Acute Oncology Guidelines (2014)
Version 2.0

Network Cancer Leads Group
(Incorporating Network Acute Oncology Group & Network Radiotherapy Group)

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1. Introduction

The National Chemotherapy Action Group (NCAG), guided partly by reports from National Confidential Enquiry in Patient Outcome and Death (NCEPOD) and National Patient Safety Agency (NPSA) and from previous cancer peer review results, has recommended that a more systematic approach should be taken to dealing with cancer-related emergencies. These recommendations have been embodied in the concept of the 'Acute Oncology Service'.

The following is a Merseyside and Cheshire Cancer Network generic guide to the pathways and protocols that should be established in all hospitals with acute oncology services. They should be read in conjunction, and reference to, specific local treatment policies where they exist along with the practitioners clinical judgement.

**Key Contact Numbers**

<table>
<thead>
<tr>
<th>Area</th>
<th>Phone Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CCC Triage - chemotherapy</strong></td>
<td></td>
</tr>
<tr>
<td>For complications within 6 weeks of receiving chemotherapy in adult cancer patients (&gt;16 years of age)</td>
<td>0151 334 1155 Bleep 5555</td>
</tr>
<tr>
<td><strong>CCC Triage - radiotherapy</strong></td>
<td></td>
</tr>
<tr>
<td>For complications within 6 weeks of receiving radiotherapy in adult cancer patients (&gt;16 years of age)</td>
<td>0151 334 1155 Bleep 4196</td>
</tr>
<tr>
<td><strong>St Helens &amp; Knowsley Triage</strong></td>
<td></td>
</tr>
<tr>
<td>(for St H&amp;K chemotherapy patients ONLY)</td>
<td></td>
</tr>
<tr>
<td>Monday to Friday 9am-5pm or Out-of-hours and bank holidays</td>
<td>01744 646170</td>
</tr>
<tr>
<td></td>
<td>0151 430 1560 (Whiston)</td>
</tr>
<tr>
<td><strong>Walton Cord Compression Co-ordinator</strong></td>
<td></td>
</tr>
<tr>
<td>All patients will confirmed/impending Metastatic Spinal Cord Compression (MSCC) on MRI (or where contraindicated)</td>
<td>0151 525 3611</td>
</tr>
<tr>
<td><strong>Local Trust Acute Oncology</strong></td>
<td></td>
</tr>
<tr>
<td>Direct all enquiries to oncology office</td>
<td></td>
</tr>
<tr>
<td>Monday to Friday 9am-5pm only</td>
<td></td>
</tr>
</tbody>
</table>
2. Complications of Chemotherapy/Radiotherapy

General Principles for the Management of Patients admitted with Chemotherapy/Radiotherapy Toxicities

These are principles only, refer to specific toxicity guidelines for guidance on each toxicity and manage each patient according to their condition, concomitant medication, other medical conditions and the practitioner's clinical judgement.

- Chemotherapy toxicities can make patients rapidly unwell but are reversible if managed rapidly and appropriately.

- Aggressive management (including HDU/ITU) is appropriate if unstable even in advanced cancer (discuss with the Acute Oncology Team, oncall oncology/haematology team)

- Neutropenia can occur any time after administration of chemotherapy but rarely within a few days or after many weeks (except in transplant patients)

- Review concomitant medications and consider stopping any which may affect their renal function/potential hypotension (for example ACE-inhibitors, diuretics). If the patient is unwell or hypotensive the risks may outweigh the benefits.

If patients are admitted ensure the following are performed:

- STOP ANY ONGOING ORAL ANTICANCER THERAPY

- Establish intra-venous access (or utilise indwelling lines if appropriately trained to do so). Hydrate if indicated and perform strict fluid balance with daily weights and bloods, particularly if low albumin.

- Perform MEWS observations as score indicates but twice a day as a minimum following trust MEWS escalation policy if indicated.

- Daily medical review and daily bloods (watch for neutropenic sepsis/dehydration).

- Consult Acute Oncology Team and patient’s oncologist if their condition is not improving.

- Escalate care (for example HDU/ITU) if patient becomes haemodynamically compromised/drowsy/shut down (discuss with specialist team if unsure of appropriateness).

- Avoid paracetamol/anti-pyretics if neutropenic as they may mask signs of sepsis.

- If the patient is on a trial, the trials team should be contacted regarding the admission.

- Inform local specialist team providing cancer treatment as adjustments to the subsequent cycle may be required.

- All patients admitted with chemotherapy toxicities will need to be reviewed by their oncologist prior to any further treatment as they may need dose delays or adjustment to the next cycle of chemotherapy. The acute oncology/haematology team should annotate the admission into the patient’s oncology/haematology notes and inform the patient’s oncologist/haematologist.
2.1 Nausea/Vomiting

AO Protocol Name: Nausea/Vomiting
AO Type: Type II (Chemo Complication),
Author: ACM and Dr Jo Cliffe (NCT AO)

Introduction:
There are a multitude of different causes of nausea and vomiting in patients with cancer. The
cancer itself can cause emesis, either directly, for instance through mechanical obstruction by a
tumour in the gastrointestinal tract or through effects of an intracranial malignancy, or indirectly,
for example through electrolyte disturbances, such as hypercalcaemia. The treatment of a
patient with cancer also contributes a number of possible causes of nausea and vomiting for
instance surgery, chemotherapy, radiotherapy and opiate based analgesia.
Therefore any assessment of a patient with nausea or vomiting requires assessment as to the
likely cause. If a specific cause such as mechanical obstruction or hypercalcaemia is identified
specific investigations and management may be required. This review will focus mainly on
nausea and vomiting for which the primary management is with antiemetic drugs.

Table 1: Common causes of nausea and vomiting in cancer patients

<table>
<thead>
<tr>
<th>Causes of nausea and vomiting</th>
<th>Malignancies most common with</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemotherapy</td>
<td>Stomach, oesophagus, duodenum, pancreas</td>
</tr>
<tr>
<td>Opiate analgesia</td>
<td></td>
</tr>
<tr>
<td>Radiotherapy</td>
<td>Colorectal, ovarian, peritoneal</td>
</tr>
<tr>
<td>Uraemia</td>
<td></td>
</tr>
<tr>
<td>Hepatic metastases</td>
<td>Breast</td>
</tr>
<tr>
<td>Primary or secondary brain tumours</td>
<td>Breast, lung, renal, bone metastases</td>
</tr>
<tr>
<td>Local effects of a tumour in the upper GI tract</td>
<td></td>
</tr>
<tr>
<td>Partial or complete bowel obstruction</td>
<td></td>
</tr>
<tr>
<td>Meningeal metastases</td>
<td></td>
</tr>
<tr>
<td>Hypercalcaemia</td>
<td></td>
</tr>
<tr>
<td>Hyponatraemia</td>
<td>Lung</td>
</tr>
</tbody>
</table>

Chemotherapy induced nausea and vomiting

Over the past two decades the management of chemotherapy induced nausea and vomiting
(CINV) has improved greatly with the development of newer anti-emetic agents, in particular,
the 5-HT3 serotonin receptor antagonists. Even with these improvements however nausea and
vomiting are both still ranked among the most distressing side effects.\(^1,2\)
Incidence and severity will depend on individual factors, with female gender, younger age, and
previous emesis with chemotherapy giving higher risk\textsuperscript{3,4}. Patients with a history of motion sickness are also more susceptible.\textsuperscript{5} Alcohol consumption is also predictive, with patients with relatively high tolerance of alcohol being less prone to CINV. Patients with a high pre-treatment expectation of severe nausea are more likely to experience nausea\textsuperscript{6}. These risk factors are well established however the most powerful determinant of risk of chemotherapy induced emesis is related to the intrinsic properties of the drug, along with the dose, route and schedule of administration. Current guidelines for antiemetic therapy are based primarily on the properties of the chemotherapy regimen rather than individual factors.

A 5 category classification ranking the emetogenic potential of chemotherapy drugs was proposed by Hesketh\textsuperscript{7} (table 2) which has since been modified and adopted and forms a key element of widely accepted guidelines for the use of antiemetics for preventing CINV\textsuperscript{8}, including the American Society of Clinical Oncology (ASCO)\textsuperscript{9}, Multinational Association of Supportive Care in Cancer (MASCC)/ European Society of Medical Oncology (ESMO)\textsuperscript{10} and National Comprehensive Cancer Network (NCCN) guidelines\textsuperscript{11} (table 3).

**Table 2: Emetic potential of chemotherapy\textsuperscript{11,12}**

<table>
<thead>
<tr>
<th>Emetic Risk</th>
<th>Agent</th>
</tr>
</thead>
<tbody>
<tr>
<td>High emetic risk</td>
<td></td>
</tr>
<tr>
<td>&gt;90% risk without prophylaxis</td>
<td>Carmustine</td>
</tr>
<tr>
<td></td>
<td>Cisplatin</td>
</tr>
<tr>
<td></td>
<td>Cyclophosphamide (&gt;1.5g/m\textsuperscript{2})</td>
</tr>
<tr>
<td></td>
<td>Dacarbazine</td>
</tr>
<tr>
<td></td>
<td>Procarbazine</td>
</tr>
<tr>
<td></td>
<td>Streptozocin</td>
</tr>
<tr>
<td>Moderate emetic risk</td>
<td>Bendamustine</td>
</tr>
<tr>
<td>30%-90% risk without prophylaxis</td>
<td>Busulfan</td>
</tr>
<tr>
<td></td>
<td>Carboplatin</td>
</tr>
<tr>
<td></td>
<td>Oral Cyclophosphamide</td>
</tr>
<tr>
<td></td>
<td>Cytarabine</td>
</tr>
<tr>
<td></td>
<td>Daunorubicin</td>
</tr>
<tr>
<td></td>
<td>Doxorubicin/ epirubicin</td>
</tr>
<tr>
<td>Low emetic risk</td>
<td>Capecitabine</td>
</tr>
<tr>
<td>10%-30% risk without prophylaxis</td>
<td>Cytarabine (low dose)</td>
</tr>
<tr>
<td></td>
<td>Docetaxel</td>
</tr>
<tr>
<td></td>
<td>Etoposide (IV)</td>
</tr>
<tr>
<td></td>
<td>Fludarabine (oral)</td>
</tr>
<tr>
<td></td>
<td>5-Fluorouracil</td>
</tr>
<tr>
<td></td>
<td>Gemcitabine</td>
</tr>
<tr>
<td></td>
<td>Ixabepilone</td>
</tr>
<tr>
<td>Minimal emetic risk</td>
<td>Asparaginase</td>
</tr>
<tr>
<td>&lt;10% risk without prophylaxis</td>
<td>Bleomycin</td>
</tr>
<tr>
<td></td>
<td>Busulfan</td>
</tr>
<tr>
<td></td>
<td>Chlorambucil (oral)</td>
</tr>
<tr>
<td></td>
<td>Fludarabine</td>
</tr>
<tr>
<td></td>
<td>Hydroxyurea</td>
</tr>
<tr>
<td></td>
<td>Lenalidamide</td>
</tr>
<tr>
<td></td>
<td>Melphalan (oral low dose)</td>
</tr>
<tr>
<td></td>
<td>Methotrexate (&lt;50mg/m\textsuperscript{2})</td>
</tr>
<tr>
<td></td>
<td>Thalidamide</td>
</tr>
<tr>
<td></td>
<td>Vinblastine</td>
</tr>
<tr>
<td></td>
<td>Vincristine</td>
</tr>
<tr>
<td></td>
<td>Vinorelbine</td>
</tr>
</tbody>
</table>
Table 3: MASCC anti-emetic regimen recommendations

<table>
<thead>
<tr>
<th>Regimen Level</th>
<th>Pre-chemotherapy:</th>
<th>Post-chemotherapy:</th>
</tr>
</thead>
<tbody>
<tr>
<td>High risk regimens</td>
<td>5HT3 serotonin receptor antagonist</td>
<td>Dexamethasone</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aprepitant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dexamethasone on days 2 and 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aprepitant on days 2 and 3</td>
</tr>
<tr>
<td>Moderate risk regimens</td>
<td>Pre-chemotherapy: 5HT3 serotonin receptor antagonist</td>
<td>Dexamethasone</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aprepitant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aprepitant on days 2 and 3</td>
</tr>
<tr>
<td></td>
<td>Pre-chemotherapy: Dexamethasone</td>
<td>Aprepitant on days 2 and 3</td>
</tr>
<tr>
<td></td>
<td>Post-chemotherapy: Dexamethasone OR a 5HT3 receptor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>antagonist days 2 and 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low risk regimens</td>
<td>Pre-chemotherapy: Dexamethasone OR a 5HT3 serotonin</td>
<td></td>
</tr>
<tr>
<td></td>
<td>receptor antagonist</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No routine prophylaxis recommended on days 2 and 3</td>
<td></td>
</tr>
<tr>
<td>Minimal risk</td>
<td>No routine pre- or post-chemotherapy antiemetics</td>
<td></td>
</tr>
</tbody>
</table>

CINV is thought to occur through a number of mechanisms and involves the action of neurotransmitters both centrally and peripherally. An important mechanism appears to be initiated peripherally by the release of neurotransmitters such as 5-hydroxytryptamine (5-HT), substance P and cholecystokinin from the enteroendocrine cells of the upper gastrointestinal tract in response to either mucosal irritation caused by cytotoxic drugs or via indirect effects. These neurotransmitters then interact with their respective receptors on vagal afferent terminals situated in the wall of the gastrointestinal tract. These vagal afferents terminate in the brainstem where the emetic reflex is then further propagated through interaction of key areas of the brainstem, comprising what was previously termed the ‘vomiting centre’, although more recently is understood to be anatomically distinct neural networks. Another important mechanism of CINV is believed to be a rather more direct action on the centrally located ‘chemoreceptor trigger zone’ (CTZ) situated in the area postrema at the caudal end of the fourth ventricle. This area lacks a specific blood brain barrier and therefore is a potential target to detect emetogenic toxins in the blood. This area can be reached by chemotherapeutics in the CSF or blood and activation is thought to occur via stimulation of a number of chemical mediators, including dopamine, serotonin, histamine and substance P amongst others.

Other proposed additional mechanisms are believed to exist through effects of chemotherapy on taste, on the vestibular system and via higher brain centres in the limbic forebrain. These mechanisms at present are relatively poorly understood.

It does seem however, that different mechanisms may predominate at different times. Serotonin mediated processes seem to act predominantly in the first 8-12 hours post administration of chemotherapy, whereas substance P mediated mechanisms seem to be more...
Emesis post chemotherapy can be categorised into acute, occurring within the first 24 hours; delayed occurring after 24 hours and usually peaking around 48-72 hours after chemotherapy and anticipatory. As the incidence and severity of post chemotherapy nausea and vomiting has reduced so has the occurrence of anticipatory nausea and vomiting.

Prevention is the main aim of anti-emetic therapy in the setting of chemotherapy. There are three main groups of drugs used in this setting.

**5HT$_3$ serotonin receptor antagonists**

The 5HT$_3$ receptor antagonists act by binding to the 5HT$_3$ receptors thus blocking the effect of serotonin. This effect is thought to be most marked on peripheral as opposed to central receptors.

There are a number of first generation 5HT$_3$ serotonin receptor antagonists available including ondansetron, granisetron, and dolesetron. When used in appropriate doses these three drugs appear to be equivalent$^{17,18}$. They also share similar side effect profiles, with constipation, mild headache and transient rises in liver transaminases being some of the more common effects seen.

Palonesetron is a second generation 5-HT$_3$ serotonin receptor antagonist. It is more potent and had a longer half life. In trials of this newer 5-HT$_3$ serotonin receptor antagonist it has been shown to be at least equivalent to the first generation agents in preventing acute emesis and appears to be superior in preventing delayed emesis$^{19,20}$.

**Corticosteroids**

Corticosteroids have a high therapeutic index in prevention of CINV and are a well established component of preventative anti-emetic regimens based on extensive published evidence. The addition of dexamethasone to a 5HT$_3$ receptor antagonist prophylaxis reduces the risk both of acute and delayed vomiting by 25-30%$^{21}$.

**NK$_1$ receptor antagonists**

NK$_1$ receptor antagonists, of which aprepitant was the first to gain regulatory approval, work by selectively blocking the binding of substance P at the NK-1 receptor centrally. The addition of aprepitant to a standard combined antiemetic regimen of 5HT$_3$ and dexamethasone given to patients receiving cisplatin, one of the most highly emetogenic drugs, showed a significant reduction in nausea and vomiting$^{22}$. These results with cisplatin have been reproduced$^{23}$ and the benefit also appears to be significant when used in moderately emetogenic regimens$^{24}$. A meta-analysis of NK-1 receptor antagonists show that they do not seem to improve acute emesis but do significantly reduce delayed nausea and vomiting$^{25}$.

For highly emetogenic chemotherapy a combination of aprepitant, dexamethasone and ondansetron is recommended. Antiemetics should start prior to the administration of chemotherapy and then cover the high risk period for delayed emesis over the following three days. Combination chemotherapy regimens are classified according to the drug with the greatest emetic potential.

Preventative antiemetic regimens are given with the aim of avoiding post-chemotherapy emesis, however when breakthrough emesis occurs it can be a challenging problem to reverse. No single drug has been identified as being better than others but this is largely due to very few adequate trials being performed in this setting$^{26}$. If it occurs, breakthrough antiemetics should be tried in a regular regimen rather than in an as required manner. No benefit was seen in
continuing on with protracted courses of 5HT³ over using regular metoclopramide. Agents such as metoclopramide, domperidone, prochlorperazine or haloperidol may be tried in this situation. Current guidelines also recommend considering addition of a proton pump inhibitor if there is a suggestion that dyspepsia is contributing to nausea¹¹. Where anticipatory nausea is a problem, this may be managed with lorazepam 0.5mg- 2mg the night before and morning of chemotherapy. Anticipatory nausea can be reduced by better management of acute and delayed nausea and vomiting. Where vomiting is persistent, assessment has to be made of hydration and admission may be required for intravenous hydration and, on occasions, parenteral anti-emetics, for instance via a syringe driver.

Where vomiting is persistent, assessment has to be made of hydration and admission may be required for intravenous hydration and, on occasions, parenteral anti-emetics, for instance via a syringe driver.

There is increasing use of biological agents, many of which such as trastuzumab, rituximab and sunitinib fall into the minimal to low risk category. However imatinib is classified in the moderate category. Antiemetics in these settings tend to be reserved for if patients have problems with nausea and vomiting.

Radiation induced nausea and vomiting

The risk of nausea and vomiting associated with radiotherapy depends upon which area of the body is being treated as well as the single and total dose, fractionation and irradiated volume. Again patient related factors play a part with younger, female patients again being higher risk features along with level of anxiety and recent experience with chemotherapy ²⁷. It is thought that the incidence of radiotherapy induced nausea and vomiting is underestimated by treating health care professionals. Observational studies have shown that around a 30-40% of patients are affected, however only about 15% of patients are routinely prescribed antiemetics ²⁷, ²⁸. ASCO guidelines outline consensus risk groups as shown in Table 4. Recommendations for preventative anti-emetic therapy are then based on this risk stratification. There is relatively little evidence to support the current guidelines or the defined risk groups. Most evidence that does exist is for the use of 5HT³ antagonists in the setting of higher risk radiotherapy (total body irradiation or radiotherapy to the upper abdomen)²⁷.
## Table 4: ASCO Guidelines for prevention of radiation induced emesis

<table>
<thead>
<tr>
<th>Risk group</th>
<th>Site of radiotherapy</th>
<th>Anti-emetic recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Risk</td>
<td>Total body irradiation</td>
<td>5-HT3 serotonin receptor antagonist with or without dexamethasone before each fraction and for at least 24 hours after completion</td>
</tr>
<tr>
<td>Moderate Risk</td>
<td>Abdomen</td>
<td>5-HT3 serotonin receptor antagonist before each fraction</td>
</tr>
<tr>
<td></td>
<td>Pelvis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mantle radiotherapy</td>
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</tr>
<tr>
<td></td>
<td>Craniospinal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cranial Radiosurgery</td>
<td></td>
</tr>
<tr>
<td>Low Risk</td>
<td>Lower thorax</td>
<td>5-HT3 serotonin receptor antagonist before each fraction</td>
</tr>
<tr>
<td></td>
<td>Cranial</td>
<td></td>
</tr>
<tr>
<td>Minimal Risk</td>
<td>Breast</td>
<td>Either 5HT3 serotonin receptor antagonist or dopamine antagonists to be used on an as required basis</td>
</tr>
<tr>
<td></td>
<td>Head and neck</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Extremities</td>
<td></td>
</tr>
</tbody>
</table>

### Antiemetics in a palliative care setting

As mentioned above, it is important to try and identify the cause of the nausea or vomiting and if possible eliminate it, for instance oropharyngeal thrush may cause nausea and be successfully treated with an anti-fungal agent, constipation may be the root cause and in fact aperients the correct solution. In many cases the reason for nausea or vomiting will not be correctable and antiemetic drugs will be the appropriate management, but again the choice of drug should be guided by the likely aetiology. Haloperidol is a potent centrally acting dopamine (D2) antagonist and can be helpful where there is a biochemical or drug-induced (for example opioid-induced) cause for the nausea. Metoclopramide is also a D2 antagonist both peripherally and centrally and also has weak effects on 5HT3. It can also act to stimulate GI motility by increasing acetylcholine release from cholinergic nerves of the GI tract. Some patients with advanced cancer can develop gastric stasis and these patients may benefit from an agent with prokinetic effects such as metoclopramide or domperidone. This effect can also be useful in some patients with inoperable partial gastrointestinal obstruction due to an intestinal or peritoneal malignancy, however prokinetic agents must be avoided if there is complete obstruction. In patients with complete obstruction there is evidence that dexamethasone and octreotide may have benefit and broad acting anti-emetics such as cyclizine or levomepromazine may be also be useful. Many patients will not have a clear single cause for their nausea and in these patients a broad acting anti emetic such as cyclizine, metoclopramide or levomepromazine may be tried. It may be necessary to try a number of antiemetic drugs either sequentially or in combination to get optimum relief for the individual.
Conclusion
Nausea and vomiting are common symptoms of patients with malignancy. It can be caused directly by the primary tumour, distant metastases or by the treatment of the cancer. Elements that lead to the successful control of emesis include using preventative antiemetic regimens, treating the most likely cause and reducing any contributing factors like anxiety. Regular review of patient’s symptoms will ensure that they are on the most effective regimen. At times it will be necessary to admit patients if nausea and vomiting has led to a significant reduction in oral intake and there is a high risk of dehydration or if there is evidence of mechanical obstruction. Current areas of interest are improving current prophylaxis for chemotherapy induced emesis as newer drugs become available and also in using other classes of drug, for example, the antipsychotic, olanzapine, for their anti-nausea properties.

Patient Referral systems (define alerts, referral pathway etc):
- Out of hours advice from CCC triage service (0151 334 1155 bleep 5555)
- Refer to acute oncology service for early input

Education:
Develop rolling programme of education for medical and nursing staff regarding management of nausea and vomiting in the cancer patient.

Time to response:
Acute Oncology review within 24 working hours (medical and/or nursing)

Initial evaluation:
- History, physical examination to identify cause
- FBC, U&Es, Calcium
- If not tolerating oral intake or biochemical dehydration for parenteral hydration and parenteral anti-emetics
- Previous Oncology Correspondence/contact detail

Ongoing management:
Acute oncology team to liaise with patient’s oncologist to ensure anti-emetic regime is reviewed prior to further chemotherapy.

References
1. Sun CC, Bodurka DC, Weaver CB et al. Rankings and symptom assessments of side effects from chemotherapy: insights from experienced patients with ovarian cancer. Supportive Care in Cancer, 2003; 13: 219-227


MCCN Acute Oncology Guidelines 2014
18. Jordan K, Hinke A. A meta-analysis comparing the efficacy of four 5-HT3- receptor antagonists for acute chemotherapy- induced emesis. Supportive Care in Cancer; 2007; 1115: 1023-1033


27. Aapro MS. How do we manage patients with refractory or breakthrough emesis? Support Cancer Car, 2002; 10: 106-109


Management of Nausea and Vomiting

Caused by Radiotherapy/Systemic Anti-Cancer Treatments

Risk factors: Radiotherapy, Chemotherapy (cycle number and day)

Examination: Clinical history, examination, MEWS observations and calculate score, ensure any anti-emetics have been taken regularly in adequate doses

Investigations for all patients: FBC, U&Es, calcium

If clinically indicated: Serum magnesium

Dietary advice: Eat small frequent meals, avoid: rich, spicy, greasy foods, alcohol. Sit up to eat meals and away from smells, drink between meals rather than with meals

Grade 1
Able to eat and drink reasonable oral intake, 1 episode of vomiting in 24 hours

Evidence of dehydration?

NO

YES

Review anti-emetics ensuring the patient is taking them as prescribed - refer to Classification of Chemotherapy by Emetic Potential, page 7, or Radiotherapy Treatment Algorithms, page 9, if needed

Grade 2
Can eat/drink but intake significant decreased, 2-5 episodes of vomiting in 24 hours

Take bloods. Review anti-emetics ensuring the patient is taking them as prescribed - refer to Classification of Chemotherapy by Emetic Potential, page 7, or Radiotherapy Treatment Algorithms, page 9, if needed

Do bloods indicate dehydration?

NO

YES

Consider administering alternatives (listed below) orally or if indicated, sub-cutaneously

Reassess patient in 24 hours time

Grade 3
No significant intake, 6-10 episodes of vomiting in 24 hours

Arrange urgent assessment, take bloods and full review. Consider admission. Review anti-emetics ensuring the patient is taking them as prescribed - refer to Classification of Chemotherapy by Emetic Potential, page 7, or Radiotherapy Treatment Algorithms, page 9, if needed

Consider administering alternatives (listed below) orally or if indicated, sub-cutaneously

If patient is not admitted, reassess patient in 24 hours time

Grade 4
No significant intake, >10 episodes of vomiting in 24 hours

Evidence of dehydration?

NO

YES

Administer alternatives (listed below) orally or if indicated, sub-cutaneously

Alternatives

- Cyclizine 50mg 3 times a day is often useful for protracted nausea
- Prochlorperazine 5-10mg oral 3 times a day
- Prochlorperazine suppositories 25mg 3 times a day
- Metoclopramide 10-20mg 4 times a day
- Levomepromazine 6mg at night (this can be increased to 12mg)
Management of Nausea & Vomiting
Caused by Systemic Anti-Cancer Treatment

### Classification of Chemotherapy by Emetic Potential

<table>
<thead>
<tr>
<th>MINIMAL (&lt;10% frequency of emesis)</th>
<th>LOW (10-30% frequency of emesis)</th>
<th>MODERATE (30-90% frequency of emesis)</th>
<th>HIGH (&gt;90% frequency of emesis)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alectuzumab</td>
<td>Cabazetaxel</td>
<td>Bendamustine</td>
<td>Cisplatin ≥50mg/m²</td>
</tr>
<tr>
<td>Alpha Interferon</td>
<td>Capecitabine</td>
<td>Carboplatin</td>
<td>Cyclophosphamide &gt; 1500mg/m²</td>
</tr>
<tr>
<td>Bevacizumab</td>
<td>Ulocetaxel</td>
<td>Cisplatin &lt;50mg/m²</td>
<td>Dacarbazine</td>
</tr>
<tr>
<td>Bleomycin</td>
<td>Doxorubicin (Liposomal)</td>
<td>Cyclophosphamide ≤1500mg/m²</td>
<td>Procarbazine (oral)</td>
</tr>
<tr>
<td>Cetuximab</td>
<td>Etoposide (IV)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chlorambucil (oral)</td>
<td>Eribulin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Etoposide (oral)</td>
<td>Etoposide (IV)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fludarabine</td>
<td>Evorolimus</td>
<td>Dactinomycin</td>
<td></td>
</tr>
<tr>
<td>Gefitinib</td>
<td>Fludarabine (oral)</td>
<td>Doxorubicin &lt;60mg/m²</td>
<td></td>
</tr>
<tr>
<td>Imatinib (oral)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interferon alpha &lt;5million units/m²</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ipilimumab</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lapatinib</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methotrexate &gt;50mg/m² &lt;250mg/m²</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methotrexate ≤50mg/m²</td>
<td>Mitomycin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pazopanib</td>
<td>Mitoxantrone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panitumumab</td>
<td>Nitotinib</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pemetrexed</td>
<td>Paclitaxel-albumin (Abraxane)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sorafenib</td>
<td>Paclitaxel-albumin (Abraxane)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temsirolimus</td>
<td>Paclitaxel-albumin (Abraxane)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trastuzumab</td>
<td>Paclitaxel-albumin (Abraxane)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vinblastine</td>
<td>Sunitinib</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vincristine</td>
<td>Topotecan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vinorelbine (IV)</td>
<td>Vandetanib</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refer to Standard Pre-Chemotherapy Anti-Emetic Regime, page 8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Standard Pre-chemotherapy Anti-emetic Regimens**
(Patient should have commenced these at time of chemotherapy administration)

**MINIMAL**
- **First Line**
  - Domperidone 10-20mg orally 4 times a day when necessary

**LOW**
- **First Line**
  - Dexamethasone 8mg orally/IV day 1
  - Domperidone 10-20mg 4 times a day when necessary

**MODERATE**
- **First Line**
  - Dexamethasone 8mg orally/IV day 1 then 4mg twice a day days 2-4
  - Ondansetron 16mg orally or 8mg IV day 1
  - Domperidone 10-20mg orally 4 times a day when necessary

  **Second Line**
  - Aprepitant 125mg orally day 1 and 80mg orally days 2 and 3
  - Dexamethasone 12mg orally/IV days 1-4
  - Ondansetron 16-24mg orally or 8-12mg IV day 1
  - Domperidone 10-20mg orally 4 times a day when necessary

**HIGH – not containing Cisplatin**
- **First Line**
  - Dexamethasone 12mg orally/IV day 1, then 4mg twice a day days 2-4
  - Ondansetron 24mg orally or 12mg IV day 1, then 8mg twice a day orally days 2-4
  - Domperidone 10-20mg orally 4 times a day when necessary

  **Second Line**
  - Aprepitant 125mg orally day 1 and 80mg orally days 2 and 3
  - Dexamethasone 12mg orally/IV day 1 then 4mg twice a day orally days 2-4
  - Ondansetron 24mg orally or 12mg IV day 1
  - Domperidone 10-20mg orally 4 times a day when necessary

**HIGH – containing Cisplatin**
- **First Line**
  - Aprepitant 125mg orally day 1 and 80mg orally days 2 and 3
  - Dexamethasone 12mg orally/IV day 1, then 4mg twice a day orally days 2-4
  - Ondansetron 24mg orally or 12mg IV day 1 of chemotherapy
  - Domperidone 10-20mg orally 4 times a day when necessary

  **Second Line**
  - Ondansetron 8mg, Dexamethasone 8mg and Lorazepam 1mg (DAZ driver) IV infusion 24 hourly
  - Domperidone 10-20mg orally 4 times a day when necessary
Management of

**Nausea and Vomiting**

Caused by Radiotherapy Treatment

**Nausea and Vomiting (Radiotherapy) Treatment Algorithm**

**First line**
Domperidone 10-20mg orally 4 times a day when necessary

**Second line**
Consider **ADDING** Ondansetron 8mg 30 minutes orally before radiotherapy treatment as a preventative measure
2.2 Neutropenic Sepsis

AO Protocol Name: Neutropenic Sepsis
AO Type: Type II (Chemo Complication),
Author: EM (StH&K AO)

Introduction:
Neutropenic sepsis is a potentially fatal complication of chemotherapy. Successful management involves immediate assessment and commencement of antibiotics within 60 minutes. A & E and medical assessment units should have defined pathways that ensure that patients receiving chemotherapy who present with symptoms and signs suggestive of sepsis are managed with the 60 minute target in mind.

Patient Referral systems (define alerts, referral pathway etc):
• Develop neutropenic /chemotherapy alert/pathway with A & E/Medical assessment unit
• Refer to acute oncology service for early input.

Education:
Develop rolling programme of education aimed at A & E/Medical assessment unit and junior doctors.

Time to response:
Acute Oncology review within 24 working hours (medical and/or nursing)

Initial evaluation:
• History (including significant microbiology, for example, Clostridium difficile, MRSA or other resistant organism) and physical examination to identify potential source
• Maintain a high index of suspicion
• FBC, U&Es, and further investigations as appropriate depending on symptoms
• Do not routinely offer G-CSF for the prevention or management of uncomplicated neutropenic sepsis unless they are receiving G-CSF as an integral part of the chemotherapy regimen or in order to maintain dose intensity.
• Offer beta lactam monotherapy with piperacillin with tazobactam as initial empiric antibiotic therapy unless there are patient specific or local microbiological contraindications.
• Previous Oncology Correspondence/contact detail
• All patients with confirmed neutropenic sepsis should have a risk assessment carried out to determine the risk of complications (MASCC index in adult patients). This should be performed as soon as possible and within 24 hours of presentation by a health care professional with competence in managing complications of anticancer treatment.

Ongoing management:
• Consider initial or step down oral antibiotics in patients with confirmed low risk neutropenic sepsis. Early discharge should take into account the patient’s social and clinical circumstances.
• Daily Acute Oncology review to facilitate step down policies, timely discharge and clinical review by patient’s usual oncologist.
Management of

Neutropenic Sepsis

Caused by Systemic Anti-Cancer Treatments

Any patient presenting with suspected NS should receive immediate empirical antibiotics WITHIN 1 HR of presentation. DO NOT wait for results of Fbc

Signs and symptoms: Defined as Neutrophils $\leq 0.5 \times 10^9/l$ AND pyrexia (over 38.0°C), however, symptoms may be non specific such as diarrhoea, vomiting and confusion despite the absence of fever.

Risk factors: Chemotherapy within 4 weeks (most commonly day 7-14 post treatment), previous episode of febrile neutropenia.

Examination: MEWS observations and calculate score, clinical history and examination including establishing if there clear clinical focus of infection for example cellulitis, abscess, central line, pneumonia. Do they have any allergies and if allergic to any antibiotics is it definite, probable or possible allergy? Have they been on any antibiotics in last 7 days? Does the patient have a significant microbiology history, for example, MRSA, Clostridium difficile. Cycle day and chemotherapy regime to allow consideration of risk

Investigations all patients: FBC and differential, U&Es, LFT’s, peripheral venous blood for aerobic and anaerobic cultures and via a CVAD if present, MASCC Prognostic Index ‘score’

For all patients with confirmed or suspected neutropenic sepsis COMMENCE immediate broad spectrum antibiotics and inform Haematology or AO team

MASCC Prognostic Index Score

<table>
<thead>
<tr>
<th>Risk</th>
<th>Score</th>
<th>Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of the patient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥60yrs</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>&lt;60yrs</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Is the patient dehydrated, requiring IV fluids?</td>
<td>No</td>
<td>3</td>
</tr>
<tr>
<td>Yes</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Is the patient hypotensive?</td>
<td>&lt;90</td>
<td>0</td>
</tr>
<tr>
<td>(systolic BP)</td>
<td>≥ 90</td>
<td>5</td>
</tr>
<tr>
<td>Does the patient have COPD?</td>
<td>Yes</td>
<td>0</td>
</tr>
<tr>
<td>No</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Does the patient have symptoms related to this febrile neutropenic episode?</td>
<td>No symptoms= 5</td>
<td>Mild = 5</td>
</tr>
<tr>
<td>Moderate = 3</td>
<td>Severe</td>
<td>= 0</td>
</tr>
<tr>
<td>Was patient already an in-patient before this episode of febrile neutropenia?</td>
<td>In-patient = 0</td>
<td>Admitted with this episode = 3</td>
</tr>
</tbody>
</table>

Total Score

If patients are unwell or any doubt exists manage as HIGH risk in the first instance

Less than 17 – HIGH RISK

17 or more – LOW RISK

Refer to local trust guidelines for antibiotics to commence

MCCN Acute Oncology Guidelines 2014
2.3 Diarrhoea

AO Protocol Name: Diarrhoea
AO Type: Type II (Chemo complication)
Author: EA

Introduction:
Diarrhoea is a common side effect of many chemotherapeutic agents and targeted therapies as well as pelvic radiotherapy.

Common chemotherapy agents associated with diarrhoea are 5-fluorouracil / Capecitabine and Irinotecan and targeted therapies such as, erlotinib, gefitinib, sorafenib, lapatinib and cetuximab.

Patient referral systems (define alerts, referral pathways etc):
• Refer to Acute Oncology service for advice
• Out of hours advice from CCC on call team or CCC triage service

Education:
Education and training of A & E and AMAU staff in management of chemotherapy induced diarrhoea.

Time to response:
Acute Oncology review within 24 hours

Initial Evaluation and Management (see appendix 1):
• Detailed medical history including (significant microbiology, for example Clostridium difficile or recent antibiotics to treat infection), dietary history and drug review, physical examination to assess for signs of dehydration, abdominal and rectal examination.
• Biochemistry for evidence of dehydration, electrolyte abnormalities and renal dysfunction and Stool culture.
• Full blood count to identify elevated WCC or neutropenia. If neutropenic treat as per neutropenic sepsis protocol.
• Stop the chemotherapeutic agent or the targeted agent
• Fluid replacement
• If neutropenic treat as per neutropenic sepsis protocol
• Loperamide (if no malena, fever, dehydration or recent history of clostridium difficile)

Ongoing Management:
Acute oncology team to communicate with treating oncologist for dose modification with the next cycle of treatment.
Managemet of Diarrhoea

Caused by Capecitabine Chemotherapy

**Signs and symptoms:** Increased amounts of loose stools, abdominal cramping

**Examination:** Clinical history including if the patient has a significant microbiology history, for example Clostridium difficile or recent antibiotic use. Onset, duration, frequency, odour, colour, consistency of stool. Examination, including: abdominal and rectal examination, fever, fever, neutropenia, abdominal pain/cramps, dizziness, lethargy, do they have an ileostomy or colostomy? Medication profile including use of laxatives, loperamide and/or analgesia. MEWS observations and calculate score.

**Investigations for all patients:** U&Es, FBC, CRP, Stool cultures, consider abdominal x-ray

**If clinically indicated:** Stool sample for clostridium difficile, serum for magnesium

**Dietary advice:** Avoid: high fibre, high fat foods, spices, caffeine, alcohol, fruit juices, Lactose containing products. Drink 9-10 glasses of clear fluids daily, eat small frequent meals

**Grade 1**
2-3 stools per day over normal pattern

For early review in known to have had Clostridium difficile recently

Loperamide 4mg then 2mg after each stool, max 16mg in 24 hours. Increase oral intake, follow dietary advice. **CONTINUE Capecitabine**

Review in 24 hours

Diarrhoea resolved?

Continue dietary advice, stop Loperamide after 12 hours of diarrhoea free interval

If Capecitabine stopped, consult oncology team and consider re-starting Capecitabine

Diarrhoea unresolved?

**Grade 2**
4-6 stools per day or nocturnal stools, moderate cramping

STOP Capecitabine and consider admission

If bloods indicate dehydration consider IV fluids and strict fluid balance chart. Commence barrier nursing, Bristol Stool Chart, consider abdominal x-ray, referral to dietician

Are there clinical signs of **Clostridium Difficile**? (watery diarrhoea (5, 6 or 7 on Bristol Stool Chart, maybe green with characteristic smell), nausea, fever, abdominal pain, loss of appetite, no plausible non-infective cause (for example not had laxatives, chemotherapy, radiotherapy)

**Grade 3**
7-9 stools per day or incontinence or severe cramping

No

Start Loperamide 4mg and 2mg after each stool max 16mg in 24 hours or Codeine Phosphate 60mg 4 times a day. Consider nutritional support

Consult oncology

Follow hospital Clostridium Difficile policy

Acute Oncology Team review in 24 hours

Diarrhoea resolved

Diarrhoea unresolved

If diarrhoea unresolved add Octreotide 100-150mcg 3 times a day, for ≥5 days, increased by 50mcg up to 200mcg 3 times a day if needed

Diarrhoea resolved

Diarrhoea unresolved

Grade 3-4 or persistent grade 1-2

For review and consider admission

**Grade 4**
>10 stools per day or bloody stool, diarrhoea or need for parental support

STOP Capecitabine

If diarrhoea unresolved add Octreotide 100-150mcg 3 times a day, for ≥5 days, increased by 50mcg up to 200mcg 3 times a day if needed

Follow hospital Clostridium Difficile policy

Consult oncology

If Capecitabine stopped, consult oncology team and consider re-starting Capecitabine

Review in 24 hours
**Non-Capecitabine related Diarrhoea**

**Caused by Radiotherapy/Systemic Anti-Cancer Treatments**

**Signs and symptoms:** Increased amounts of loose stools, abdominal cramping

**Examination:** Clinical history including if the patient has a significant microbiology history, for example Clostridium difficile or recent antibiotic use. Onset, duration, frequency, odour, colour, consistency of stool. Examination, including: abdominal and rectal examination fever, fever, neutropenia, abdominal pain/cramps, dizziness, lethargy, do they have an ileostomy or colostomy? Medication profile including use of laxatives, loperamide and/or analgesia. MEWS observations and calculate score.

**Investigations for all patients:** U&Es, FBC, CRP, Stool cultures, consider abdominal x-ray

**Dietary advice:** Avoid: high fibre, high fat foods, spices, caffeine, alcohol, fruit juices, lactose containing products. Drink 9-10 glasses of clear fluids daily, eat small frequent meals.

**Grade 1**

- 2-3 stools per day over normal pattern

**Grade 2**

- 4-6 stools per day or nocturnal stools, moderate cramping

**Grade 3**

- 7-9 stools per day or incontinence or severe cramping

**Grade 4**

- >10 stools per day or bloody stool, diarrhoea or need for parental

---

**For early review in known to have had Clostridium difficile recently**

- Loperamide 4mg then 2mg after each stool, max 16mg in 24 hours
- Increase oral intake, follow dietary advice

**Diarrhoea resolved?**

- Continue dietary advice, add in solid foods, stop Loperamide after 12 hours of diarrhea free interval

**Diarrhoea unresolved?**

- Persistent (grade 1-2)
  - Add Codeine Phosphate 60mg 4 times a day

**Review in 24 hours**

**Grade 3-4 or persistent grade 1-2**

- Start Loperamide 4mg and 2mg after each stool max 16mg in 24 hours or Codeine Phosphate 60mg 4 times a day. Consider nutritional support

**Consult oncology**

**Acute Oncology Team review in 24 hours**

- If diarrhoea unresolved add Octreotide 100-150mcg 3 times a day, for ≥5 days, increased by 50mcg up to 200mcg 3 times a day if needed

---

**If clinically indicated:** Stool sample for clostridium difficile, serum for magnesium

---

**Follow hospital Clostridium Difficile policy**

---

**Are there clinical signs of Clostridium Difficile?**

- (watery diarrhoea (5, 6 or 7 on Bristol Stool Chart, maybe green with characteristic smell), nausea, fever, abdominal pain, loss of appetite, no plausible non-infective cause (for example not had laxatives, chemotherapy, radiotherapy)

---

**Review in 24 hours**

**Diarrhoea resolved?**

- Diarrhoea unresolved?

---

**NO**

**YES**
2.4 Cardiac

AO Protocol Name: Cardiac toxicity
AO Type: Type II
Author: EA

Introduction:
Chemotherapeutic agents can cause both short and long term cardiovascular complications. The common drugs associated with cardiovascular toxicity are listed in Table 1. The cardiovascular toxicities may present as arrhythmias, acute coronary syndromes, pericarditis / myocarditis, hypertension, arterial or venous thromboembolism and congestive cardiac failure. The toxicity can be acute (seen any time from the start of therapy up to 2 weeks) which can manifest as arrhythmias (e.g. Paclitaxel) and acute coronary syndromes (e.g. 5 FU/capecitabine) or chronic (seen within a year or more after the completion of therapy, typically seen with anthracyclines and trastuzumab) that can present as asymptomatic left ventricular dysfunction and cardiac failure.

Radiotherapy involving cardiac structures can also cause cardiac complications that can manifest as pericardial disease, restrictive cardiomyopathy, accelerated coronary artery disease, and valvular heart disease.

Patient referral systems (define alerts, referral pathways etc)
- Refer urgently to cardiology
- Acute Oncology service for advice

Education:
Education and training of A&E and AMAU staff in recognition and management of cardiac toxicities of anticancer therapy.

Time to response:
- Cardiology review on admission
- Acute Oncology review within 24 hours

Initial Evaluation:
- History and examination including cardiac evaluation
- ECG, Echocardiogram and Bloods including Troponin if appropriate.
- Stop the offending drug
- Patients with acute coronary syndromes and arrhythmias treated according to the established local guidelines in consultation with cardiology team
- Assess for heart failure

Ongoing Management:
Acute oncology team to communicate with treating oncologist regarding cardiac event and for an early review to discuss further treatment.
Future options may include the use of an alternative drug (eg Raltitrexed), bolus 5FU regimen and/or cardiac prophylaxis (calcium antagonist, aspirin and/or nitrates). Management should be coordinated with cardiology advice.
Management of **Ongoing Chest Pain**

Caused by Anti-Cancer Treatment

**Signs and symptoms:** Pain in the chest which may extend to their left shoulder, arm, jaw, stomach or back, shortness of breath, sweating, nausea or vomiting

**Risk factors:** Radiotherapy, systemic anti-cancer treatment (particularly 5FU/Capecitabine)

**Examination:** Clinical history, examination including cardiac evaluation, MEWS observations and calculate score

**Investigations for all patients:** FBC, U&Es, LFTs, Troponin T (or I), ECG, echocardiogram

---

**Grade 1**
Mild pain. Not interfering with function

**Grade 2**
Moderate pain, limiting instrumental ADL’s

**Grade 3**
Pain at rest, limiting self-care ADL’s

---

Treat chest pain until proven to be non-cardiac/life threatening

---

**Is this pain cardiac?**

**NO**

Other causes of chest pain in oncology patients are pulmonary embolism, indigestion and disease progression. Arrange appropriate investigations

---

**YES**

**STOP** IV infusions of 5 Fluorouracil and disconnect

**STOP** oral Capecitabine/UFT

---

These patients are often myelosuppressed and are at risk of neutropenic fever and sepsis. If present, this should be managed according to approved guidelines

---

Monitor patient and ongoing assessment and management in accordance with local trust guidelines

---

Inform Acute Oncology team of admission as soon as possible

---

MCCN Acute Oncology Guidelines 2014
Management of

**Chest Pain**

Caused by Anti-Cancer Treatment

**Common chemotherapeutic agents causing cardiovascular complications**

<table>
<thead>
<tr>
<th>Agent</th>
<th>Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthracyclines (Doxorubicin, Epirubicin etc)</td>
<td>CHF, arrhythmias</td>
</tr>
<tr>
<td>Cyclophosphamide</td>
<td>CHF, tachyarrhythmias, heart block, haemorrhagic myopericarditis</td>
</tr>
<tr>
<td>Cisplatin</td>
<td>Arrhythmias, hypertension, heart block, CHF, ischaemia/infarction</td>
</tr>
<tr>
<td>Vinca alkaloids (Vincristine, Vinblastine)</td>
<td>Ischaemia/infarction</td>
</tr>
<tr>
<td>Taxanes (Pacitaxel, Docetaxel)</td>
<td>Arrhythmias, hypotension</td>
</tr>
<tr>
<td>5-Fluorouracil, Capecitabine</td>
<td>Arrhythmias, CHF, ischaemia/infarction</td>
</tr>
<tr>
<td>Methotrexate</td>
<td>CHF, arrhythmias, infarction</td>
</tr>
<tr>
<td>Etoposide</td>
<td>Ischaemia/infarction</td>
</tr>
<tr>
<td>Mitomycin</td>
<td>CHF</td>
</tr>
<tr>
<td>Bleomycin</td>
<td>Pericarditis, ischaemic heart disease</td>
</tr>
<tr>
<td>Trastuzumab, Lapatinib</td>
<td>CHF, arrhythmias</td>
</tr>
<tr>
<td>Bevacizumab</td>
<td>Hypertension, thromboembolism</td>
</tr>
<tr>
<td>Sorafenib, sunitinib</td>
<td>Hypertension, arrhythmias</td>
</tr>
</tbody>
</table>
Management of
Cardiac Chest pain in Follow up

Review indication for chemotherapy
And relative benefit/risk

If further chemotherapy essential

If yes, Is there an alternative regimen?

Non 5FU
Raltitrexed

Consider cardiac prophylaxis
Aspirin
Calcium antagonist and/or Nitrate (discuss with cardioloav)

Consider rechallenge
Or bolus 5FU regimen

MCCN Acute Oncology Guidelines 2014
2.5 Mucositis

AO Protocol Name: Mucositis
AO Type: Type II (Chemo complication)
Author: M. Varey (RLUH AO)

Introduction:
Mucositis is a manifestation of oral toxicity that is usually short lived. The severity is variable and can affect the entire alimentary tract with symptoms ranging from mild mouth soreness to severe erosive mucositis accompanied by severe pain and an inability to eat or drink.

The cytotoxic drugs most commonly associated with mucositis are 5-Flurouracil/Capecitabine, Bleomycin, Methotrexate, Doxorubicin, and Etoposide, Docetaxel, cisplatin and is also a common toxicity of Head and neck radiotherapy. Patients with poor oral hygiene and pre-existing dental or periodontal disease are at increased risk for this complication.

Patient referral systems (define alerts, referral pathways etc):
- Refer to Acute Oncology service for advice
- Out of hours advice from CCC on call team or CCC triage service

Education:
Education and training of A&E and AMAU staff in the recognition and management of mucositis.

Time to response:
Acute Oncology review within 24 hours

Initial Evaluation and Management (see appendix 1):
- History and examination including a assessment of severity- oral examination
- Treatment is supportive and mainly aimed at symptom control
- Oral hygiene and oral care
- Patients unable to eat/drink may need parenteral fluid and nutritional support
- Pain relief- Difflam, topical lidocaine, and mucosal coating agent, Gelclair
- Soluble aspirin, Oramorph or sub cut morphine

Ongoing Management:
Acute oncology team to communicate with the treating oncologist for dose modification with the next cycle.
Management of

Mucositis/Stomatitis

Caused by Radiotherapy/Systemic Anti-Cancer Treatments

**Signs and symptoms:** Pain, inflammation of mucosa, ulceration, xerostomia (dry mouth), pyrexia, bleeding, white patches or spots, thick, green or yellow saliva

**Risk factors:** Radiotherapy, systemic anti-cancer treatment

**Examination:** Clinical history, examination, MEWS observations and calculate score

**Investigations for all patients:** FBC, U&Es

**If clinically indicated:** Magnesium, group and save and clotting screen if bleeding, oral swab for cultures and sensitivities, referral to dietician

<table>
<thead>
<tr>
<th>Grade 1</th>
<th>Grade 2</th>
<th>Grade 3</th>
<th>Grade 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Painless ulcers, erythema or mild soreness, able to eat and drink</td>
<td>Painful, erythema, oedema or ulcers but able to eat and drink</td>
<td>Painful, erythema, oedema or ulcers and difficulty with eating and drinking</td>
<td>Mucosa/necrosis and / or requires parenteral or enteral support</td>
</tr>
</tbody>
</table>

**First Line**
- Benzydamine 0.15% oral rinse (Difflam), rinse or gargle, using 15ml every 1½ - 3 hours as required (may dilute with water if stinging occurs)
  - AND a bland oral rinse:
    - Sodium Chloride 0.9%, rinse mouth 4 times a day and 2 hourly as mouth becomes sore
    - Sodium bicarbonate 1 level teaspoon in 500mls warm water, rinse mouth 4 times a day and 2 hourly as mouth becomes sore
    - Telldent mouthwash tablets, 1 tablet in 200mls of water – no evidence for benefit but may be used when patients are unable to tolerate other bland oral rinses

**Does the patient have:**
- ORAL PAIN?
  - Refer to Oral Pain Treatment Algorithm page 20
- MOUTH ULCERS?
  - Refer to Mouth Ulcers Treatment Algorithm page 21
- XEROSTOMIA?
  - Refer to Xerostomia Treatment Algorithm page 22
- ORAL INFECTION?
  - Refer to Oral Infection Treatment Algorithm page 23
- BLEEDING MUCOSA?
  - Refer to Bleeding Mucosa Treatment Algorithm page 24
- SORE LIPS?
  - Refer to Lip Care Treatment Algorithm page 25
Management of

**Mucositis/Stomatitis**

Caused by Radiotherapy/Systemic Anti-Cancer Treatments

**Oral Pain Treatment Algorithm**

Does the patient have total dysphagia or intractable nausea?

**NO**
- **First Line**
  - Benzydamine 0.15% oral rinse (Difflam), rinse or gargle, using 15ml every 1½ - 3 hours as required (may dilute with water if stinging occurs)
  - Paracetamol soluble tablets, 1g four times a day OR Co-Codamol 8/500mg soluble tablets 1-2 tablets 4 times a day
  - Aspirin soluble gargles, 600mg 4 times a day – Gargle and spit

**AND**
- Administer analgesia and anti-emetics if required via the subcutaneous route. Try to avoid IM and IV routes

**YES**
- **Second Line**
  - Co-Codamol 30/500mg soluble tablets, 1-2 tablets 4 times a day
  - Morphine Sulphate liquid, 5-10mg up to 4 hourly prn, may be rinsed around mouth if tolerated

**Third Line**
- Morphine Sulphate liquid, titrate dose as required, may be rinsed around mouth if tolerated
- Antacid and Oxcetacaine 10mls 4 times a day (unlicensed product)

**Fourth Line**
- Oxycodone liquid, 2.5-5mg up to 4 hourly prn – for use in patients unable to tolerate Morphine Sulphate liquid due to stinging

If pain is still not controlled consider strong opioids and specialist palliative care advice. Mucositis associated pain is usually transient and regular review of analgesia must take place as symptoms resolve.
Management of
Mucositis/Stomatitis
Caused by Radiotherapy/Systemic Anti-Cancer Treatments

Mouth Ulcers Treatment Algorithm

First Line
- Benzydamine 0.15% oral rinse (Difflam), rinse or gargle, using 15ml every 1½ - 3 hours as required (may dilute with water if stinging occurs)
  AND
- Choline salicylate 8.7% gel (Bonjela), apply ½inch of gel with gentle massage to the affected area(s) every 3-4 hours, maximum of 6 applications a day
  OR
- Hydrocortisone pellets 2.5mg, 1 lozenge 4 times daily, allow to dissolve slowly in mouth in contact with the ulcer
  OR
- Carmellose paste (Orabase), apply a thin base when necessary after meals

Second Line
- Gelclair gel sachets, dilute contents of one sachet with 40mls of water and use as a mouthwash three times a day. Rinse around the mouth for at least one minute. Avoid eating and drinking
Management of

**Mucositis/Stomatitis**

Caused by Radiotherapy/Systemic Anti-Cancer Treatments

---

**Xerostomia Treatment Algorithm**

**First Line**
- Frequent sips of water, chewing sugar-free gum, pineapple ice cube chunks (avoid in dentate patients) and sugar free pastilles may stimulate saliva flow

**Second Line**
- AS Saliva Orthana spray, spray 2-3 times onto oral and pharyngeal mucosa, when required – *contains animal derived products*
- Biotene Oral Balance Gel, apply to gums and tongue as required – *contains animal derived products*

**Free from animal products**
Restrict the following use to patients who are unable to use the above options due to animal components.
Avoid in dentate patients:
- Glandosane aerosol spray, spray on oral and pharyngeal mucosa as required

**Third Line**
- Pilocarpine tablets, 5mg three times a day
Management of

**Mucositis/Stomatitis**

Caused by Radiotherapy/Systemic Anti-Cancer Treatments

---

### Oral Infection Treatment Algorithm

#### Fungal Infection

**Signs and symptoms:**
- White patches or spots
- Bright red patches of mucosa
- Thick, creamy saliva
- Sudden increase in pain that is burning in nature

**Nystatin 1ml (10,000u) 4 times a day for 7 days.**
For more severe infection:
**Fluconazole 50mg daily for 7-14 days. Maximum 14 days except in severely immunocompromised patients.**

#### Bacterial Infection

**Signs and symptoms:**
- Green or yellow saliva/phlegm, may be blood stained
- Copious amounts of saliva/phlegm,
- Foetor oris (foul smell on the breath)
- Sudden increase in pain
- Patient complains of feeling unwell
- Pyrexia (uncommon in mild infections)

#### Viral Infection

**Signs and symptoms:**
- Circular, punctate lesions
- Pain

Refer to Trust anti-microbial guidelines or antibiotics pharmacist

---

MCCN Acute Oncology Guidelines 2014
Management of

Mucositis/Stomatitis

Caused by Radiotherapy/Systemic Anti-Cancer Treatments

Bleeding Mucosa Treatment Algorithm

Tranexamic Acid mouthwash 5%, rinse 10mls of the solution around the mouth for 2 minutes before spitting it out four times a day after meals and before bed. Avoid eating or drinking for one hour after mouthwash.
Management of

**Mucositis/Stomatitis**

Caused by Radiotherapy/Systemic Anti-Cancer Treatments

**Lip Care Treatment Algorithm**

**First Line**
- White/Yellow soft paraffin, apply to the affected area when required. Patients with head and neck carcinoma should be informed not to apply this immediately prior to receiving radiotherapy treatment as the ointment can increase the dose of radiotherapy to the lips. Paraffin based products should not be used in conjunction with oxygen therapy
  **OR**
- Orabase, apply as thin film to the affected areas as required
2.6 Palmar Plantar Erythema

AO Protocol Name: Palmar Plantar Erythema
AO Type: Type II (Chemo Complication),
Author: Abdallah (COCH)

Introduction:
Palmar plantar erythema (PPE) is a common skin toxicity which affects the palms of the hands and soles of feet and occasionally other areas. PPE is most frequently seen with the use of fluoropyrimidines in particular capecitabine. It can also occur following treatment with 5-FU, pegylated liposomal doxorubicin (caelyx), sunitinib, sorafenib, docetaxel and lapatinib.

Symptoms include redness, swelling, tingling, burning, dryness, flaking, blisters and pain. Patients' dexterity and mobility may be impaired. PPE can be distressing and can affect quality of life during the chemotherapy course as some patients may not be able to carry out normal daily activities. It can be particularly severe in patients with dihydropyrimidine dehydrogenase (DPD) deficiency. Upon discontinuation of the causative agent (temporary or permanent) the symptoms will start to improve.

Patient Referral systems (define alerts, referral pathway etc):
- Out of hours advice from CCC triage service regarding interruption or discontinuation of chemotherapy
- Unless the patient has other problems PPE should not necessitate admission. However patients with severe pain, blisters and desquamation and those with other symptoms like diarrhoea and stomatitis may need urgent admission. Suspect DPD deficiency in those with early severe reactions (during or post first cycle of capecitabine/5FU).
- Patients advised to moisturise affected areas several times a day and OPD review with patient usual Oncologists to discuss further management (for example dose reduction or discontinuation)

Time to response:
Management guided by CCC triage service based on common toxicity criteria grading system. Patients who describe severe symptoms should be invited for day case review and assessment.

Initial evaluation:
- History, physical examination to ensure no other clinical problems related to toxicity. Skin assessment should include colour, integrity, swelling and presence of ulcers, blisters or bleeding.
- Identify the causative agent in addition to previous oncology correspondence/contact detail

Management:
- Early identification and intervention can prevent further deterioration in symptoms and might help resume the treatment without prolonged delays.
- Stop the culprit drug until symptoms resolve or improve to grade 1.
- Dose adjustment in the remaining cycles may be indicated depending on severity and grade.
- Advice patients to avoid exposure to sources of heat including the sun & hot water. Also avoid friction and excessive skin pressure.
- Cooling measures like applying ice packs
- Loose well ventilated shoes
- Skin care with creams and emollients
• Pyridoxine (vitamin B6) might help.
• Arrange review with patient’s usual oncologist prior to the next cycle of treatment.

* Please add page 27 of the MCCN Acute Oncology Guidelines (PPE management graph)

References:


http://www.oncolink.org/resources/article.cfm?id=1059
Management of Palmar Plantar Erythema [PPE] (Hand and Foot Syndrome) Caused by Systemic Anti-Cancer Treatments

**Signs and symptoms:** Redness, flaking/peeling skin, swelling, blisters, rash, tingling, pain/tenderness to palms of the hands and soles of the feet.

**Risk factors:** Systemic anti-cancer treatments, for example Capecitabine, Sunitinib, 5FU

**Examination:** Clinical history, examination, MEWS observations and calculate score

**Investigations if clinically indicated:** Swab if skin not intact

**Skin care advice:** Rest hands and feet, limit exposure of hands and feet to sources of heat and hot water, avoid exposure to harsh chemicals used in laundry powders and cleaning detergents, wear loose fitting, well ventilated shoes and clothes

**Grade 1**
Minimal skin changes or dermatitis, for example erythema, oedema or hyperkeratosis without pain. Not affecting Activities of Daily Living

May be treated as outpatient

**If on oral chemotherapy – CONTINUE taking**
Apply moisturising cream, for example Aveeno or Aqueous cream

**Grade 2**
Skin changes, for example peeling, blisters, bleeding, oedema or hyperkeratosis with pain, limiting instrumental Activities of Daily Living (for example preparing meals, shopping)

Usually treated as in-patient

**If on oral chemotherapy – STOP taking**
Apply moisturising cream, for example Aveeno or Aqueous cream

**Grade 3**
Severe skin changes, for example peeling, blisters, bleeding, oedema or hyperkeratosis with pain, limiting self care Activities of Daily Living (for example bathing, dressing, feeding themselves)

If on oral chemotherapy – STOP taking
Consider admission and urgent review by patient’s oncologist. Apply moisturising cream, for example Aveeno or Aqueous cream. Do not apply cream to broken skin and apply an appropriate dressing

Review pain, consider commencing analgesia referring to WHO analgesic ladder

For review by patient’s oncologist prior to next cycle as may need a dose reduction, deferral or discontinuation of treatment

MCCN Acute Oncology Guidelines 2014
2.7 Skin Reaction

Management of Skin Reaction

Caused by Radiotherapy and Systemic Anti-Cancer Treatments

Signs and symptoms: Erythema, pain, moist desquamation, yellow/green exudate, moist oedema

Risk factors: Radiotherapy, site of treatment, chemotherapy, co-existing diseases, (eg diabetes), ethnic origin/skin diversity, age, infection, mechanical irritants, nutritional status, obesity, previously irradiated areas and smoking

Examination: Clinical history, examination, MEWS observations and calculate score

Investigations if clinically indicated: Swab for cultures if the skin is not intact. Grading as per Radiation Therapy Oncology Group (RTOG) Classifications

Skin care advice: Wash/bath on a daily basis using warm water with unperfumed soap, avoid rubbing the area and pat dry with a towel, wear loose fitting clothing to avoid friction, avoid sun exposure, scratching the skin, direct application of hot or cold to the area and using perfumed soaps, perfume, aftershave, hair removal creams or waxing within the treatment area. If having radiotherapy to breast, chest or armpit do not use a deodorant containing metal and if having radiotherapy to face use an electric shaver

Has the patient received Systemic Anti-Cancer Treatments?

NO

YES

Has a potential extravasation been ruled out?

YES

NO

See Skin Reaction Treatment Algorithm, page 29

See Management of Confirmed or Suspected Extravasation, page 31
Management of

Skin Reaction

Caused by Radiotherapy and Systemic Anti-Cancer Treatments

Skin Reaction Treatment Algorithm

RTOG 0
No visible change to skin
Apply aqueous cream twice daily
1% hydrocortisone cream may be prescribed for symptomatic relief
Commence analgesia as guided by WHO analgesic ladder

RTOG 1
Faint or dull erythema. Mild tightness of skin and itching may occur
Increase application of aqueous cream as needed
1% hydrocortisone cream may be prescribed for symptomatic relief
Commence analgesia as guided by WHO analgesic ladder

RTOG 2
Bright erythema/dry desquamation, sore, itchy and tight skin
Increase application of aqueous cream as needed
Stop using aqueous and hydrocortisone cream on moist/broken skin
Commence analgesia as guided by WHO analgesic ladder

RTOG 2.5
Patchy moist desquamation yellow/pale green exudate, soreness with oedema
Continue using aqueous on unbroken skin
Apply appropriate dressing to exuding areas (e.g. PolyMem, Mepilex)

RTOG 3
Confluent moist desquamation yellow/pale green exudate, soreness with oedema
Stop using aqueous and hydrocortisone cream on moist/broken skin
Trimovate cream is only indicated if infection is likely to occur
Commence analgesia as guided by WHO analgesic ladder

RTOG 4
Ulceration, bleeding, necrosis (rarely seen)
Seek specialist advice (ie Clinical Oncologist, Radiotherapy Clinical Nurse/ Radiographer Specialist in your area)

Increase application of aqueous cream as needed
Consider arranging review and may be treated as in-patient
Increase application of aqueous cream as needed
Increase using aqueous and hydrocortisone cream on moist/broken skin
Stop using aqueous and hydrocortisone cream on moist/broken skin

MCCN Acute Oncology Guidelines 2014
2.8 Extravasation

**AO Protocol Name:** Extravasation  
**AO Type:** Type II (Chemo Complication),  
**Author:** M. Varey (RLUH AO)

**Introduction:**  
Extravasation is defined as the leakage of a vesicant drug or fluid from a vein into the surrounding tissue during intravenous administration. A vesicant is defined as a drug or solution which has the potential to cause blistering severe tissue damage and even necrosis if extravasated. Vesicants may cause damage to the surrounding tissue nerves, tendons or joints. This may be accompanied by pain, erythema, inflammation and discomfort, which, if left unrecognised or treated inappropriately can lead to necrosis and functional loss of the vein and possibly the limb concerned. Infiltration is the inadvertent administration of a non-vesicant solution into surrounding tissues. While this may cause inflammation and discomfort, damage and necrosis rarely occurs.

**Patient Referral systems (define alerts, referral pathway etc):**  
- Usually extravasation will identified by the professional administering chemotherapy  
- MCCN (2011) extravasation policy should be followed  
- Out of hours advice from CCC triage service regarding management

**Time to response:**  
Management guided by CCC triage service

**Initial evaluation:**  
- History, Physical examination to ensure no other clinical problems related to toxicity  
- Previous Oncology Correspondence/contact detail

**Ongoing management:**  
Arrange review with patient's usual oncologist
Management of Confirmed or Suspected Extravasation

Caused by Systemic Anti-Cancer Treatments

This is a guide to be used in conjunction with the MCCN (2011) Extravasation Policy

Recognition: It is vital an extravasation is diagnosed early and is not misdiagnosed. This can occur when the practitioner fails to differentiate discolouration reactions in the vein, venous shock, flare or phlebitis

Signs and symptoms: Pain, stinging, burning, induration, erythema, venous discolouration, swelling at injection site, no venous blood return (if this is found in isolation, assess for other clinical signs), increased resistance to administration, changes in infusional rate (these may not be noticed if using an infusion pump so close observation is required)

Risk factors: Systemic anti-cancer treatments

Examination: Clinical history and examination

Is systemic cancer treatment currently being infused?

NO

• STOP the infusion or injection – do not remove the access device
• Seek assistance if required
• Disconnect drip and aspirate as much drug as possible, trying also to draw some blood back into the cannula
• Remove cannula with minimal pressure – if central or mixed chemotherapy administration inform consultant with a view to immediate plastic surgeon referral. Extravasations from Portacath needle locking points may be treated as peripheral

• Mark the affected area
• Elevate the limb and encourage movement
• Refer to the specific Antidote Guidance, page 32
• Inform the patient’s oncologist
• For vesicants consider immediate referral to a plastic surgeon
• Provide analgesia according to the WHO analgesic ladder if required
• Measure the area of extravasation, document any treatment and photograph injury if possible
• Provide patient information leaflet with documented measurements of injury – be alert to the possibility of delayed injury
• Patient to contact CCC triage, 0151 334 1155 bleep 5555 if symptoms worsen or persist
• Advise mobility and elevation of affected limb for next 2-3 days.
• Arrange follow-up appointment if needed

YES

• Complete Green Card, trust incident form and any other local documentation as required.
• Send copy of green card to trust and network pharmacist. http://www.extravasation.org.uk/Greenmenu.htm
• Consider referral to physiotherapist
• Refill extravasation kit – liaise with pharmacy

MCCN Acute Oncology Guidelines 2014
Management of

Confirmed or Suspected Extravasation

Caused by Systemic Anti-Cancer Treatments

This is a guide to be used in conjunction with the MCCN (2011) Extravasation Policy

Antedote Guidance
Determine the type of chemotherapy that has been administered

- **Vinca Alkaloids**
  - Vincristine
  - Vinblastine
  - Vinorelbine
  - Apply **WARM** compression for 24 hours
  - **Hyaluronidase 1500IU** - dilute in 1ml of water for injection. Inject 0.1ml-0.2ml sub-cutaneously at points of the compass around the circumference of the area of extravasation

- **Bendamustine**
  - Apply **COLD** compression for 30 minutes in every 2 hours for 24 hours. Place dry gauze between skin and
  - **No evidence for any specific antidote** - Topical hydrocortisone 1% cream may be applied if there are signs of erythema. Apply sparingly to the affected area 4 times a day while symptoms persist

- **Anthracyclines**
  - Daunorubicin
  - Doxorubicin
  - Epirubicin
  - Idarubicin
  - Mitoxantrone
  - Mitomycin C
  - Apply **COLD** compression for 30 minutes in every 2 hours in 24 hours. Place dry gauze between skin and
  - **Topical Dimethyl Sulfoxide (DMSO) 50%** - Apply using a cotton bud every 2 hours for 24 hours to the extravasation site. Avoid contact with good skin. For the next 7 days apply every 6 hours alternating with topical hydrocortisone 1% cream every 6 hours so a preparation is applied every 3 hours. Do not use an occlusive cover. If blistering occurs discontinue DMSO and seek advice from Acute Oncology Team or local trust IV and Interventional Procedure nurse CNS. If further advice needed phone CCC IV and Interventional Procedures CNS 0151 334 1155 bleep 4095 (Monday – Friday 9am – 5pm)

- **Oxaliplatin**
  - Cisplatin or Carboplati
  - Hot or cold compression is **NOT** required. However, if symptoms warrant apply intermittent **WARM** compress

- **All other cytotoxic drugs**
  - Hot or cold compression is **NOT** required. However, if symptoms warrant apply intermittent **COLD** compress

- **No specific antidote needed** - Topical hydrocortisone 1% cream may be applied if there are signs of erythema. Apply sparingly to the affected area 4 times a day while symptoms persist.
2.9 Acute hypersensitivity reactions

AO Protocol Name: Acute hypersensitivity reactions
AO Type: Type II (Chemo Complication),
Author: ACM (NCT AO)

Introduction:
Patients may present clinically with angio-oedema, urticaria, dyspnoea, and hypotension. But some patients may die from acute irreversible asthma or laryngeal oedema with few more generalised manifestations. Other symptoms include rhinitis, conjunctivitis, abdominal pain, vomiting, diarrhoea, and a sense of impending doom. The most likely cause of anaphylactic reactions within a cytotoxic chemotherapy service is the administration of intravenous drugs, especially cytotoxic drugs, antibiotics, contrast media, anaesthetics, blood, and blood products.

Patient Referral systems (define alerts, referral pathway etc):
Usually hypersensitivity reactions will be identified by the professional administering chemotherapy. If severe reaction occurs the arrest team maybe needed followed by admission to hospital for further observation. The MCCN guidance for the prevention and management of acute hypersensitivity reactions should be followed.

Time to response:
Inform acute oncology service within 24 hours.

Initial evaluation:
- Stop IV infusions/injection if thought to be causing the reaction
- Call for medical help
- If hypotensive, lie patient flat with or without leg elevation.
- Administer oxygen at 10-15 litres/minute via a non-rebreathing mask
- Prepare to carry out basic life support at any time or if response to actions is ineffective
- Administer drugs as per algorithm for severe reactions (refer to MCCN anaphylaxis policy)
- Observe the skin condition, pulse rate, blood pressure, upper airway,
  and if possible, peak flow
- Report all cytotoxic anaphylactic reactions to the relevant personnel as agreed in the local policy
- Fill in a yellow adverse drug reaction form if applicable

Ongoing management:
A review with patient's usual oncologist should be arranged so that alterations to management plan can be made if necessary.
Management of

**Acute Hypersensitivity Reactions**

Caused by Systemic Anti-Cancer Treatments

**Signs and symptoms:** Angio-oedema, urticaria, dyspnoea, hypotension, laryngeal oedema, rhinitis, conjunctivitis, abdominal pain, vomiting, diarrhoea, sense of impending doom, flushed or pale skin, cardiovascular collapse

**Risk factors:** Administration of drugs, especially cytotoxic agents, blood and blood products, contrast media, anaesthetics, insect stings and certain foods

**Examination:** Clinical history, examination, MEWS observations and calculate score

**Investigations if clinically indicated:** FBC, U&Es, LFTs

*This treatment flow chart covers both anaphylactic and hypersensitivity reactions*

---

**Mild**  
Urticarial rash, pruritis, rhinitis

Chlorpheniramine 10mg slow IV push and hydrocortisone 200mg IV

Observe the patient

---

**Moderate**  
Tachycardia, dyspnoea, wheeze, malaise, flush, nausea, vomiting, anxiety, agitation

Chlorpheniramine 10mg slow IV push, hydrocortisone 200mg IV, an inhaled bronchodilator eg Salbutamol, Oxygen 10-15 litres per minutes

Monitor vital signs

---

**Severe**  
Angio-oedema, laryngeal oedema, hoarseness, urticaria, dyspnoea, hypotension, rhinitis, conjunctivitis, abdominal pain, cold & clammy, sense of impending doom

Remove the trigger to the reaction if possible

Assess the patient: Airway, Breathing, Circulation, Disability, Exposure

---

Look for acute onset of illness and any life threatening problems

<table>
<thead>
<tr>
<th>Airway</th>
<th>Swelling, hoarseness, stridor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breathing</td>
<td>Rapid breathing, wheeze, fatigue, cyanosis, oxygen saturations &lt;92%, confusion</td>
</tr>
<tr>
<td>Circulation</td>
<td>Pale, clammy, low blood pressure, faintness, drowsy/coma</td>
</tr>
</tbody>
</table>

Call for help

Follow Anaphylaxis Algorithm for Adults and Children, page 35
Management of

**Acute Hypersensitivity Reactions**

Caused by Systemic Anti-Cancer Treatments

This treatment flow chart covers both anaphylactic and hypersensitivity reactions

### Anaphylaxis Algorithm for Adults and Children

- Establish airway. Administer oxygen 10-15 litres/min via non-re-breathable mask.
- Monitor vital signs – BP, TPR, oxygen saturations.
- Administer adrenaline (IM unless experienced with IV adrenaline) doses of 1:1000 adrenaline (repeat after 5 minutes if no improvement).

<table>
<thead>
<tr>
<th>Age</th>
<th>Adrenaline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult</td>
<td>500 micrograms IM (0.5ml)</td>
</tr>
<tr>
<td>Child more than 12 years</td>
<td>500 micrograms IM (0.5ml)</td>
</tr>
<tr>
<td>Child 6-12 years</td>
<td>300 micrograms IM (0.3ml)</td>
</tr>
<tr>
<td>Child less than 6 years</td>
<td>150 micrograms IM (0.15ml)</td>
</tr>
</tbody>
</table>

Titrate: adults 50 micrograms; children 1 microgram/kg.

- Perform IV fluid challenge.

<table>
<thead>
<tr>
<th>Age</th>
<th>IV fluids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult</td>
<td>500 – 1000ml</td>
</tr>
<tr>
<td>Child</td>
<td>Crystalloid 20ml/kg</td>
</tr>
</tbody>
</table>

Stop IV colloid if this might be the cause of anaphylaxis.

- Administer chlorphenamine AND hydrocortisone (IM or slow IV).

<table>
<thead>
<tr>
<th>Age</th>
<th>Chlorphenamine</th>
<th>Hydrocortisone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult or child more than 12 years</td>
<td>10mg</td>
<td>200mg</td>
</tr>
<tr>
<td>Child 6-12 years</td>
<td>5mg</td>
<td>100mg</td>
</tr>
<tr>
<td>Child 6 months – 6 years</td>
<td>2.5mg</td>
<td>50mg</td>
</tr>
<tr>
<td>Child less than 6 months</td>
<td>250 micrograms/kg</td>
<td>25mg</td>
</tr>
</tbody>
</table>

- Perform ECG and monitor vital signs.
- Inform patient’s oncologist.

MCCN Acute Oncology Guidelines 2014
2.10 Hypomagnesaemia

**AO Protocol Name:** Hypomagnesaemia  
**AO Type:** Type II (Chemo Complication),  
**Author:** ACM (NCT AO)

**Introduction:**  
Some anti-cancer treatments (cisplatin, cetuximab) may lead to low magnesium levels. Signs and symptoms include generalized weakness, anorexia, apathy and ventricular arrhythmias. Magnesium replacement should be instituted as per hospital guidelines.

**Patient Referral systems (define alerts, referral pathway etc):**  
Magnesium should be replaced as indicated and acute oncology team informed so that review by patient’s oncologist can be arranged if necessary.

**Time to response:**  
Inform acute oncology service within 24 hours.

**Initial evaluation:**  
Check Magnesium in patients who present with symptoms suggestive of hypomagnesaemia and those who previously had hypomagnesaemia and who are due to have further platinum chemotherapy. Consider urgent replacement if Magnesium<0.4 and/or cardiac history.

**Ongoing management:**  
A review with patient’s usual oncologist should be arranged.
Management of Hypomagnesaemia

Caused by Systemic Anti-Cancer Treatments

**Signs and symptoms:** Muscle cramps, numbness/tingling, palpitations, swollen ankles, shortness of breath

**Risk factors:** Systemic cancer treatment

**Examination:** Clinical history, examination, MEWS observations and calculate score

**Investigations for all patients:** FBC, U&Es, Magnesium

**Urgent replacement:** If Magnesium <0.4 and cardiac history (IHD, AF, AVF).

---

**Flowchart:**

1. **Magnesium >0.5 with no symptoms**
   - No infusion required

2. **Magnesium < 0.5 with Symptoms**
   - Is the renal function normal? (creatinine <125 umol/l)
     - **NO** (Creatinine ≥125umol/l)
       - 40mmol magnesium in 1 litre of normal saline over 8 hours
     - **YES** (Creatinine <125umol/l)
       - Is the patient already an in-patient
         - **NO**
           - Treat as out-patient
           - 40mmol magnesium in 250mls of normal saline over 2 hours
         - **YES**
           - 40mmol magnesium in 1 litre of normal saline over 8 hours

3. **Magnesium < 0.4 regardless of symptoms**
   - Treat as out-patient
   - 40mmol magnesium in 250mls of normal saline over 2 hours

4. **Magnesium < 0.4 with Cardiac history**
   - No infusion required

---

**Instructions:**

- Give magnesium 40mmol and re-assess symptoms
- Review by Acute Oncology Team
- Re-check magnesium if symptoms persist or if clinically indicated
- Do not give more than 40mmol in one day
- Check serum magnesium 5-7 days post infusion or earlier if symptoms recur
2.11 Radiation Pneumonitis

AO Protocol Name: Radiation Pneumonitis
AO Type: Type II (Radiotherapy Complication),
Author: ACM (NCT AO)

Introduction:
Clinical radiation pneumonitis may develop in patients if the lung is irradiated (for example lung and oesophagus cancer). Radiation-induced lung injury results from the combination of direct cytotoxicity upon normal lung tissue and, perhaps more importantly, the development of fibrosis triggered by radiation-induced cellular signal transduction. Symptoms of radiation pneumonitis develop 4 to 12 weeks post radiation and include dyspnoea, cough and malaise. A reducing course of steroids may help with after radiation therapy but can be up to 2-3 months after completion of radiotherapy.

Patient Referral systems (define alerts, referral pathway etc): Referral to acute oncology team so that review by patient’s clinical oncologist can be arranged.

Time to response:
Inform acute oncology service within 24 hours

Initial evaluation:
- CXR, FBC and biochemical profile
- Previous oncology correspondence/contact details (regarding timing of radiotherapy)

Ongoing management:
A review with patient’s usual oncologist should be arranged.
Management of

**Radiation Pneumonitis**

Caused by Radiotherapy Treatment

**Signs and symptoms:** Mild hypoxia, fine crepitations – wide spread if drug induced, localised if following focal radiation, low grade fever, development of acute or sub-acute dyspnoea, new or worsening cough

**Risk factors:** Radiotherapy, low performance status, co-morbidity lung disease, smoking history, low pulmonary function tests. The risk is increased inpatients who have undergone biopsy only compared to those who undergo complete surgical resection.

**Examination:** History and physical examination including assessment of performance status and history of previous effusions and management, MEWS observations and calculate score.

**Investigations for all patients:** Chest x-ray and comparison with previous imaging, FBC, U&Es, LFTs, CT and CTPA to exclude pulmonary embolism and cancer progression

**If clinically indicated:** Admit under a Respiratory Physician, if appropriate

---

Has pulmonary embolism, cancer progression or infection been excluded?

- **NO**
  - Perform chest x-ray, CT and CTPA to exclude them

- **YES**
  - Review by Acute Oncology Team and Respiratory Physician

**Grade 1**

- Mild symptoms
- Dry cough, dyspnoea on exertion

  - Can be managed at home.
  - Arrange review by patient’s oncologist as an out-patient

**Grade 2**

- Persistent cough requiring a narcotic, dyspnoea with minimal effort but not at rest

  - Usually managed at home.
  - Consider Dexamethasone 4mg once or twice daily if symptoms persist. Arrange review by patient’s oncologist as an out-

**Grade 3**

- Severe cough, chest x-ray shows evidence of acute pneumonitis, requiring intermittent oxygen

  - ADMIT
  - Commence high dose oral/IV steroids, consider Dexamethasone 6mg twice a day. Review by the acute oncology team within 24 hours and thereafter daily. For review by patient’s oncologist
2.12 Cerebral oedema due to cranial irradiation

**AO Protocol Name:** Cerebral oedema  
**AO Type:** Type II (Radiotherapy Complication),  
**Author:** ACM (NCT AO)

**Introduction:**
A transient worsening of pretreatment symptoms can occur early in the course of radiation, probably as a result of transient mild cerebral oedema. Corticosteroids can lessen the radiation-induced blood-brain-barrier disruptions and improve the symptoms.

Patients with recognized significant pre-treatment cerebral oedema should begin oral or parenteral corticosteroids (for example dexamethasone 8 to 16 mg daily) prior to initiating radiation. Maintaining the dose for the first two weeks of radiotherapy can prevent clinical deterioration due to transiently worsened peritumoral oedema. However, a short-term increase in corticosteroid dose may be warranted if symptoms are severe.

**Patient Referral systems (define alerts, referral pathway etc):**
Referral to acute oncology team so that review by patient’s clinical oncologist can be arranged if cranial irradiation is complete

**Time to response:**
Inform acute oncology service within 24 hours

**Initial evaluation:**
- FBC and biochemical profile
- Previous oncology correspondence/contact details (regarding timing of radiotherapy)

**Ongoing management:**
A review with patient’s usual oncologist should be arranged.
**Management of Cerebral Oedema**

**Caused by Malignant Disease or Anti-Cancer Treatments**

**Signs and symptoms:** Headaches (typically worse on waking and lying flat), nausea/vomiting, seizure – focal or generalised, reduced conscious level, papilloedema, focal neurology, cushing triad (a late sign comprising raised systolic BP, widened pulse pressure, bradycardia and abnormal respiratory pattern), ocular palsies

**Risk factors:** Malignant disease or cancer treatments

**Examination:** History and physical examination, MEWS observations and calculate score, previous oncology correspondence/contact details (regarding timing of radiotherapy).

**Investigations for all patients:** FBC, U&Es, LFTs, CT or MRI brain with IV contrast to check for: new tumour; treatment induced oedema; haemorrhage; infection

---

CT or MR brain with IV contrast confirms intracranial malignancy with raised intracranial pressure

Is the patient on Dexamethasone?

- **NO**
  - Start Dexamethasone 8mg twice a day (at 8am and 12noon) IV or orally
  - Ensure patient is on a Proton Pump Inhibitor (PPI)
  - Inform Acute Oncology Team and ensure review by patient’s oncologist and consider referral to palliative care for symptom control

- **YES**
  - Increase Dexamethasone to a maximum of 12mg twice a day (at 8am and 12noon)

---

Has the patient had a seizure? Is surgery an option?

- **YES**
  - Consider starting an anti-convulsant, usually phenytoin

- **NO**
  - Contact neurosurgical registrar

---

Continue with treatment and review by Acute Oncology Team. Ensure follow-up by patient’s oncologist

---

MCCN Acute Oncology Guidelines 2014
3. **New Cancers**

3.1 **Diagnosis and Management of malignancy of uncertain origin (MUO) - Generic**

**AO Protocol Name:** MUO generic  
**AO Type:** Type I (New Cancer),  
**Author:** EM (St H&K AO)

**Introduction:**
The majority of MUO’s present with poor PS and a prognosis < 3 months. Emphasis should be placed on assessing PS and ‘pattern of presentation’, early symptom management, patient information, focussed investigation and early discharge planning.

**Patient Referral systems** (define alerts, referral pathway etc):
Ensure there is a MUO alert with radiology that reinforces guidance on referral to oncology services before extensive investigation:
Develop urgent OPD referral pathways and services

**Education:**
Develop rolling programme of education aimed at key departments and junior doctors. Raise awareness with primary care teams and cancer MDT’s

**Time to response:**
Clinical review within 24 working hours (medical and/or nursing) and within 2 weeks for urgent OPD review

**Initial evaluation:**
- Patient/family understanding and expectations
- PS, pattern, investigations
- Previous Oncology Correspondence/contact detail

**Ongoing management:**
- Information/support and symptom control with consideration of early PCT involvement
- CUP/AO MDT review and minimum dataset
- Identify named key worker
- Urgent GP fax (inpatients)
- Identify preferred place of care (PPC) when appropriate
- Provide focussed patient information
- Focussed investigation according to PS, pattern and prognosis
- Cancel unnecessary investigations
- Consider early attempt at histology if therapeutic options
- Start discharge planning

**Specialist referral:**
- CUP MDT to collect agreed minimum dataset and collate centrally for all MUO’s
- For patients with PS 0-2 and/or considered for active therapy link with MUO SSMDT
- Develop site specific links for proven primary and key MUO ‘patterns’ for example brain, solitary liver
Management of

**Malignancy of Uncertain Origin (MUO) - Generic**

Caused by Malignant Disease

- Urgent referral to local CUP MDT and Acute Oncology Team

  - For review by local CUP team or Acute Oncology Team and following to be performed:
    - Organise appropriate investigations
    - Ensure symptom control
    - Inform the patient
    - Commence early discharge planning
    - Consider referral to palliative care team for patients who are symptomatic or performance status 3-4

- “Provisional CUP”
  - Joint management with specialist MDT

- Primary identified
  - Refer through to site specific oncologist/MDT

- Non-malignant
  - Refer on
3.2 Diagnosis and Management of malignancy of uncertain origin (MUO) - Brain

**AO Protocol Name:** MUO (brain)
**AO Type:** Type I (New Cancer)
**Author:** EM (St H&K AO)

**Introduction:**
A brain ‘cancer’ diagnosis is made following emergency admission in > 60% of cases and MUO (brain) represents up to one third of MUO admissions. Patients often present with a stroke syndrome, multiple metastases, poor PS and prognosis less than three months. Emphasis should be placed on assessing PS and steroid response before extensive investigation.

**Patient Referral systems:**
Develop MUO alert with radiology
Coordination of care with neurooncology services and SSMDT at Walton is essential

**Education:** Rolling programme of education aimed at key departments and junior doctors

**Time to response:**
Clinical review within 24 hours working time (medical and/or nursing)

**Initial evaluation:**
- Patient/family understanding and expectations
- RPA prognostic score as detailed below, and chest x-ray.
- Previous Oncology Correspondence/contact detail

**RPA Prognostic Score**

<table>
<thead>
<tr>
<th>RPA Class</th>
<th>Clinical Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>PS 0-2, controlled primary site, age ≤65, no extracranial metastatic disease</td>
</tr>
<tr>
<td>II</td>
<td>Neither Class I nor III</td>
</tr>
<tr>
<td>III</td>
<td>PS 3-4</td>
</tr>
</tbody>
</table>

**Ongoing management:**
- Information/support and symptom control with consideration of early PCT input
- Commence Dexamethasone 16mg and PPI cover
- Stop unnecessary medicines
- Cancel unnecessary investigations
- Start discharge planning and review steroid dose reduction schedule
- Arrange AO/CUP MDT review
- Consider MRI brain if surgery/stereotactic radiotherapy appears appropriate
- Consider staging CT scan chest/abdo/pelvis for MUO only when this influences a management decision
- Facilitate referral to Walton neurooncology SSMDT and capture MDT outcome
- Where necessary, establish links with site specific MDT’s.
Management of

**Malignancy of Uncertain Origin (MUO) - Brain**

Caused by Malignant Disease

- Review patient's performance status, clinical history and perform any necessary investigations
- Review patient's prognosis and cancel any unnecessary medicines and investigations
- Commence Dexamethasone 16mg and a PPI cover
- Refer to Acute Oncology Team and consider referral to Palliative Care Team
- Continue discharge planning and review steroid dose reduction schedule

Is patient considered eligible for active treatment?
- Good PS (0-2)
- No histology
- Acute deterioration due to mass effect, cystic tumour, Cerebellar lesion, tumour diameter > 5cm

**YES**
- Consider brain MRI and CT chest, abdo, pelvis
- Refer to neurosurgical service

**NO**
- Consider discharge and follow-up

Faxed referral to weekly (Thurs) neuro SSMDT 529 5733
Or on call Registrar
3.3 Cancer Relapse

AO Protocol Name: Cancer Relapse (generic)
AO Type: Type III (Cancer Complication)
Author: EM (St H&K AO)

Introduction:
Approximately, 50% of emergency admissions occur in known cancer patients. 50% of these are linked to disease progression/relapse and 50% due to unrelated complications (PE, infection etc). AO teams can improve communication, provide prognostic information and guide appropriate inpatient management. 20% of patients have a prolonged inpatient stay and AO assessment and audit can facilitate discharge strategies with PCT and DN liaison.

Patient Referral systems:
Develop a electronic alert system for all cancer patients
Ensure pathways are in place to support referral to appropriate site specific cancer teams and/or acute oncology within 24hours of admission

Education:
Rolling programme of education aimed at key departments and junior doctors

Time to response:
Clinical review and/or telephone advice within 24hours working time (medical and/or nursing)

Initial evaluation:
- Patient/family understanding and expectations
- PS, clinical diagnosis, prognosis
- Ensure Previous Oncology Correspondence/contact detail made available in case notes

Ongoing management:
- Determined by likely diagnosis and prognosis
- Information/support and symptom control with consideration of early PCT input
- Define the named key worker
- Cancel unnecessary investigations
- Start discharge planning
- Inform treating oncologist and/or site specific team as appropriate

Specialist referral:
- Establish links with existing clinical team and/or MDT for information and review
- Consider development of early discharge team for complex cases (DN, PCT)
Management of **Cancer Relapse**

**Caused by Malignant Disease**

- Review patient’s performance status, clinical history and perform any necessary investigations
- Review patient’s prognosis and cancel any unnecessary investigations
- Consider referral to Palliative Care Team
- Start discharge planning

**Is the case complex?**

**YES**
- Consider development of early discharge team including DN and PCT
- Establish links with existing clinical team and / or MDT referral for information and review

**NO**
3.4 Cancer and Diabetes

AO Protocol Name: Cancer and Diabetes (generic)
AO Type: Type III (Cancer Complication)
Author: ACM (NCH AO)

Introduction:
Cancer and diabetes are both common diseases. A meta-analysis has shown that there is a increased mortality HR of 1.41 (95% confidence interval [CI], 1.28-1.55) compared with normoglycemic individuals across all cancer types. There can be several reasons for this. Cancer patients with diabetes may have increased tumor cell proliferation and metastases in a physiologic environment of hyperinsulinemia and hyperglycemia. It is possible that high insulin or insulin-like growth factor levels may promote cancer cell and tumor growth. Another potential pathway is that acute exposure to hyperglycemia may increase endothelial cell permeability due to increased generation of reactive oxidative species and structural changes in the basement membrane, increasing the likelihood of metastasis.1

Patients with pre-existing diabetes may have poorer response to cancer treatment along with increased infection risk and intra-operative mortality. Furthermore, the diagnosis and treatment of cancer may distract both the patient and the health care team from appropriate management of glycaemia, blood pressure, and lipids, proven to reduce morbidity and mortality in diabetic adults. Although results are not consistent, a multidisciplinary approach that includes a diabetes-management team for the treatment of cancer patients with diabetes may be important for improving long-term outcomes and decreasing mortality.1,2,3

Patient Referral systems:
Develop pathways are in place for patients with diabetes to request early review by their diabetes care provider or hospital diabetes team

Education:
Rolling programme of education aimed at key departments and junior doctors

Time to response:
AOS clinical review and/or telephone advice within 24hours working time (medical and/or nursing)

Initial evaluation:
- Patient/family understanding of risk of poorly controlled diabetes while on steroids/treatment
- Ensure patient has community diabetes support if diabetes less well controlled
- Ensure Previous Oncology Correspondence/contact detail made available in case notes

Ongoing management:
- If deterioration in diabetes control early referral to diabetes specialist nurse/team
- If patient taking steroids rationalise whether necessary and/or dose
- On discharge inform patient’s GP practice and diabetes specialist nurse of issues
- Patients will need to continue to monitor or be monitored if they are discharged on steroids. This is essential as diabetes treatment will need to be adjusted as steroids are tapered or increased.
- Inform treating oncologist and/or site specific team as appropriate

Specialist referral:
- If ongoing difficulties with diabetes control refer to diabetes consultant
References:


4. Cancer Complications
4.1 Hypercalcaemia

AO Protocol Name: Hypercalcaemia
AO Type: Type I & III (New Cancers and Cancer Complication)
Author: EM (St H&K AO)

Introduction:
Malignant hypercalcaemia is most frequently encountered in the context of known cancer and often results in repeated presentation and admission. Breast, non-small cell lung and renal cancer, represent the most common primary sites. Patients may be asymptomatic but can present with confusion, constipation, vomiting and dehydration.

Patient Referral systems:
Malignant hypercalcaemia should trigger early referral to the AO team to aid coordination of care

Education:
Rolling programme of education aimed at key departments (A&E, MAU,) and junior doctors

Time to response:
AO Clinical review within 24hours working time (medical and/or nursing)

Initial evaluation:
- Clinical presentation (symptomatic or routine blood test?)
- Previous Oncology Correspondence/contact detail should be made available in case notes

Ongoing management:
- Information/support
- Intravenous N Saline to correct dehydration
- Intravenous Bisphosphonate (Pamidronate or Zolodronate 4mg)
- Consider early discharge unless symptomatic. Clinically well patients can receive outpatient bisphosphonates
- Inform clinical team
- Start discharge planning

Specialist referral:
Establish links with biochemistry to capture new patients
Management of

**Hypercalcaemia**

**Caused by Malignant Disease**

**Signs and symptoms:** Fatigue, weakness, constipation, nausea, vomiting, polyuria, polydipsia, cardiac arrhythmias, delirium, drowsiness and coma. The severity of symptoms correlates more closely with the rate of increase in calcium rather than the actual level.

**Risk factors:** Malignant disease

**Examination:** Clinical history, examination, MEWS observations and calculate score

**Investigations for all patients:** FBC, U&Es, calcium, albumin

**Normal range:** Normal serum corrected calcium is 2.2-2.6mmol/l. Decision to treat should be based on patient symptomology rather than absolute calcium level

---

**Is the serum corrected calcium >2.6mmol/l **AND** patient symptomatic?**

- **NO**
  - Monitor patient symptoms

- **YES**
  - **Re-hydrate with 1-3 litres of 0.9% sodium chloride IV.**
    - The volume and rate of fluid replacement should be adjusted in each patient according to their age, severity of hypercalcaemia, degree of dehydration and ability of the cardiovascular system to tolerate rehydration
    - Drugs which reduce renal blood flow or renal calcium excretion should be **discontinued/avoided** where appropriate (for example non-steroidal anti-inflammatory agents and thiazide diuretics)

  - **Treat with IV Bisphosphonate - Zoledronic Acid IV,** dilute in 100mls of sodium chloride 0.9% or 100mls of dextrose 5% and infuse over 15-30 minutes. Monitor renal function and prescribe dose according to creatinine clearance:

    | Creatinine clearance (ml/min) | Dose  |
    |------------------------------|-------|
    | >60                          | 4mg   |
    | 50-60                        | 3.5mg |
    | 40-49                        | 3.3mg |
    | 30-39                        | 3mg   |
    | <30                          | no treatment |

  - If creatinine clearance is <30ml/min Ibandronic acid 50mg weekly orally may be considered

  - Inform patient’s oncologist and check corrected calcium levels **5-7 days** post bisphosphonate infusion

  - Refer to Hypercalcaemia Follow-Up Treatment Algorithm, page 50
**Management of Hypercalcaemia**

Caused by Malignant Disease

**Hypercalcaemia Follow-up Treatment Algorithm**

- Are the correct calcium levels >3.0mmol/l OR symptoms persist?
  - NO
    - Corrected calcium levels to be rechecked every 3-4 weeks or when symptoms occur
  - YES
    - Is it 7 days post initial infusion?
      - NO
        - Wait at least 7 days from initial infusion to allow maximal response to the initial dose
      - YES
        - Consider a further infusion of bisphosphonates and recheck bloods 5-7 days post infusion. Options include:
          - The same dose of bisphosphonates OR
          - An increased dose OR
          - Change to an alternative Bisphosphonate

- Is the patient experiencing subsequent episodes of symptomatic hypercalcaemia?
  - NO
    - Corrected calcium levels to be rechecked every 3-4 weeks or when symptoms occur
  - YES
    - Consider a further infusion of bisphosphonates and recheck bloods 5-7 days post infusion. Depending on how close the recurrence is to the original episode options include:
      - The same dose of bisphosphonates OR
      - An increased dose OR
      - Change to an alternative bisphosphonate

- Is the patient experiencing subsequent episodes of symptomatic hypercalcaemia?
  - NO
  - YES
    - Seek advice from the Acute Oncology Team and patient’s oncologist
4.2 Venous Thromboembolism

AO Protocol Name: Venous Thromboembolism
AO Type: Type II, and III (Complication of cancer and cancer treatment)
Author: Abdallah (COCH)

Introduction:
Venous Thromboembolism VTE is a common and serious complication of cancer and its treatment. Malignancy is associated with a four fold increased risk of VTE and patients on chemotherapy have a seven fold increase in the risk of VTE. Recurrent VTE is also more common in cancer patients and confers worse prognosis. Patients with advanced cancer are particularly at higher risk of VTE with a significant impact on morbidity and mortality. There is evidence that old age, obesity, previous history of VTE and pre-chemotherapy thrombocytosis & leukocytosis increase the risk of VTE in patients receiving chemotherapy.

Thrombosis may represent the presenting symptom (pancreatic cancer) or complicate a known cancer and increasingly, asymptomatic PE is diagnosed on routine CT imaging and follow up. Conventional treatment should apply, however patients should be stabilised on low molecular weight heparin until full oncological history and prognosis is established. AO team should work in collaboration with Haematology and Radiology to allow the development of common patient pathways.

Symptoms & Signs:
Low index of suspicion is justified in cancer patients.
DVT: recent onset of unilateral leg swelling, pain or tenderness
   Remember, upper limb DVT is not uncommon in patients with central catheters like PICC line
PE: breathlessness, chest pain, collapse, haemoptysis, hypotension, tachycardia, tachypnoea with or without hypoxia.
Commence therapeutic dose of LMWH while waiting for scan results unless there is contraindication like thrombocytopenia or active bleeding.

Investigations:
Doppler Ultrasound is the investigation of choice for suspected DVT. Repeat scan within a week may be needed when initial scan negative with persistent symptoms.
CTPA is the standard investigation for suspected PE.

Initial evaluation:
- Clinical assessment and symptoms
- FBC, U/Ees & LFTs
- Patient/family understanding and expectations
- Previous oncology correspondence/contact detail should be made available in case notes.

Management:
☐ Commence low molecular weight heparin on suspicion
☐ Thrombolysis (streptokinase/urpkinase) is rarely indicated, this needs discussion between senior clinicians.
☐ Information/support
☐ Withhold oral anticoagulation until clarity concerning prognosis and relative contraindications (for example chemotherapy, history of bleeding)
☐ Consider outpatient management for asymptomatic PE
☐ Inform oncologist
☐ Start discharge planning
Patient Referral systems:
Develop radiology alert for unsuspected VTE. Make sure the local radiology department has a system in place to contact the relevant clinician as soon as DVT or PE confirmed particularly in outpatient setting.

Education:
Rolling programme of education aimed at key departments (A&E, MAU, Haematology) and junior doctors

Time to response:
AO clinical review within 24 hours working time for patients who require admission to the hospital (medical and/or nursing)

Specialist referral:
Establish links with haematology, radiology, MAU and A&E
Arrange OP review by the oncologist in charge.

References


Management of

**Venous Thromboembolism**

Caused by Malignant Disease

**Signs and symptoms:** DVT - swelling, pain, redness and warmth. PE – dyspnoea, pleuritic chest pain, retrosternal chest pain, cough, haemoptysis, dizziness and syncope

**Risk factors:** Malignant disease

**Examination:** Clinical history, examination, MEWS observations and calculate score

**Investigations for all patients:** Wells score

**Investigations if clinically indicated:** Proximal leg vein ultrasound scan, D-dimer if this scan cannot be carried out within 4 hours of request or if the result of this is negative, CTPA if suspected PE

---

Positive venous thromboembolism (VTE)

Discuss with the patient’s consultant

**Pharmacological Management**

This will depend on the severity of the episode of VTE and the patient's oncology plan.

- **Commence low molecular weight heparin**, taking into account co-morbidities and contraindications

- **Withhold oral anti-coagulation** until clarity concerning prognosis and relative contraindications (for example chemotherapy, history of bleeding)

Consider treatment according to local policy as an out-patient if the patient has an asymptomatic PE

For patients with a proximal DVT **AND** an ankle pressure greater than 23mmHg

**Mechanical Management**

Offer below knee graduation compression stockings to be worn to the affected leg or legs **one week after** diagnosis or when swelling is reduced sufficiently and if there are no contraindications. Follow local policy regarding ongoing use.
4.3 Spinal Cord Compression

AO Protocol Name: Metastatic Spinal Cord Compression (MSCC)
AO Type: Type I (New Cancer), Type III (Cancer Complication)
Author: ST (NCT AO)

Introduction:
MSCC can cause irreversible paraplegia and be associated with very poor prognosis. Urgent evaluation and investigation is required to decide on optimal treatment. For some patients this may be BSC, however most will receive urgent RT and some patients may benefit from a more aggressive approach of surgery and postoperative RT. In some cases of MSCC secondary to MUO (for example undiagnosed lymphoma) obtaining a histological diagnosis may be appropriate prior to definitive management.

Patient Referral systems (define alerts, referral pathway etc):
Develop MUO alert with radiology:

New MCCN guidelines on MSCC:
Contact the MSCC coordinator at the Walton Centre

Education:
Develop rolling programme of education aimed at key departments and junior doctors. NICE MSCC Guidelines 2008.

Time to response:
Clinical medical review on admission

Initial evaluation:
- Patient/family understanding and expectations
- PS, assessment of neurological status
- Previous Oncology Correspondence/contact detail

Ongoing management:
- Information/support and symptom control with consideration of early PCT involvement
- Start dexamethasone 16mg/24hour with proton pump inhibitor
- Urgent MRI scan whole spine within 24 hour
- Nursing, moving etc advice as per algorithms and network guidelines
- Start discharge planning

Specialist referral:
- Emergency referrals (incipient neurological deficit) requiring immediate opinion: Contact MSCC coordinator at Walton Centre on bleep 5385 (Mon-Fri 9am-5pm) or on call neurosurgical registrar out of hours.
- Fax referral form to 0151 529 6626 and forward scans.
- Urgent referrals (mechanical spinal pain with no neurology) requiring opinion within 24 hours: fax referral form and forward scans and contact the MSCC coordinator
- If informed surgery inappropriate contact on call clinical oncology registrar for opinion on urgent RT at CCC
- Inform patient’s oncologist if known malignancy.
Management of

**Suspected Metastatic Spinal Cord Compression (MSCC)**

Caused by Malignant Disease

**Suspected MSCC Treatment Algorithm**

Urgent senior clinical assessment within **2 hours** – history, physical and neurological examination, fitness to treat

Is the patient fit for treatment (usually radiotherapy, occasionally neurosurgery)?

- **NO**
  - Inform the referring clinician urgently. Contact palliative care specialist/acute oncology team for further management of symptoms. Do not discharge until a full care package/placement is in place.

- **YES**
  - Does the patient have progressive spinal pain with neurological signs (for example weakness, sensory loss, bowel/bladder disturbance?)
    - **NO – Spinal pain only**
      - Refer urgently for urgent spinal assessment as per regional spinal assessment protocols
    - **YES**
      - **Organise MRI urgently.** If contra-indicated, contact Walton Centre 0151 525 3611
      - Identify and inform MRI department who will receive MRI report
      - **Standard** is to have MRI and treatment within **24 hours**

Do they have cancer?

- **NO**
  - Make same day contact with clinician (oncologist/specialist palliative care consultant/site specific team/cancer clinician) actively managing the patient or who patient last saw if not on active treatment

- **YES**
  - **Flag letter ‘SUSPECTED MSCC’** otherwise this may cause delay
  - Agree who will organise an MRI
  - **Standard** – for investigation and treatment to be concluded within **1 week**
    - **Patient to be nursed flat until MRI performed if possible**
    - **Patient to be NBM until surgery ruled out**
    - Communicate ‘suspected MSCC’ if handing over to another team
    - **Refer to confirmed MSCC treatment algorithm, page 55**
Management of

Confirmed Metastatic Spinal Cord Compression (MSCC)

Caused by Malignant Disease

**Confirmed MSCC Treatment Algorithm**

MRI positive for MSCC, cauda equina/impending MSCC

Ring MSCC clinical co-ordinator immediately at the Walton Centre on 0151 525 3611

- Complete referral form and fax to 0151 529 6626. Do not delay contact if you do not have all the details
- Arrange to share scans electronically
- It is the responsibility of referrer to confirm the referral has been received
- Telephone triage with MSCC clinical co-ordinator including: clinical history; presenting symptoms; tumour type; extent of disease; co-morbidity; previous treatments. Discussion will include initial management advice, including moving and handling and medication treatment

**Clinical Decision**

- A senior spinal surgeon and oncologist will discuss the patient and review scans (with a consultant radiologist if appropriate)
- Response to referrer within 2 hours – the service which will take the patient will contact the referrer directly to communicate clinical advice and agree a management plan
- Referrer to send results of bloods (calcium and haemoglobin); scans and notes
- Information about moving and handling advice to be given to patient
- Organise transport (stretcher ambulance)
- Inform Acute Oncology Team and patients oncologist

For surgical assessment?

Transfer to Walton Centre

For radiotherapy?

Transfer to Clatterbridge Cancer Centre

For supportive/palliative care?

Refer for supportive/palliative care

Refer to Management of mobilisation and corticosteroids treatment algorithms, pages 56 and 57 if required

MCCN Acute Oncology Guidelines 2014
Management of Mobilisation

From Metastatic Spinal Cord Compression (MSCC)

Management of Mobilisation Treatment Algorithm

Does the patient have severe mechanical pain suggestive of spinal instability or any neurological symptoms?

NO – patient has confirmed MSCC (spinal shock is settled and neurology is stable)

Is patient suitable for definitive treatment?

NO

Assist patient to position and mobilise as symptoms permit with the aid of orthoses and/or specialist seating to stabilise the spine if appropriate

YES

Patients to be nursed flat with neutral spine alignment (including ‘log rolling’ or turning beds, with the use of bed pans) until bony or neurological stability are ensured and cautious remobilisation may

Is there significant increase in pain or neurological symptoms occur or blood pressure becomes unstable?

NO

Continue with unsupported sitting, transfers and mobilisation as symptoms allow

YES

Carry out close monitoring and interval assessment during gradual sitting from supine to 60 degrees over a period of 3-4 hours

Return them back to a position where these changes reverse and reassess the stability of their spine
Management of **Corticosteroids**

Administered for Metastatic Spinal Cord Compression (MSCC)

**Management of Corticosteroids Treatment Algorithm**

Is the patient to be referred for surgical assessment?

- **NO**
- **YES**

Discuss the use of corticosteroids with the MSCC Co-ordinator on 0151 525 3611

Unless contra-indicated (including significant suspicion of lymphoma) administer a loading dose of Dexamethasone 16mg followed by Dexamethasone 8mg twice a day

Ensure a proton pump inhibitor is prescribed as a gastric protector and monitor blood glucose levels in all patients receiving corticosteroids

Has the patient had surgery, at the start of radiotherapy or for supportive/palliative care?

- **NO**
  - If still awaiting treatment, continue Dexamethasone 8mg twice a day

- **YES**
  - Reduce the dose of daily Dexamethasone gradually over 5-7 days

Has the patient’s neurological function deteriorated at any time?

- **NO**
  - Continue reducing dose of Dexamethasone gradually over 5-7 days and stop

- **YES**
  - Dexamethasone dose to be reviewed and increased temporarily
4.4 Superior Vena Cava Obstruction

**AO Protocol Name:** SVCO  
**AO Type:** Type I (New Cancer), Type III (Cancer Complication)  
**Author:** ST (NCT AO)

**Introduction:**
SVCO may be due to known malignancy (usually SCLC, NSCLC or lymphoma) or be a presentation of MUO. It is rarely an acute emergency and in the absence of critical signs, e.g. stridor, an attempt at a histological diagnosis should be made before treatment. If appropriate, SVC stenting can provide rapid palliation whilst awaiting biopsy.

**Patient Referral systems (define alerts, referral pathway etc):**
Develop MUO alert with radiology:  
Refer to acute oncologist. Inform patient’s oncologist if known malignancy.

**Education:**
Develop rolling programme of education aimed at key departments and junior doctors

**Time to response:**
Clinical review within 24 working hours (medical and/or nursing)

**Initial evaluation:**
- Patient/family understanding and expectations
- PS, assess clinical signs of SVCO including stridor. Organise imaging.
- Previous Oncology Correspondence/contact detail

**Ongoing management:**
- Information/support and symptom control (eg dexamethasone) with consideration of early PCT involvement
- Focussed investigation according to PS, pattern and prognosis: CXR, CT scan of thorax.
- Cancel unnecessary investigations
- Consider SVC stent if rapid relief required. If fit for treatment consider biopsy if presentation of MUO
- Start discharge planning

**Specialist referral:**
- Urgent referral to respiratory MDT for histological diagnosis (Transbronchial or percutaneous guided biopsy)
- Refer to acute oncologist if urgent chemotherapy appropriate (SCLC, lymphoma, Germ Cell Tumours)
- Refer to on call clinical oncology registrar for consideration of palliative RT
Management of

Superior Vena Cava Obstruction (SVCO)

Caused by Malignant Disease

**Signs and symptoms:** Breathlessness, plethora, facial/conjunctival oedema, cyanosis, distension of collateral vessels in neck, dyspnoea, facial/arm swelling, cough, chest pain, dysphagia, stridor
All signs and symptoms are exacerbated by bending forward or lying down. Treatment will usually be palliative and therefore symptom control is foremost in the management of SVCO

**Risk factors:** Malignant disease

**Examination:** History, physical examination, MEWS observations and calculate score, performance status.

**Investigations for all patients:** Chest x-ray, CT thorax, biopsy for histological diagnosis

**If clinically indicated:** FBC, U&Es, LFTs

---

<table>
<thead>
<tr>
<th>Does the patient have a confirmed SVCO?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NO</strong></td>
</tr>
<tr>
<td>• Arrange urgent biopsy and consider stenting (chest physician/radiologist)</td>
</tr>
<tr>
<td>• Inform Acute Oncology Team</td>
</tr>
<tr>
<td><strong>YES</strong></td>
</tr>
<tr>
<td>• Contact relevant clinician (eg chest physician, oncologist, haematologist)</td>
</tr>
<tr>
<td>• Inform Acute Oncology Team</td>
</tr>
</tbody>
</table>

SCLC/Lymphoma
- Dexamethasone 6mg twice a day
- Chemotherapy
- Palliative radiotherapy

NSCLC
- Dexamethasone 6mg twice a day
- Stent
- Palliative radiotherapy

Unknown malignancy
- Dexamethasone 6mg twice a day
- Stent
- Palliative radiotherapy

Ensure follow-up with relevant patient’s oncologist
4.5 Hyponatraemia

**AO Protocol Name:** SIADH/hyponatraemia  
**AO Type:** Type II (Chemo Complication), Type III (Cancer Complication)  
**Author:** RWG  

**Introduction:**  
Hyponatraemia is the most commonly observed electrolyte abnormality and is associated with excess in-hospital mortality. Hyponatraemia is usually a consequence of water excess because of a failure in renal water excretion rather than a sodium deficit. In cancer patients, this can occur as a result of ectopic ADH (anti-diuretic hormone) production from the cancer or as a side effect of drug therapy. Hyponatraemia in the context of euvalaeia is usually caused by excess ADH secretion (e.g. ectopic secretion) or by enhancing the sensitivity of the renal tubules to the effects of physiologically released ADH (e.g. cyclophosphamide, NSAIDs). Hypovolaemia can also cause hyponatraemia through the action of baroreceptors stimulating appropriate ADH release. Some hypervolaemic states such as cardiac failure, renal failure, nephrotic syndrome and liver cirrhosis can cause hyponatraemia through due to impaired clearance of water relative to sodium. Careful assessment of the patients fluid balance, serum/plasma osmolalities and renal sodium excretion are therefore key to elucidating the cause of hyponatraemia and implementing appropriate management.

### Common causes of hyponatraemia in cancer patients

<table>
<thead>
<tr>
<th>Euvolaemic</th>
<th>Hypovolaemic</th>
<th>Hypervolaemic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ectopic ADH production</td>
<td>Vomiting</td>
<td>Cardiac failure</td>
</tr>
<tr>
<td>Drugs</td>
<td>Acute renal failure</td>
<td>Chronic renal failure</td>
</tr>
<tr>
<td>Cisplatin*</td>
<td>Salt wasting states</td>
<td>Nephrotic syndrome</td>
</tr>
<tr>
<td>Cyclophosphamide</td>
<td>CNS metastases</td>
<td>Cirrhosis</td>
</tr>
<tr>
<td>Vinca alkaloids</td>
<td>Meningitis</td>
<td></td>
</tr>
<tr>
<td>Opioids</td>
<td>Cisplatin*</td>
<td></td>
</tr>
<tr>
<td>Antidepressants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antipsychotics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antiepileptics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSAIDs</td>
<td></td>
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</tr>
</tbody>
</table>

*Head trauma  
Hypothyroidism  
Encephalitis  
Pneumonia  
Tuberculosis  
Strenuous physical exercise  
Demyelinating conditions  
Nausea  
Pain

*Cisplatin can cause inappropriate ADH release in addition to causing a salt wasting state. Differentiation of these two states is essential to implement appropriate management

### Implications of hyponatraemia

Hyponatraemia has long been recognized as associated with excess mortality in a hospital inpatients and a range of malignancies. Furthermore, patients with chronic hyponatraemia are affected by impaired quality of life and suffer from a range of neurocognitive symptoms. Acute or severe hyponatraemia can be life threatening and requires urgent management.
Approach to Investigation and Diagnosis of Hyponatraemia

Na < 130mmol/l

Diagnostics are essential!
Serum: U&E, PO₄³⁻, uric acid, glucose, TSH, cortisol, osmolality
Urine: Na⁺, K⁺, osmolality

Serum osmolality <280 mOsm/kg

Serum osmolality >280 mOsm/kg

Pseudohyponatraemia
Check cholesterol/lipids/glucose
Exogenous compounds? e.g. mannitol

Urine osmolality >100 mOsm/kg

Urine osmolality <100 mOsm/kg

Inappropriate Antidiuresis

Appropriate renal dilution – excessive water intake?

Assess Volume Status

Hypovolaemia
Physical exam
Cr and uric acid high
Urine Na <10mmol/l when due to dehydration
Urine Na >20mmol/l when due to renal salt wasting

Euvolaemia
Physical exam
Cr and uric acid low
Urine Na >30mmol/l

Hypervolaemia
Physical exam
Cr and uric acid low
Urine Na <10mmol/l

Euvolaemic Hyponatraemia
Treat as SIADH
Stop any medications contributing
Review cortisol and TFT
Implement immediate management as defined below
**Initial Approach**
Management of hyponatraemia is very dependent on its aetiology. The flowchart describes the initial investigations required to accurately identify the cause of hyponatraemia. Management is aimed at addressing the underlying cause but severe (Na⁺ <125mmol/l) or symptomatic hyponatraemia may require urgent treatment to increase the serum sodium.

**Management of confirmed SIADH**
Patients presenting with depressed level of consciousness, coma or seizures should be considered for management in an intensive care environment. Such patients should be considered for the use of hypertonic (3%) saline. Other patients can be managed by fluid restriction and/or medications to correct sodium homeostasis.

**Use of hypertonic (3%) saline**
Hypertonic saline should not be routinely used in the management of hyponatraemia. It is only considered for patients presenting acutely with severe neurological symptoms, coma or seizures. 3% saline needs to be administered via a central vein with critical care support. Aim to increase sodium by no more than 12mmol/l in a 24 hour period. To define the infusion rate first calculate the sodium deficit:

\[
\text{Sodium deficit} = (\text{Desired Na}^+ - \text{Actual Na}^+) \times \text{body weight (kg)} \times \begin{bmatrix} 0.6 \\ 0.45 \end{bmatrix}
\]

The infusion rate in millilitres per hour is the Na⁺ deficit/12.312

For example a 45 kg woman with a sodium of 106. The desired sodium is 118 after 24 hours.

\[
\text{Sodium deficit} = 12 \times 45 \times 0.45 = 248 \\
\text{Infusion rate} = \frac{248}{12.312} = 20\text{ml/hr}
\]

Check serum Na⁺ and osmolality regularly

**Fluid Restriction**
Aim to correct sodium by no more than 12mmol/l per 24 hours. A faster rise may cause irreversible central pontine myelinolysis, particularly in patients with chronic hyponatraemia.

Fluid restriction is the mainstay of therapy unless V2 receptor antagonists are being used. To calculate the degree of fluid restriction, the free water clearance calculation can be used:

\[
\text{Free water clearance} = \frac{\text{Na}_{\text{urine}} + \text{K}_{\text{urine}}}{\text{Na}_{\text{serum}}}
\]

<table>
<thead>
<tr>
<th>Liquid restriction</th>
<th>Amount per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;1</td>
<td>fluid restriction alone unlikely to work – consider use of V2 receptor antagonist if available</td>
</tr>
<tr>
<td>0.5-1.0</td>
<td>500ml per day</td>
</tr>
<tr>
<td>&lt;0.5</td>
<td>1000ml per day</td>
</tr>
</tbody>
</table>

**Drug therapy**
Demeclocycline is a tetracycline antibiotic that causes nephrogenic diabetes insipidus. It is unlicensed for treatment of SIADH. The dose used is 150-300mg qds. It has an effect in around 60% of patients, can cause reversible renal dysfunction and photosensitive skin rashes.

Tolvaptan is an oral V2 receptor antagonist and directly blocks the effect of ADH on its receptor. It promotes a rapid aquaresis and therefore patients are encouraged to drink adequate amounts of water. Dose is 15mg a day and it is recommended that patients are admitted overnight in hospital for the first dose to avoid too rapid a rise in sodium. Over
correction or too rapid correction is rare and usually only seen when there is co-existing hypovolaemia. It is therefore important to ensure that patients are well hydrated. If too rapid correction of Na occurs (>12mmol/l per 24 hours or >18mmol/l in 48 hours) then give 5% dextrose intravenously. Tolvaptan is only recommended for short term (<4 weeks) treatment of SIADH induced hyponatraemia. Side effects are thirst, dehydration, hyperglycaemia and hepatotoxicity. As of Q1 2014, there is no central commissioning agreement in place to fund the drug.
4.6 Acute Kidney Injury

AO protocol name: Acute Kidney Injury
AO type: type II & III
Author: Abdallah (COCH)

Introduction:
Acute kidney injury (AKI) is rapid impairment of renal function resulting in fluid and electrolyte disturbance, elevation in serum urea and creatinine and failure to excrete certain metabolic waste products normally excreted by the kidney.
AKI is common among cancer patients particularly the older ones, often due to a combination of factors which could be as a complication of the underlying cancer or secondary to the use of nephrotoxic drugs. One study showed that over 20% of cancer patients may experience AKI during the first year after diagnosis with higher incidence and worse prognosis among critically ill cancer patients due to its association with multi organ dysfunction in this setting. AKI may preclude cancer patients from receiving optimal anticancer drugs and is associated with high morbidity and mortality compared with non-cancer patients.

Types of AKI:
Pre renal: dehydration/hypovolemia due to diarrhoea, vomiting and sepsis
Renal: mainly due to nephrotoxic drugs including chemotherapy, bisphosphonate and NSAIDs. Tumour lysis syndrome and myeloma can cause intrinsic renal failure also.
Post renal: urinary tract obstruction due to cancer infiltration by tumours like prostate, bladder uterus and cervix.

Presentation:
Post chemotherapy nausea, vomiting, diarrhoea, mucositis and reduced oral intake leading to dehydration and volume depletion.
Nephrotoxicity post chemotherapy without dehydration
Sepsis
Oliguria due to renal tract obstruction
Tumour lysis syndrome should be suspected in rapidly proliferating cancers like haematological malignancies particularly after initiation of cytotoxic chemotherapy
Symptoms of uraemia include lethargy, general malaise, anorexia, nausea & vomiting, and muscle cramps. AKI could be asymptomatic.
Incidental finding on routine blood test

Anticancer drugs at high risk of nephrotoxicity:
• Cisplatin
• Mitomycin
• Methotrexate
• Ifosfamide
• Gemcitabine
• Streptozotocin
• Bisphosphonate
**Evaluation & Investigations:**
Cancer patients with AKI require detailed history including drug history, pre-existing renal function and careful clinical assessment of volume status in order to identify possible causes and reversibility.

- Serial blood tests including U&Es, estimated GFR, calcium, phosphate, magnesium and FBC
- Urinalysis
- ECG
- Infection screen if sepsis suspected
- Renal tract US
- Non-contrast CT

**Management:**
- Involve renal physicians in managing AKI particularly in severe cases and in patients with good prognosis malignancy.
- Patients with life threatening complications of AKI like hyperkalemia, metabolic acidosis or volume depletion should be admitted and treated immediately.
- Hyperkalemia requires immediate treatment with calcium chloride, intravenous insulin and glucose. Hypocalcemia is also common mainly due to increase in serum phosphate level.
- Patients with volume depletion should be commenced on IV fluids like normal saline as soon as possible
- Urinary catheterisation for patients with urinary retention. Urology referral may be required.
- Renal dialysis reserved for patients with hyperkalemia or rapidly rising potassium, metabolic acidosis and volume overload not responding to medical therapy.

**References:**

1. Incidence of acute kidney injury in cancer patients: A population-based cohort study in Denmark. J Clin Oncol 27:15s, 2009 (suppl; abstr 9570)
Management of

**Acute Kidney Injury**

**Signs and symptoms:** Oliguria, raised serum urea and creatinine

**Risk factors:** Dehydration, anti-cancer systemic treatments, nephrotoxic drugs (for example cisplatin, NSAIDS, aminoglycosides), ureteric obstruction from a pelvic tumour

**Examination:** Clinical history, examination, MEWS observations and calculate score

**Investigations for all patients:** U&Es, urinalysis

**Investigations if clinically indicated:** Renal tract USS within 24 hours (if renal tract obstruction is suspected)

---

**Acute Kidney Injury is defined as:-**

- Serum creatinine rises by ≥ 26µmol/L within 48 hours OR
- Serum creatinine rises ≥1.5 fold from the reference value, which is known or presumed to have occurred within one week OR
- Urine output is <0.5ml/kg/hr for > 6 consecutive hours

---

**Is medical intervention appropriate?** (maybe inappropriate if patient is terminally ill with advanced cancer)

- **No**
  - Consider referral to palliative care team

- **Yes**
  - Commence immediate medical management, for example:-
    - IV fluids for hypovolaemia
    - treat hyperkalaemia
    - stop nephrotoxic drugs
    - urgent USS to exclude obstruction
    - treat any underlying sepsis

---

**Refer to oncall urologist if obstruction present: nephrostomy or utereric stent?**

**Refer to Acute Oncology Team if first presentation of cancer or opinion needed, for example appropriateness of ureteric stents or dialysis**

---

**Is medical management effective?**

- **No**
  - Early referral to renal physicians as may need dialysis

- **Yes**
  - Continue

---

Early Palliative Care Team involvement if required

**Inform patient’s oncologist**
4.7 Pleural Effusion

**AO Protocol Name:** Pleural effusion  
**AO Type:** Type I (New Cancer), Type III (Cancer Complication)  
**Author:** ACM (NCT AO)

**Introduction:**
Pleural effusion may be due to known malignancy or be a presentation of MUO. It is rarely an acute emergency and in the absence of critical signs, an attempt at a histological diagnosis should be made before treatment (chest drain/pleurodesis). Aspiration can provide rapid relief and also cytological confirmation of malignancy.

**Patient Referral systems (define alerts, referral pathway etc):**
- Develop MUO alert with radiology:  
- Refer to acute oncologist. Inform patient’s oncologist if known malignancy.  
- Involve respiratory physicians and consider referral to Liverpool Heart and Chest hospital

**Education:**
Develop rolling programme of education aimed at key departments and junior doctors

**Time to response:**
Acute oncology review within 24 working hours (medical and/or nursing)

**Initial evaluation:**
- Patient/family understanding and expectations  
- PS, assess clinical signs. Organise imaging.  
- Previous Oncology Correspondence/contact detail

**Ongoing management:**
- Information/support and symptom control with consideration of early PCT involvement  
- Focussed investigation according to PS, pattern and prognosis: CXR, staging CT scan  
- Consider pleurodesis once diagnosis confirmed  
- Start discharge planning

**Specialist referral:**
- Urgent referral to appropriate MDT for histological diagnosis  
- Refer to acute oncologist or arrange review by patient’s own oncologist (if relapse)
Management of

**Malignant Pleural Effusion**

Caused by Malignant Disease

**Signs and symptoms:** Dyspnoea, chest pain, cough

**Risk factors:** Malignant disease

**Examination:** History, physical examination, MEWS observations and calculate score, assessment of performance status, life expectancy and history of previous effusions and management and outcomes

**Investigations for all patients:** Chest x-ray and comparison with previous imaging

**If clinically indicated:** FBC, U&Es, clotting

```
Confirmed malignant pleural effusion

Is it a recurrence or are they symptomatic?

NO

Observe

YES

Seek specialist opinion from a member of the thoracic malignancy team and Acute Oncology Team

Drainage

- Use intercostal tube – small bore (10-14F)
- Preferably under ultrasound guidance
- Drain up to 1.5litres each session according to tolerance and symptoms

Perform chest x-ray

Is there complete lung re-expansion?

NO

YES

Consider:-

- Thoracoscopy
- Long term indwelling catheter
- Pleuroperitoneal shunt

Perform Chemical pleurodesis

Recurrence of effusion?

NO

YES

Consider

- Repeated pleurodesis
- Thoracoscopy
- Long term indwelling catheter
- Pleuroperitoneal shunt

Ongoing management. Ensure follow-up with relevant primary oncologist
```
4.8 Pericardial Effusion

**AO Protocol Name:** Pericardial effusion  
**AO Type:** Type I (New Cancer), Type III (Cancer Complication)  
**Author:** M. Varey (RLUH AO)

**Introduction:**  
Pericardial effusion may be due to known malignancy or be a presentation of MUO. It can be an acute emergency and with critical signs, urgent drainage is necessary.

**Patient Referral systems (define alerts, referral pathway etc):**  
- Refer to acute oncologist. Inform patient’s oncologist if known malignancy.

**Education:**  
Develop rolling programme of education aimed at key departments and junior doctors

**Time to response:**  
Acute oncology review within 24 working hours (medical and/or nursing)

**Initial evaluation:**  
- Refer to cardiologist regarding possible drainage; ask for fluid to be sent for cytology  
- Patient/family understanding and expectations  
- PS, assess clinical signs. Organise imaging.  
- Previous Oncology Correspondence/contact detail

**Ongoing management:**  
- Information/support and symptom control with consideration of early PCT involvement  
- Focussed investigation according to PS, pattern and prognosis  
- Start discharge planning

**Specialist referral:**  
- Cardiologist/ Liverpool Heart and Chest hospital  
- Arrange review by patient’s own oncologist (if relapse)
Management of

**Malignant Pericardial Effusion**

Caused by Malignant Disease

**Signs and symptoms:** Chest pain, lightheadedness, palpitations, cough, dyspnoea, fatigue

**Risk factors:** Malignant disease

**Examination:** History, physical examination, assess clinical signs and performance status, TPR, BP, oxygen saturations

**Investigations for all patients:** Echocardiography, ECG, chest x-ray

**If clinically indicated:** Drainage fluid for cytology, pericardiocentesis

---

- **Confirmed malignant pericardial effusion**
  - Refer to cardiologist regarding possible drainage. Ask for fluid to be sent for cytology
  - Consider referral to Palliative Care Team
  - Focus investigation according to performance status, pattern and prognosis
4.9 Lymphangitis Carcinomatosis

AO Protocol Name: Lymphangitis Carcinomatosis
AO Type: Type I (New Cancer), Type III (Cancer Complication)
Author: A. Chaffe (NCT AO)

Introduction:
Pulmonary lymphangitis carcinomatosis is a metastatic lung disease characterised by diffuse spread of the tumour to the pulmonary lymphatic system. Common locations of the primary tumours are breast, stomach, lungs and pancreas. It often presents with breathlessness and a non-productive cough. CXR can be normal. Prognosis is generally poor but steroids and appropriate cytotoxic therapy maybe of benefit.

Patient Referral systems (define alerts, referral pathway etc):
- Develop MUO alert with radiology:
- Refer to acute oncologist. Inform patient’s oncologist if known malignancy.

Education:
Develop rolling programme of education aimed at key departments and junior doctors

Time to response:
Acute oncology review within 24 working hours (medical and/or nursing)

Initial evaluation:
- Patient/family understanding and expectations
- PS, assess clinical signs. Organise appropriate imaging.
- Previous Oncology Correspondence/contact detail

Ongoing management:
- Information/support and symptom control with consideration of early PCT involvement
- Start discharge planning

Specialist referral:
- Urgent referral to appropriate MDT if histological diagnosis needed
- Refer to acute oncologist or arrange review by patient’s own oncologist (if relapse)

References:

Management of Lymphangitis Carcinomatosis

Caused by Malignant Disease

**Signs and symptoms:** Dyspnoea, dry cough

**Risk factors:** Malignant disease

**Examination:** History, physical examination, TPR, BP, oxygen saturations

**Investigations for all patients:** Chest x-ray and comparison with previous imaging, sputum culture to exclude concomitant infection

**If clinically indicated:** FBC, U&Es

---

**Are there typical chest x-ray features of lymphangitis carcinomatosis with other reversible causes excluded (for example, infection, effusion)?**

- **NO**
  - Exclude reversible causes

- **YES**
  - Does the patient have known malignancy?

- **NO**
  - CT of chest/abdomen/pelvis
  - Consider a mammogram
  - Refer to relevant MDT and Acute Oncology team

- **YES**
  - Obtain latest correspondence from CCC
  - Oxygen
  - Dexamethasone, consider 4mg twice a day (with breakfast and lunch)
  - Oramorph, consider 5mg/2.5ml for dyspnoea
  - Consider referral to palliative care team for support
  - Review by Acute Oncology team within 24 hours

---

Follow-up review with patient’s oncologist
4.10 Abdominal Ascites

**AO Protocol Name:** Abdominal Ascites  
**AO Type:** Type I (New Cancer), Type III (Cancer Complication)  
**Author:** HNW (S&O AO)

**Introduction:**
Ascites is the accumulation of fluid within the peritoneal cavity with the commonest cause actually secondary to benign liver cirrhosis and portal hypertension. Approximately, 10% of ascites cases are due to malignancy, most commonly from primary ovarian, colon, stomach, pancreas, lung and breast cancers but it can also be associated with primary liver or peritoneal cancers. Ascites can be caused by occlusion of the draining lymphatic channels by malignant cells, massive liver metastases causing portal hypertension, or primary liver cancer in the setting of cirrhosis. Ascites can be extremely distressing to the patient and cause: abdominal swelling and bloating, nausea, vomiting, constipation, shortness of breath (due to pressure on the diaphragm), pain, anorexia, fatigue, peripheral oedema, heartburn, and weight loss. Mean survival once malignant ascites is diagnosed is approximately 1 to 4 months, though may be longer in ovarian cancer associated ascites, and treatment should be aimed at improving quality of life.

**Patient Referral systems (define alerts, referral pathway etc):**
- Refer to acute oncology service on day of admission.

**Education:**
Develop rolling programme of education aimed at key departments and junior doctors

**Time to response:**
Acute oncology review within 24 working hours (medical and/or nursing)

**Initial evaluation:**
The aim of the initial investigations is to:
1. Diagnose the underlying condition causing ascites, whether benign or malignant, and
2. for patients not previously diagnosed with malignancy, to direct investigations which will lead to diagnosing the primary malignancy, assuming the patient is fit enough to undergo active management of cancer.

**Investigations advised:**
1. Blood tests for FBC, LFT and U+E to exclude anaemia, infection, hypoalbuminaemia, liver and renal dysfunction.
2. If infection is suspected, ascitic fluid can be analysed for cell counts and culture of microorganisms.
3. On first presentation, cytology of ascitic fluid can be performed.
4. Tissue diagnosis following biopsy of solid tumour is necessary in establishing the diagnosis. The decision to do this rests with the Acute Oncology/CUP Consultant as invasive tests to determine the primary malignancy should only be recommended if patient is fit enough for cancer treatment, which will be palliative, and patient wishes to pursue based on this information.
5. Therefore on initial presentation, a CT scan is required to further identify the disease process, and in the case of malignancy, aid identification of a primary tumour and stage disease.
6. Prior to paracentesis, a coagulation profile is required.
7. Tumour markers have poor sensitivity and specificity and are not recommended. However should an ovarian or bowel mass be identified on CT scanning, CA 125 and CEA tests are then appropriate.
Ongoing management: management is aimed at relieving patient's symptoms

i. **Information** and support to patient and family.

ii. Consider involvement of **Palliative Care Team**.

iii. **Paracentesis** if clinically indicated. This is the mainstay of managing malignant ascites, and may need to be done under Ultrasound guided conditions. Paracentesis of up to 5L of ascites can be safely carried out with minimal risk of hypotension and renal failure providing quick relief of symptoms, such as distension, dyspnoea, nausea, early satiety and constipation. Larger volume paracentesis may require clamping after every 4-5 L to allow time for the haemodynamic system to adjust. It is important to emphasise that, unlike benign ascites, intravenous fluid replacement is largely not required to prevent hypotension in patients undergoing paracentesis for malignant ascites, (who do not also have portal hypertension). Ensure patient has adequate analgesia through the process and strict fluid balance monitoring is required whilst the drain is in-situ. In competent hands, paracentesis carries a low risk of complication, however the following are all possible adverse outcomes: bacterial peritonitis, loculation of the ascites, inadvertent puncturing of an organ with ascitic needle, and adhesions. **Contraindications to paracentesis** include: disseminated intravascular coagulation and clinical evidence of fibrinolysis. **Relative contraindication** includes severe bowel distension and previous extensive abdominal/pelvic surgery.

iv. **Diuretics** are useful only in 50% of cases. Spironolactone at a starting dose of 100mg per day (less may be needed in elderly, frail patients). Ensure monitoring of renal function and titrate up, every 3 days, to 400mg maximum per day. It can take 3 to 4 days to work. If no benefit at 400mg per day, add in furosemide 40 to 80mg, with renal function monitoring.

v. **The PleurX® peritoneal catheter** and drainage system has recently been approved by NICE for use in patients with recurrent malignant ascites. The device consists of a silicone peritoneal catheter that is permanently placed inside the abdominal cavity with a cuff that is placed subcutaneously with a safety valve on the abdominal wall of the patient. A vacuum bottle can be intermittently attached to the port to enable drainage of ascitic fluid by the patient or their carer in the community and reduce hospitalisation. When not in use the valve is covered with a cap and a simple dressing. Whilst initially costing more than simple paracentesis, due to admission avoidance, it is potentially more cost effective, and avoids repeat admissions for patients, leading to enhanced quality of life.

vi. Peritoneo-venous shunts have been used effective in patients with expected longer median survival (months rather than weeks). Surgical input is required. Side effects can be significant, such as pulmonary embolism, coagulation disorders, infection and shunt blockage.

vii. Octreotide may be useful in chylous ascites, at a dose of 200 to 600 micrograms/24 hours, via continuous subcutaneous infusion.

viii. Cytotoxic therapy. Treatment of the underlying malignancy with chemotherapy, surgery or biological agents can be helpful in reducing risk of recurrent ascites, especially in breast or ovarian cancers. Peritoneal dissemination of primary gastro-intestinal cancers (stomach and pancreas), lung cancer or unknown primary cancers are associated with a very poor prognosis, and treatment of the primary is not usually appropriate.
Management of Abdominal Ascites Caused by Malignant Disease

**Signs and symptoms:** Abdominal bloating/swelling, pain, nausea, vomiting, anorexia, fatigue, peripheral oedema, heartburn, dyspnoea, weight loss

**Risk factors:** Malignant disease

**Examination:** History, physical examination, TPR, BP, oxygen saturations

**Investigations for all patients:** FBC, U&Es

**If clinically indicated:** Clotting screen if the patient is bleeding, has liver metastases, is jaundiced or is on anticoagulant therapy, Ultrasound prior to paracentesis if there is diagnostic uncertainty or suspected loculation of fluid. Computerised tomography and/or magnetic resonance imaging

Management should be aimed at maximising patient comfort and quality of life

---

**Diuretic Therapy**
- Check U&Es before and throughout diuretic therapy
- **Spironolactone** 100-400mg is first choice
- Consider lower dose for elderly patients and titrate according to individual response
- It may take 3-5 days to get a response
- The dose should be increased every 3-7 days in 50mg-100mg increments to a maximum of 400mg a day
- If there is no improvement - **ADD Frusemide** 40mg-80mg daily

---

If the patient is resistant to diuretics or for control of acute symptoms

**Therapeutic Paracentesis**
- Check FBC, U&Es and clotting screen if indicated and weigh the patient
- Empty the bladder. Analgesia should be available before, during and after procedure
- Perform paracentesis and drain fluid as quickly as is comfortable for the patient, limited only by their clinical condition. Clamping of the drain is often not required. Perform strict fluid balance
- Remove the drain when no longer in use and weigh the patient
- May be necessary to repeat paracentesis for ongoing symptom control
- **Contra-indications:** disseminated intravascular coagulation and clinical evidence of fibrinolysis. Relative contraindication includes severe bowel distension and previous extensive abdominal/pelvic surgery

---

**Consider ambulatory drainage or Peritoneovenous shunts**
To be considered if recurrent ascites is the main clinical problem and prognosis is measured in months rather than weeks. This may limit the need for diuretics and paracentesis

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**Octreotide**
Useful in chylous ascites. The dose is 200-600 micrograms via a continuous subcutaneous infusion over 24 hours

---

**Cytotoxic Therapy**
May be of benefit of the primary disease is known to be responsive to cytoxics
5.1 Central Venous Access Devices (CVAD)

Management of Exit site Inflammation/Phlebitis

Caused by Central Venous Access Devices (CVAD)

**Signs and Symptoms:** Pyrexia, vein hard on palpation, swelling at and above exit site, change in colour or tenderness at exit site of CVAD, exudate at exit site, raised WCC and CRP

**Examination:** Clinical history, examination, temperature

**Investigations:** FBC, CRP, venous blood for aerobic and anaerobic cultures peripherally to be taken and first and then immediately via CVAD

**If Clinically Indicated:** CVAD exit site culture swabs

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**Signs and symptoms suggestive of exit site inflammation/phlebitis**

- Apply alternate hot/cold compress to the affected area
- Cleanse the area using a 2% Chlorhexidine and 70% alcohol applicator (Chlorprep) and re-dress the device using a skin fixing device and moisture permeable dressing to prevent movement and enable observation in case of mechanical phlebitis
- Ensure daily observation

Have the symptoms resolved?

**NO**
- Monitor for signs of infection and swab the exit site if exudate present
- Discuss with Medical Microbiologist
- Assess the need for CVAD and consider re-siting
- Seek advice from Acute Oncology Team or local trust IV and Interventional Procedure CNS. If further advice needed phone CCC IV and Interventional Procedures CNS 0151 334 1155 bleep 4095 (Monday to Friday 9am – 5pm)

**YES**
- Proceed with caution as long as there are no other complications or pain

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Management of

**Systemic Infection**

Caused by Central Venous Access Devices (CVAD)

**Signs and symptoms:** Fever and chills without other apparent reason, malaise, nausea and vomiting, low grade pyrexia, unresponsive to broad spectrum antibiotics, headache, raised WCC and CRP, maybe discharge from exit site or no evidence of sepsis at catheter site

**Examination:** Clinical history, examination, temperature

**Investigations:** FBC, CRP, venous blood for aerobic and anaerobic cultures peripherally and via CVAD

**If Clinically Indicated:** CVAD exit site culture swabs, wound swabs, sputum and urine cultures

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Signs and symptoms suggestive of systematic infection

- Monitor site daily
- Continue to use strict asepsis and needle free system
- Take peripheral venous blood cultures and from CVAD
- Treat with IV antibiotics or combination of oral and IV’s as indicated in local policy or by Medical Microbiologist
- CVAD may be used to administer IV antibiotics

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Have the symptoms resolved?

**NO**

- Swab catheter site, any wound, sputum and urinalysis
- Line lock if clinically well to salvage line
- Discuss with Medical Microbiologist
- Assess the need for CVAD and patient’s immune system
- Seek advice from Acute Oncology Team or local trust IV and Interventional Procedure CNS. If further advice needed phone CCC IV and Interventional Procedures CNS 0151 334 1155 bleep 4095 (Monday to Friday 9am – 5pm)

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**YES**

Proceed with caution as long as there are no other complications or pain
Management of Persistent Withdrawal Occlusions (PWO)

Of Central Venous Access Devise (CVAD)
(fluids can be infused freely by gravity but blood cannot be withdrawn)

Blood return is absent

Check the line for position, kinking, unclamp any clamps, massage length of catheter

Ask the patient to cough, take deep breaths, change position – stand up or lie down with the foot of the bed tipped up. Ascertain possible causes of PWO

Blood return is obtained?

NO

Flush CVAD with 0.9% sodium chloride in 10ml/20ml syringe using a push-pull motion. Check for flashback of blood

Use CVAD as usual

YES

Are you able to flush CVAD?

NO

Can you withdraw blood?

NO

Proceed with caution as long as there are no other complications or pain

YES

Refer to Blocked an Occluded CVAD Treatment Algorithm page 75

Can you withdraw blood?

NO

Is the patient to receive highly irritant/vesicant drugs or chemotherapy?

NO

Proceed with caution as long as there are no other complications or pain

YES

Step 1

Administer a 250ml normal saline “challenge” (unless serum sodium ≤120mmol/l) via an infusion pump over 15 minutes to test for patency – the infusion will probably not resolve the lack of blood return (unless the patient has a high sodium or fluid restricted go to step 2).

If there have been no problems, therapy can be administered as normal. If the patient experiences ANY discomfort or there is any unexplained problems then stop and seek medical advice. If may be necessary to verify tip local by chest x-ray.

OR

Step 2

Infuse Urokinase 10000iu in 3.5mls, using the push lock method over a 30 minute period. Withdraw the urokinase and assess the catheter again. Repeat as necessary. If blood return is still absent, it may be necessary to verify tip location by chest x-ray.

Seek advice from Acute Oncology Team or local trust IV and Interventional Procedure CNS.

Push Lock Method
Reconstitute Urokinase 10,000iu in 3.5ml / 0.9% sodium chloride for each lumen

Lock each lumen with 2.5ml 0 mins

Push 0.5ml solution/lumen 10 mins

Push 0.5ml solution/lumen 20 mins

Aspirate lumen 30 mins

MCCN Acute Oncology Guidelines 2014
Management of Blocked and Occluded Central Venous Access Devices (CVAD)

Unable to flush with 0.9% sodium chloride

Check the line for position, kinking, unclamp clamps, massage length of catheter

Ask the patient to cough, take deep breaths, change position – stand up or lie down with the foot of the bed tipped up.

Are you able to flush the CVAD?

NO

Attach a 3 way tap to end of the catheter, add on an empty 10ml syringe to 1 port and to the 2nd port a 10ml syringe with Urokinase 10,000 units/2ml

Can you withdraw blood?

NO

Attempt to unblock the catheter using a negative pressure

When Urokinase has been draw into catheter clamp and leave for 1-2 minutes

Attach empty syringe and attempt to aspirate clots

Is blood obtained?

NO

Instil a 2nd Urokinase dose and leave for a longer period (for example overnight)

Is blood obtained?

NO

Withdraw a minimum of 10mls and discard. Flush the catheter with 10ml sodium chloride using pulsating flush and then with hepsal

YES

YES

If occlusion cannot be removed the catheter is no longer patent. It may be necessary to remove the catheter if a single lumen or multi-lumen to refrain from using the blocked lumen. This should be discussed with the interventional radiologist in x-ray to determine if catheter can be salvaged

NO

Use CVAD as usual

Refer to Persistent Withdrawal Occlusions Treatment Algorithm page 74

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<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AO</td>
<td>Acute Oncology</td>
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<tr>
<td>BP</td>
<td>Blood pressure</td>
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<td>BSC</td>
<td>Best Supportive Care</td>
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<td>Clatterbridge Cancer Centre</td>
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<td>CHF</td>
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<td>CRP</td>
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<td>CUP</td>
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<tr>
<td>CVAD</td>
<td>Central Venous Access Device</td>
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<td>Chest x-ray</td>
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<td>Nil by mouth</td>
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