical signs and symptoms:
   - Headache
   - Nausea and vomiting
   - Weakness
   - Personality changes
   - Somnolence
   - Impaired cognition
   - Seizures
   - Gait disorder
   - Visual disturbance
   - Language disturbance
   - Hemiparesis
   - Sensory loss (unilateral)
   - Papilloedema
   - Ataxia
   - Aphasia

2. Diagnostic measures:
   - Complete neurological examination
   - CT scan
   - MRI scan (best for visualising oedema).

3. Treatment
   - Aggressive therapy is necessary to sustain or restore optimal neurological function.
   - High doses of Dexamethasone 8 mg bd.
   - The dose is tapered once neurological symptoms are controlled and reduced.
   - If patients have seizures they are placed on anticonvulsant therapy.
   - Control of seizures avoids sudden increases in ICP.
   - Mannitol osmotherapy can be used to produce profound reductions of cerebral oedema on a temporary basis.
   - Surgical decompression or debulking of the tumour is effective in reducing intracranial pressure and preventing further oedema.
   - Unifocal brain tumours are potentially curable with radiation therapy.
   - Radiation causes an increase in brain oedema but is used once the patient is stabilised to treat the underlying cause of oedema.
   - Chemotherapy is limited in use due to its inability to cross the blood-brain barrier.
12) Pleural effusions

1. Small asymptomatic effusions may be left alone (remember: most recur anyway).

2. Chemotherapy etc for a particular tumour (response to treatment will often see a reduction or resolution of the effusion).

3. If the tumour is chemo-resistant or refractory to systemic treatment, pleurodesis may be performed.

4. Thoracentesis provides short-term relief of symptoms: insertion under US.

5. Thoracostomy tube.

6. Pleuroperitoneal shunt.

7. Pleural stripping.

8. External beam radiotherapy.

9. Pleural drains should only be inserted following ultrasound location, performed by the radiology department. This is in compliance with the BTS guidance.
13) **Pericardial effusion**

Cardiac tamponade is a life threatening oncological emergency. This situation occurs from an excess accumulation of fluid in the pericardial sac (pericardial effusion). This fluid causes an increase in pressure around the heart and a decrease in blood flow to the heart. Amount of fluid surrounding the heart varies and may range from 50 ml to 1 litre. As excess fluid accumulates it compresses the right ventricle and therefore is unable to fill. The amount of blood leaving the left side of the heart is less. Severity is based on how rapidly and the amount of fluid that is accumulating.

1. **Signs and symptoms:**
   - Variable depending on the rate and amount of fluid that is accumulating.
   - Must also consider baseline cardiac function.
   - Chest fullness and discomfort.
   - Look for signs associated with:
     - Decreased cardiac output;
     - Compression of the heart by other structures (cough, retrosternal chest pain, dyspnoea);
     - Venous congestion;
     - Weak heart sounds.

2. **Tests:**
   - Echocardiography.
   - CXR.
   - CT.
   - MRI.

3. **Treatment:**
   - Urgent referral to on call cardiology team.
   - Pericardiotomy.
   - Pleuropericardial window.
14) **Lymphangitis carcinomatosis**

Lymphangitis carcinomatosis is caused by cancer cells invading the lymphatic space in the lungs. It is primarily seen in patients with breast cancer, ovarian cancer and prostate cancer. The symptoms are:

- Dyspnoea;
- Dry cough;
- Fever;
- Night sweats;
- Chest pain;
- Haemoptysis.

1. **Diagnosis:**

   Chest X-ray may show widespread linear or nodular interstitial infiltrations, but in the initial stages it may be clear. CT scan can show the changes earlier and can help differentiate it from other interstitial lung diseases.

2. **Treatment:**

   - Symptomatic treatment of the patients dyspnoea and cough.
   - Corticosteroids may produce some relief: 100-150 mg Prednisolone or 12-16 mg Dexamethasone daily. Should be tried for a week and if there is no improvement it should be stopped. If there is a response it should be titrated down to the lowest possible dose.
   - Chemotherapy or anti-hormonal therapy may have a very good effect in patients who have a turnout that is still sensitive to these drugs.
15) Superior mediastinal obstruction including SVCO

1. Fullness in head/SOB/cough/ chest discomfort/occ dysphagia.
2. Fixed dilated veins/head and neck and upper body cyanosis.
3. Elevate head of bed and bed rest.
4. Oxygen
5. DO NOT USE STEROIDS unless tracheal compression or cerebral oedema.
6. CXR and CT to establish level of SVCO.
7. Exclude non-malignant cause- indwelling catheter.
8. Urgent review by interventional radiology regarding stenting.
10. Consider anticoagulation to prevent SVC thrombosis.
16) **Abdominal ascites**

Accumulation of ascites is rarely an emergency. However, it can be extremely uncomfortable for patients and it is not uncommon for over 8 litres of fluid. In ovarian cancer and other intra-abdominal malignancies, ascites accumulates due to presence of widespread peritoneal deposits, which leak fluid. In addition, involvement of retroperitoneal nodes by disease prevents drainage.

There is almost no level 1 evidence on the ‘optimal’ management of malignant ascites, so these are local guidelines based upon experience, mainly in women with advanced or recurrent ovarian cancer.

**Assessment**

a. Clinical examination usually suffices – however, it is rare to be able to detect ascites unless there is at 2 – 3 litres present.
b. Ultrasound is extremely sensitive and should be used if there is any ambiguity – also, drainage can be performed at the same time (see below).
c. Abdominal x-ray. This is useless at detecting ascites, but very useful for excluding small bowel obstruction, which is frequently also present in women with recurrent ovarian cancer.

**Acute Management**

a. Drainage. This will provide symptomatic relief in over 90% of cases, often very rapidly. In a patient who has had no prior abdominal surgery, who is in significant pain and distress and who has a large volume of ascites, blind drainage is perfectly acceptable. Use a Bonanno catheter and drain into a urinary catheter bag. Let the fluid drain freely. Clamping of the tube is not necessary unless the patient becomes hypotensive, in which case clamp for an hour, then try again.
b. Ultrasound. If there is any uncertainty, ultrasound-guided drain insertion should be undertaken.
c. Cytology. If there is any doubt about the diagnosis, send at least 50ml fluid to cytology, as well as samples to biochemistry.
d. Fluid for research. Ascites fluid in ovarian cancer gives unique access to primary cancer cells. These will keep overnight at 4°C, so NEVER discard ascites fluid without discussing with Professor McNeish’s team.²
e. Treating the cancer is the most effective treatment to prevent recurrence.

**Chronic management**

a. Ascites frequently reaccumulates. Drainage tends to provide ever decreasing symptomatic benefit, but it still worth performing. As ascites can become loculated, ultrasound becomes more important in patients whose fluid has been drained more than twice before.
b. Diuretics. There are anecdotal reports that they can be useful, but experience here suggests that they simply induce intravascular volume depletion.
c. PleuRx. These are indwelling tunneled catheters that allow patients to drain fluid at home. They are put in under ultrasound guidance and can be extremely useful.
d. Shunts. Peritoneal-venous shunts are almost never used now.

² *London Cancer AOS ERG amendment:* This particular instruction obviously relates to Barts Health. Other institutions may have an individual (or individuals) in a similar role with whom a similar arrangement may apply.
17) **HYPERCALCAEMIA OF MALIGNANCY**

Treatment should be aimed at treating the underlying cancer if possible.

**PREFERRED APPROACH**

**Mild hypercalcaemia <3**

Patients with asymptomatic or mildly symptomatic (eg constipation) hypercalcaemia do not need immediate treatment. However, they should be advised to avoid thiazide diuretics and lithium, immobilization, cimetidine, NSAIDS, Vitamin D, volume depletion, and a high calcium intake or supplements. Advise to drink at least 2 litres per day.

**Moderate hypercalcaemia 3-3.5**

Calcium 3-3.5 may be well tolerated chronically. Initial therapy includes isotonic saline- in the absence of oedema, adjusted to maintain UO. This rarely normalises calcium in more than mild hypercalcaemia. Use bisphosphonates

(a) Zometa 4mg over at least 15 minutes if available OR
(b) Pamidronate 90mg (preferred dose over 90 minutes) – Takes 1-2 days to work.

Bisphosphonates may be re-administered after 48 hours, if calcium not normalised, but extreme caution re hypocalcaemia.

**Severe hypercalcaemia >3.5**

Calcium more than 3.5 requires treatment regardless of symptoms. Volume expansion as above- in absence of renal or heart failure, don’t use diuretics. Administration of calcitonin

Initial dose 4iu/kg sc or im every 12 hours for 2 days: usually effective within 2-4 hours.

Escalate after 1-2 days to 8iu/kg every 12 hours and finally to 8iu/kg every 6 hours if response to lower doses unsatisfactory. Tachyphylaxis common, effects only last few days.

THEREFORE GIVE WITH EITHER

IV Zometa 4mg iv
OR
IV Pamidronate 90mg in 250ml over 1 hour.

Bisphosphonates may be repeated 7 days later if necessary- usually though given every 4 weeks.

If calcitonin fails, IV mithramycin 25mcg/kg, repeat in 48 hours if no response; 12.5mcg if renal or hepatic dysfunction.
**Calcium 4.5-5**

Consider haemodialysis

Steroids are only used in hypercalcaemia of granulomatous conditions or lymphoma/myeloma: 40-100mg prednisolone.
For breast cancer, use 30mg pred.
Takes 1-2 weeks to have effect.

NOTE-
Dose of bisphosphonates depends on renal function.

Watch PO4 level and supplement as needed- oral poorly tolerated.
18) Spinal Cord Compression

**Why is Cord Compression an Emergency?**

If radiotherapy is started:
- When the patient is ambulant, 80-100% will maintain the ability to walk.
- After the patient is not mobile, but not paraplegic, 30% will regain the ability to walk.
- When the patient is paraplegic, 2 – 6% will regain the ability to walk.

**Alerting Symptoms**
- Pain situated in the middle or upper spine.
- Progressive lower spinal pain.
- Severe unremitting lower (lumbar) spinal pain.
- Spinal pain aggravating by straining.
- Localised spinal tenderness on examination.
- Nocturnal pain preventing sleep.
- Radicular pain.