Kent and Medway Cancer Network

Network Document

Systemic Anti-Cancer Therapy Workbook part 2

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Document Administration

Acknowledgements

With grateful thanks to the **Yorkshire Cancer Network** for their permission to adapt the **Yorkshire Cancer Network Chemotherapy Education Programme workbook**

Approval Record

Approval Date	Name / Title	Signature

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Document Location

The document is located in the Kent and Medway Cancer Network office, in hardcopy and electronic format. It can be found on the Kent and Medway Cancer Network website

http://www.kentmedwaycancernetwork.nhs.uk/home-page/for-professionals/

DATE OF NEXT REVIEW

This item is next to be reviewed on April 2014 (by) Network Nursing and Pharmacy sub group of the Network Chemotherapy Group

Revision History

Date	Version	Status	Author	Summary of Changes
02/03/12	2	Live	Paula Kuzbit	Major revision

PERSONAL DETAILS AND RECORD OF LEARNING

Name of Learner	
Name of Mentor	
Name of Assessor	
Date Commenced Workbook	
Date Completed Workbook	

INTRODUCTION TO WORKBOOK 2

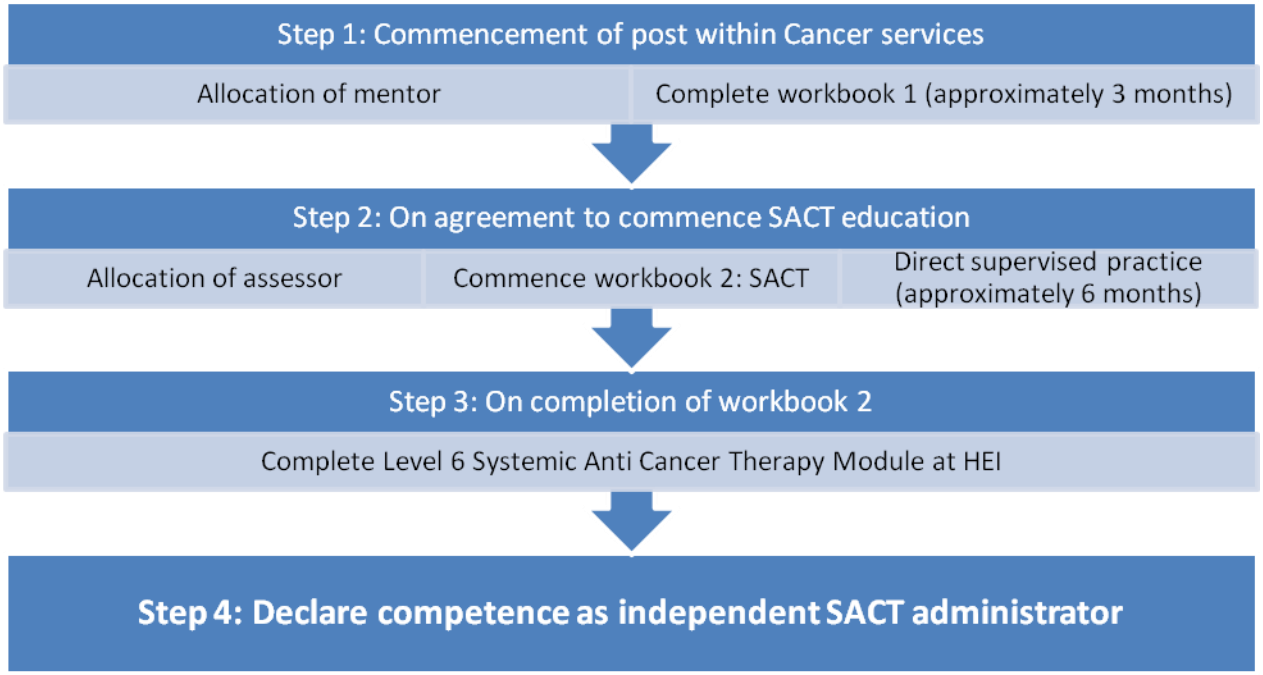
How to use the work book

- The work book is intended to introduce nurses to Systemic Anti-Cancer Therapy (SACT) and the associated supportive care requirements and is part 12 of the network agreed process for becoming a competent cancer nurse and SACT administrator.

- It is intended that through enhancing your theoretical knowledge in conjunction with developing your clinical nursing and technical skills, that a high standard of considered nursing care and intervention will be provided.

- The workbook is a step-by-step guide to SACT care. The aim is to provide you with introductory information, and then to set out tasks and questions for you to independently pursue.

- Successful completion of Workbook 2 and approval by your line manager will enable you to continue your professional development into the administration of Systemic Anti Cancer Therapy:



NB Experienced cancer/SACT nurses may be able to skip directly to step 3 or 4 with agreement from their line manager and Lead Chemotherapy Nurse and proof of competence

Aim and Learning Outcomes

Aim

This workbook is designed for registered nurses who have experience in cancer care and in order to fulfil their job role are required to develop their knowledge of Systemic Anti Cancer Therapy (SACT) and the required supportive care of patients receiving these treatments.

The Learner should use the Workbook with the guidance and support of a named Mentor and Assessor. Practical and theoretical learning should take place simultaneously.

Organisational Aim:

- To develop high quality, evidence based and standardised care for all patients receiving cancer care.
- For all nurses at band 5 or above working in a designated clinical area to have an understanding of the nursing care needs of patients undergoing treatment for cancer.

Learning objectives for the individual:

The following objectives apply to workbook two and will be further developed when undertaking Higher Education studies in SACT.

1. To discuss legal and professional issues related to SACT
2. To discuss how SACT interrupts or halts cancer cell growth.
3. To explain normal cellular processes and how these relate to SACT,
4. To develop an understanding of the pharmacological action of SACT.
5. To be able to assess the information and support need of patients (and their carers) receiving routine SACT.
6. To maintain a safe environment where patients are receiving treatment for cancer
7. To demonstrate sound knowledge of the commonly occurring side effects and complications of SACT
8. To assess, plan, implement and evaluate nursing care for patients receiving SACT.

GUIDELINES FOR LEARNER, NOMINATING MANAGER, ASSESSOR AND MENTOR

The Learner

The learner will have been nominated by a line manger to undertake further study into cancer care and SACT. The learner must fulfil the following criteria:

- Be a registered nurse
- Completed workbook 1 (Cancer Care)
- Have identified an interest and learning need with line manager

- Have undergone staff development review with line manager
- Have an identified mentor/ assessor

Professional, Trust and Legal Requirements

The professional position is the NMC Code of Professional Conduct : Standards for Conduct, Performance and Ethics (2008), which places specific responsibility on registered nurses / midwife practitioners: The registered nurse / midwife is personally accountable for their practice and in the exercise of his or her accountability must acknowledge any limitations in their knowledge and competence. They must also decline any duties or responsibilities unless they are able to perform them in a safe manner.

The Trust position is that it accepts liability for the action of those practitioners who have completed the identified training for this skill and are deemed competent by their clinical supervisor, and who have updated their knowledge and skills according to policy.

Mentor – Definition of role

A mentor must fulfil the following criteria:

- Be a registered nurse
- Be competent in SACT
- Have completed mentorship training
- Be aware of and adhere to health and safety policies and procedures including COSHH
- Be aware of and adhere to local and/or network policy for cytotoxic medication administration
- Demonstrate a positive commitment to being a mentor

Assessor – Definition of role

An assessor must fulfil the following criteria:

- Be a registered nurse
- Be competent in SACT
- Have successfully completed a HEI level 6 SACT education programme
- Have successfully completed a recognised teaching and assessing course
- Be aware of and adhere to health and safety policies and procedures including COSHH
- Be aware of and adhere to local and/or network policies for cytotoxic medication administration
- Be familiar with the content and standards set out in this workbook

INTRODUCTION TO THE ASSESSMENT PROCESS

Assessment has been defined by Nicklin and Kenworthy, 2000, as a ‘Measurement that directly relates to the quality of learning and as such is concerned with student progress and attainment’.

The Assessment Process

- The Learner and Mentor should meet regularly, ideally twice a month, to discuss the learner’s on-going learning needs.

- The Learner and Assessor should aim to meet 3 times during the learning process to ensure the learner is achieving standards expected. These meetings should ideally take place prior to commencing the workbook, when half of the workbook has been completed and on completion of the workbook and records of practice prior to requesting final assessment.

- Theoretical knowledge and practical experience are gained simultaneously. The aim of this learning package is to introduce you to the nursing issues to be considered when caring for patients undergoing SACT, to enable you to plan and implement and evaluate care more effectively and sensitively.

- The assessment of theoretical knowledge (including completed workbooks) should be carried out by the named Assessor.

- All sections of the workbook should normally be completed over a period of at least 3 months and no more than 6 months.

- Once workbook has been completed and reviewed by the Assessor, the Assessor should meet with the Learner to provide feedback on the completed workbook

- A copy of the completed workbooks may be retained for audit purposes.

PART 1: Legal and Professional Issues

In this section we will cover the professional and legal issues which impact upon your role when delivering SACT.

Nursing and Midwifery Council (NMC)

The NMC was founded, in 2002, by Parliament to protect the public by ensuring that nurses and midwives provide a high standard of care to their patients.

To achieve its aims and goals the NMC:

- Maintains a register of qualified nurses, midwives and specialist community public health nurses.
- Sets standards for conduct, performance and ethics.
- Provides advice for nurses and midwives.
- Considers Fitness to Practice including allegations of misconduct, lack of competence or unfitness to practice due to ill health.

Learning Point

Define the following:

Accountability:

Responsibility:

Which one can you delegate and what must you ensure before you do?

Competence:

Key to a nurses' role and responsibility when administering Systemic Anti-Cancer Therapy is the NMC's Code of Professional Conduct (2008).

Learning Point

List the key elements of the *NMC Code of Professional Conduct (2008)*:

The *NMC Code of Professional Conduct (2008)* states that the nurse must maintain their professional knowledge and competence. Nurses are encouraged to develop and expand their practice provided that they have the necessary knowledge and skills and accept responsibility for their actions (RCN, 2003).

Learning Point

List the key training and assessments which you must undertake before you can declare your competence in the administration of SACT & practice independently (N.B. This will vary slightly with individual Trust requirements):

How frequently must your SACT competences be re-assessed?

Informed Consent

A historical background of consent can be traced to the Hippocratic Oath with the emphasis on benefiting the sick and keeping patients from harm and injustice, although nothing about truth-telling. In 1803 Thomas Percival published a document on medical ethics which laid down strict rules for medical practitioners. However it was based on benevolent deception, i.e. the truth could harm the patient, their family or the public and this quickly permeated into medical practice. In 1914 Judge Cardoza declared 'every human being of adult years and sound mind has a right to determine what should be done with his or her own body'.

During the 1950's and 1960's the history books show the emergence of the legal doctrine of informed consent. The Nuremburg trials (1947) condemned Nazi experiments, thus voluntary consent became of primary consideration. The Declaration of Helsinki (1964) first written in response to the atrocities and experimentation described in the Nuremburg trials has since become the most widely accepted guidance worldwide on medical research involving human participants. This was revised for a fifth time in 2000. In the latest revision it was declared that every patient entered into a study should have access to the best treatment identified by the study after the study is completed and calls were made for testing of any new treatment to be done against the best current method, where that exists and not against a placebo (Christie, 2000). Since this latest revision an EU directive on Clinical Trials (2001) has been published and in 2004 Medicines for Human Use (Clinical Trials) became part of UK law (amended in 2009).

It is a general legal and ethical principle that valid consent must be obtained before starting treatment or physical investigation or provide personal care (DoH, 2001). As a registered nurse you MUST obtain consent before you give any treatment or care (NMC, 2008).

Learning Point

What are the 4 key components of informed consent?

1.

2.

3.

4.

In what formats can consent to given?

Defining Informed Consent

A voluntary un-coerced decision made by a sufficiently competent or autonomous person, on the foundation of adequate information or deliberation, to accept rather than reject some proposed course of action that will affect him/her. (Gillon, 1985).

The patient can give consent

- Expressly/explicitly, i.e. in written or verbal form
- Tacitly/implicitly, i.e. consent through non-verbal communication, e.g. sticking an arm out when a nurse approached with sphygmomanometer to take a blood pressure
- Hypothetically, i.e. Advance directives.

Who Gains Consent?

According to the Department of Health (2009), the clinician providing the treatment or investigation is responsible for ensuring that the person has given valid consent prior to the treatment beginning. The Consultant in charge of the patients care remains ultimately responsible for the quality of medical care provided however the task of gaining consent may be delegated to a clinician who is both capable and specifically trained (GMC 2002, DH 2009).

Consent requires:

- ***Voluntariness*** i.e. it is give freely, the patient is not under sedation or manipulated into a situation of agreement
- ***Capacity***, in law there is no fixed criteria to assess competence but there are laws and specific instructions which must be adhered to of who can give consent
- ***Knowledge*** that the type of treatment, risks involved, subsequent consequences and alternatives are given truthfully.

For consent to be valid all three must be present (Mayberry, 2003)

Learning Point

Capacity is an essential element of the consent process. What does the law say with regards to capacity in consent in the following groups of patients?

Adults:

Minors:

Vulnerable clients:

Patients who are mentally ill:

Right to Refuse?

The basic principle in law is that an adult, mentally competent person has the right to refuse treatment contrary to medical advice. Thus an adult who is deemed mentally competent can refuse, even when there is overwhelming medical reasons in favour, even if it means putting his or her life at risk.

However, this refusal can be overturned by the courts if it is felt that the patient's decision is caused by undue influence. It is important to note that the presence of a mental disorder does not automatically mean that the person is incapable of making a valid decision in relation to treatment.

Learning Point

List three reasons why a patient may refuse treatment:

In 2005 the Mental Capacity Act passed into law in the UK. This Act gives clear guidance on determining capacity and actions to be taken when a person lacks the ability to make decisions for their self. It is based on 5 key principles:

Learning Point

Describe each of these principles

1. The presumption of capacity

2. Individuals to be supported to make their own decisions

3. People can make unwise decisions

4. Best interest decisions

5. Least restrictive option decisions

Capacity is judged on 5 questions:

1. Is there impairment/ disturbance in functioning of mind/brain
2. Can the person understand information relevant to the decision
3. Can the person retain information even if only for short periods
4. Can the person use or weigh the information relevant
5. Can they communicate their decision

"Under English law, no one is able to give consent to the examination or treatment of an adult who lacks the capacity to give consent for them self, unless they have been authorised to do so under a Lasting Power of Attorney or they have the authority to make treatment decisions as a court appointed deputy" (DH 2009 pg 23 para 2).

However there are certain circumstances under which health Care Professionals (HCP) can make 'best interest' decisions on behalf of their patient. However when doing so HCP's must consider all relevant circumstances before making a best interest decision.

Learning Point

What are the steps Health Care Professionals must take in order to ensure key considerations are taken into account

Health and Safety

Key to the safe delivery of SACT is health and safety legislation. The Health and Safety Commission and its operating arm, the Executive (HSE/C) has spent the last twenty years modernising the structure of health and safety law. Its aims are to protect the health, safety and welfare of employees and to safeguard others, mainly the public who may be exposed to risks from work activity (HSE, 2003).

The HSE/C provides three types of action:

- ***Guidance***, which aims to help people interpret and comply with the law and gives technical advice. Following this guidance is not compulsory, but if they do then normally they will be doing enough to comply with the law.

- ***Approved Codes of Conduct*** offers practical examples of good practice and gives advice on how to comply with the law.

- ***Regulations***, which are law approved by Parliament, usually made under the Health and Safety at Work Act (1974) following proposals from the HSE. This applies to regulations based on European Commission (EC) Directives as well as 'home-grown' ones. (HSE, 2003)

Amongst the entities that can prompt action from HSC/E are:

- Changes in technologies, industries or risks
- Evidence of accidents and ill health plus public concern
- EU Directives (HSE, 2003)

Health & Safety at Work Act (1974)

This is the basis of all health and safety law. It is an enabling act, which allows further legislation to be added to it. The act lays out the common duties which employers have towards their employees and the general public and what employees have to themselves and each other. It is important to note as with this and other health and safety legislation, employees have key responsibilities for health and safety as well as employer's. These duties are qualified in the Act by the principle of '*so far as is reasonably practicable'* i.e. an employer doesn't have to implement measures to avoid or reduce risk if they are technically impossible or if the time, trouble or cost of the measures would be grossly disproportionate to the risk (SE< 2003). Ultimately the law requires risks to be identified and sensible measures taken to deal with them.

The Management of Health & Safety at Work Regulations (2006)

These regulations made it more explicit what employers are required to do under the Health and Safety at Work Act (1974). As with the Act they apply to every work activity. The main requirement on employers is to carry out a ***Risk Assessment***. This is essential to ensure a safe environment and delivery of Systemic Anti-Cancer Therapy.

European Law

In recent years a lot of UK health and safety law has originated in Europe. Proposals from the EU may be agreed by the Member states, however they are then responsible for making them part of domestic law. Modern health and safety law in the UK and most of Europe is based on the principle of risk assessment.

Learning Point

List the key Duties of Employers under the Health & Safety at Work Act (1974) (Section 2)

List the key Duties to Employees under the Health & Safety at Work Act (1974) (Section 7)

There are a number of key Health and Safety Regulations which impact upon the administration of SACT.

Learning Point

Identify the key element(s) of the following regulations which have implications for the delivery of SACT:

Control of Substances Hazardous to Health (2005)

In September 2003 the HSE published guidance for those who handle cytotoxic drugs called *Safe Handling* of Cytotoxic Drugs. It provides useful information for all those involved in the handling of cytotoxic chemotherapy. It contains information on:

- Potential health hazards and health surveillance
- Legal framework and the duties of employers and employees
- Useful tips on ways of controlling and monitoring exposure and appropriate waste disposal.

Learning Point

Reading Activity – Access the Health & Safety Executive website & read and familiarise yourself with HSE Information sheet MISC615 – Safe Handling of Cytotoxic Drugs

www.hse.gov.uk/pubns/misc615.pdf

Conclusion

Nurses have a key role in the safe administration of SACT. It is essential that each practitioner demonstrates accountability for their practice and responsibility for their actions. Each nurse has a responsibility to ensure that safety and well-being of themselves, their patients, visitors and colleagues. No nurse should undertake this role without appropriate education and training. Annual competence must be demonstrated and assessed. It is paramount that this practice is based on a good sound evidence knowledge base.

PART 2: Cancer and SACT

In this section you will be revising cancer pathology and relating this to SACT

What is cancer?

Cancer is a collection of over 200 diseases that have shared characteristics. King et al (2006) defines cancer as, "a set of diseases characterised by unregulated cell growth leading to invasion of surrounding tissues and spread (metastasis) to other parts of the body" (p.1). However, they acknowledge that with cancers there are always exceptions to the rule! Currently in the UK 1 in 3 people will develop a cancer in their lifetime and over two million people are today living with or beyond a diagnosis of cancer. Each year 250 000 people are diagnosed and 150 000 will die of the disease (CRUK 2011).

Learning Point

Explain the following terms:

Carcinogenesis:

Benign:

Malignant:

Cancer develops when the structure or function of a gene changes (Anderson et al in Pinkerton et al, 2004). There then needs to be a succession of errors in the pathway that controls cells regulation for cancer to occur. Cancer cells also have the capacity to invade surrounding tissues, create a blood supply and spread to distant sites. Without these characteristics any cell mass would be classified as benign rather than malignant.

Learning Point

Are the following true or false?

Core features of cancer are:

Proliferation	**T**	**F**
Decreased rate of cell death	**T**	**F**
Frequently has rapid proliferation	**T**	**F**
Subject to internal/external regulatory signals	**T**	**F**
Solid tumour able to create new blood supplies	**T**	**F**

How does cancer develop?

Normal cell growth is governed by many homeostatic mechanisms. To form a malignancy, cells need to undergo a series of genetic changes which enable them to escape from normal growth regulation (Anderson et al 2004 p.28). These changes are referred to as the 6 hallmarks of cancer (Hanahan and Weinberg 2000).

Learning Point

List Hanahan and Weinberg's 6 hallmarks of cancer

1.

2.

3.

4.

5.

6.

Proto-oncogenes and tumour-suppressor genes are genes that are found in normal cells. In order for a malignancy to occur there has to be genetic alterations in the proto-oncogenes (which becomes an oncogene) and tumour suppressor genes.

Learning Point

Define:

Oncogene

Tumour suppressor gene

As a consequence of the interruption to cell regulation the following occurs;

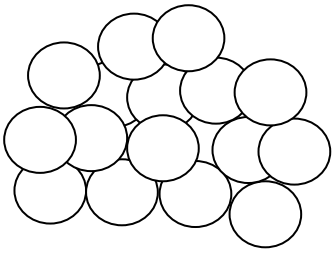
- Cells become 'immortal', this is in contrast to normal cells that will replicate for a finite number of times.
- Apoptosis (cell death) fails to occur. This occurs in normal cells to give shape to an organism or prevent abnormal cells from replicating.
- Cells replicate without the normal triggers being present, in contrast to normal cells that replicate in response to physiological need.
- Cells continue to replicate despite being in contact with other cells. Normal cells exhibit contact inhibition and cease dividing when they touch (think about cells growing across a wound and stopping once they meet).
- Cells become less differentiated; in contrast normal cells are usually highly differentiated, i.e. have a specialist function.

(Anderson et al 2004, King et al, 2006)

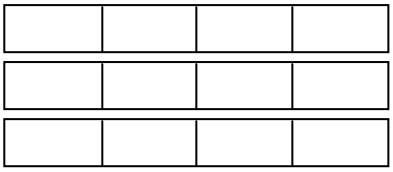
The effect of these changes can be seen in the diagram below.

Diagrammatical representation of normal and cancer cell replication

Cancer cells



Normal cells



In addition to the above, three other factors are necessary for cancer to become malignant. These are the ability to form new blood vessels, invade surrounding tissue and metastasise (Kelland, 2005).

Learning Point

Explain what is meant by angiogenesis.

Why is angiogenesis important to the development of tumour?

What affects tumour growth?

Three factors are known to affect tumour growth. They are:

- The fraction of cells diving at any one time (growth fraction).
- The length of time it takes each cell to complete a cell cycle.
- The rate at which cells die, necrose and migrate.

Different tumours will grow at different rates for different reasons. For example, tumours that contain cells that are highly differentiated (specific for purpose) proliferate more slowly than cells that are undifferentiated. Smaller tumours will grow faster than larger tumours as they can move easily access a blood and nutrient supply (Young, 1999).

Learning Point

Read the information about tumours A and B and then answer the following questions:

Tumour A

- Cells take 6 hours to complete a cell cycle.
- 90% of the cells within the tumour are dividing at any one time.
- Blood supply is poor and the centre of the tumour is necrosing.

Tumour B

- Cells take 24 hours to complete the cell cycle.
- 10% of the cells within the tumour are dividing at any one time.
- Highly vascular tumour metastasised to several sites.

1. Which tumour has the highest growth fraction?
2. Which tumour is most likely to be growing the quickest?
3. Is it possible to say which tumour is losing most cells?
4. What are the two methods by which the tumours are losing cells?

and

Classification of cancers

Cancers can be classified by the type of tissue they originate from or by the location in the body where the cancer first developed. The first classification is histological typing. There are five major categories; carcinoma, sarcoma, myeloma, leukaemia and lymphoma (SEER's Training Website). seer.cancer.gov/

Learning Point

Match the histological classification with the description of where each arises:

Carcinoma	plasma cells of bone marrow
Sarcoma	glands/nodes lymphatic system
Myeloma	epithelial tissue
Leukaemia	supportive/connective tissue
Lymphoma	bone marrow

Metastases

Cancer cells can spread to distant sites of the body via three transport systems; lymph vessels, blood vessels and body cavity spaces, e.g. pleural and peritoneal cavities (King et al, 2006). Often, but not in all cases, the site of a secondary malignancy will be the first organ that the transport vessel drains into. For example, abdominal tumours that use blood vessels for transport are likely to metastasise to the liver. Cancers that spread via the lymphatic system are likely to metastasise to the first set of lymph nodes that the lymph passes through after it has been populated with cancer cells. This explains why breast cancer may metastasise to the axillary lymph nodes (King et al, 2006).

Learning Point

Where are the most likely sites of metastases for the following primary tumours?

Lung:

Colorectal:

What is Chemotherapy?

Chemotherapy is the use of drugs to treat disease. In the case of cancer treatment the majority of chemotherapy agents given are cytotoxic; which means they cause damage to cells. Chemotherapy can be used as a single agent or more commonly as combination therapy. It may also be given in combination with other treatment modalities such as surgery or radiotherapy.

Learning Point

Define the following:

Adjuvant chemotherapy:

Neo-adjuvant chemotherapy

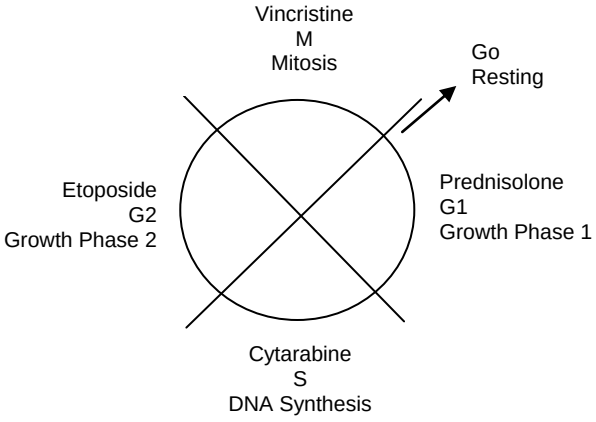
Concomitant

How does Chemotherapy work?

"In order to exert any anti-tumour effect, chemotherapeutic agents must either block cell replication or induce cell death" (Boddy, 2004, p.142). The majority of chemotherapy agents target rapidly dividing cells are not cancer cell specific. It is hoped that, in the future, more drugs can be developed that are target specific. This would reduce the level and nature of unwanted side-effects.

Chemotherapy drugs often target cells at a particular stage of the cell cycle and are called phase specific. Other drugs can be none cell cycle specific and will have an effect on cells wherever they are in the cell cycle.

The diagram below shows the cell cycle and gives an example of drugs that are specifically active at certain stages. The non-cell cycle specific drugs, such as doxorubicin will also have an effect on the cell when it is in its resting phase.



Chemotherapy Regimes

Chemotherapy regimes are designed for specific tumours and stages of disease. Chemotherapy is usually given as a combination of drugs to minimise the riskof tumour cells becoming resistant to a drug and to minimise the risk of encountering dose limiting toxicities for individual drugs. This helps to increase the cell kill potential per chemotherapy cycle (the ability of a certain amount of chemotherapy to kill a certain percentage of cells), so increasing the chance of killing all the cancer cells.

Learning Point

Combinations of chemotherapy drugs are used because:

Cancer cells can become r _____ to drugs.

Cells will be targeted at different stages of the c_____c_____.

More chemotherapy will be given before d _____ limiting t_____ is reached with any particular drug

Chemotherapy regimes are written as protocols which supply standardised information of which drugs to be given, at what dose, in what order at what time. The dose of chemotherapy agents can be calculated on a patient's weight or surface area.

Chemotherapy drugs

There are many chemotherapy drugs that are used in the treatment of cancer. They can be broadly divided up into the following categories:

Drug group	Mode of action	Cell cycle specific/ non specific	Example drugs
Anti-metabolites	Structural analogues of intracellular metabolites required for cell function and replication. Prevent DNA synthesis and result in cell death.	S phase specific	5-Flurouracil, Methotrexate, Cytarabine, Gemcitabine, Capecitabine
Anti-tumour Antibiotics and Anthracyclines	Act in numerous ways to inhibit DNA synthesis and replication	Non specific	Daunarubicin, Doxorubicin, Epirubicin
Alkylating agents	Bind with DNA causing intra and inter strand cross linkages, resulting in DNA being unable to separate during replication.	Non specific	Cyclophosphamide, Ifosfamide, Chlorambucil, Temozolomide, Dacarbazine
Mitotic Inhibitors	Inhibit the formation of mitotic spinals and bind to microtubules	G2/ M phase specific	Docetaxel, Paclitaxel, Vincristine, Vinorelbine,
Platinum Agents	Interact with DNA causing cross linkages	Non specific	Cisplatin, Carboplatin, Oxaliplatin
Topoisomerase Inhibitors	Interact with Topoisomerase I and II enzymes required for the accurate replication of DNA	Non specific	Irinotecan, Etoposide,

Chemotherapy drugs can also be classified as to whether they are vesicants, irritants, exfoliants, neutral or inflammatory agents. These signify the effect the drug will have on tissue if extravasation occurs.

What is targeted therapy

Targeted therapies are the newest of the cancer treatments and have been called the fourth modality, but unlike surgery, radiotherapy and chemotherapy it has not fully matured as an approach and is still undergoing major investigations. However some breakthroughs have been made and are now integrated into cancer therapy including:

- Monoclonal antibody therapy
- Kinase inhibitors
- mTOR inhibitors
- Hormone therapy
- Cytokine therapy
- Haemopoietic growth factors
- Gene therapy

Targeted therapy is defined as the use of naturally occurring biological molecules, including antibodies and cytokines, to target cancer cells in order to inhibit, control, or destroy, the tumour (Kerr et al., 2006). These therapies have varied ways of working, however the basic principles behind them include binding with cancer cells and blocking signalling pathways, as with monoclonal antibodies; blocking the production of molecules that may encourage the cancer to grow, for example oestrogen; or to promote the replacement of cells that have been destroyed by other treatments e.g. granulocyte colony stimulating factor (Kuzbit 2008).

Learning point

Define the following:

- Monoclonal antibody

- Kinase inhibitor

- Haemopoietic growth factor

Learning point

Give one example of each of the following therapies, outline its mode of action and potential side effects

Monoclonal antibody:

Kinase inhibitor:

Cytokine therapy

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Health and Safety Issues

The effects of SACT on health

In this section we will cover the health and safety issues you need to know about to give SACT safely.

At the end of this section you should be able to:

- Understand the health and safety issues associated with exposure to SACT.
- Understand how to minimise risks of exposure.
- Refer to the policies and guidelines which inform safe practice in SACT administration.
- Understand the safety issues involved when SACT is given in a patient's home.
- Understand infection control guidelines relevant to SACT administration practice.

Here is some of the information which may help you read about this subject:

- KMCN chemotherapy administration guidelines
- Department of Health (2003). Winning Ways: Working together to reduce Healthcare Associated Infection in England: Report from the Chief Medical Officer.
- Clinical practice guidelines: The administration of cytotoxic chemotherapy (1998). RCN.
- www.hse.gov.uk
- www.bopa-web.org

Exposure to SACT

Studies have found evidence of chemotherapy in the urine of healthcare staff who work with these drugs, but the implications and likely outcome of these findings are not well understood.

Learning Point

How much chemotherapy exposure is safe for people who are not receiving treatment?

Many chemotherapy drugs are carcinogenic, mutagenic and teratogenic.

Learning Point

Explain the terms:

Carcinogenic:

Mutagenic:

Teratogenic:

The information available on the health effects of cytotoxic drugs comes from data in animals and from patients who have received chemotherapy as treatment. It is not known how this information relates to health workers who may be exposed to chemotherapy but it is considered that occupational exposure levels are likey to be much lower than those that have caused chronic ill health effects in animals or patients (HSE, 2003).

Learning Point

List three acute health effects of exposure to chemotherapy:

1.

2.

3.

Handy Hint: You might find the HSE 'Safe handling of cytotoxic drugs' information sheet number MISC615 helpful (09/03). It's available on the internet at www.hse.gov.uk/pubns/misc615.pdf

Routes of exposure

SACT may unintentionally enter the body by three main routes:

Learning Point

What are the three main routes in which SACT can unintentionally enter the body?

•

•

•

The potential for exposure exists during various tasks, e.g. drug reconstitution and mixing, connecting and disconnecting intravenous tubing and disposing of waste equipment or patient waste (HSE, 2003). Less likely exposure risks include needle stick injury with injectable agents during administration.

What can be done about the risks?

Working practices must protect all staff that prepare, administer and handle SACT drugs or contaminated waste products and members of the public who may be exposed to these agents within a clinical setting.

Under the Health and Safety at Work Act (1974) and the Management of Health and Safety at Work Regulations (1999), an employer has a legal duty to protect the health of their employees and anyone else (eg general public) who may be affected by their work.

COSHH regulations require an employer to carry out a risk assessment of all activities which could expose staff to hazardous substances and to ensure any exposure is prevented or controlled.

Learning Point

List some of the SACT practices in your service which runs the risk of exposure if incorrectly managed:

Where an assessment indicates a need, personal protective equipment (PPE) should be provided and used. However, the HSE (2003), note that effective protection will only be obtained if the PPE chosen is:

- Suitable for the task
- Suitable for the wearer and the environment
- Compatible with other PPE in use
- In good condition
- Worn correctly

Learning Point

Name the protective items of equipment which must be used in the handling of chemotherapy:

1)

2)

3)

PPE commonly used where SACT is prepared and administered would include gloves, eye and face protection and protective clothing such as aprons.

In addition to the above, health risks can be minimised by adhering to the following guidelines for good practice:

- Don't eat, drink or smoke in areas where chemotherapy is handled.
- Wash your hands thorough before and after using gloves and in between patients.
- Make sure you know of the risks in your area and the precautions you must take.
- Ensure chemotherapy is given in quiet areas away from passing traffic.
- Avoid skin contact with chemotherapy. This includes oral chemotherapy which should be blister or foil packed.
- Make sure you know how to deal with a chemotherapy spillage and how to manage safe disposal of waste.

Gloves

It is important to realise that no glove material will provide unlimited protection from chemotherapy (HSE, 2003). Natural rubber latex (NRL) is often used to produce protective gloves. Nitrile gloves may be used for people who are hypersensitive to latex.

Learning Point

Circle the statements you agree with:

Gloves should:

1) Be worn during chemotherapy delivery and administration.
2) Be worn during assessment for chemotherapy.
3) Be worn during disposal of contaminated chemotherapy equipment and patients contaminated waste products.
4) Be changed at least four hourly when used continuously.
5) Be changed at least two hourly, when damaged and between patients.
6) Be powder free.
7) Be powdered.
8) Fit correctly.

Eye and face protection

Learning Point

When should eye and face protection be worn in relation to the chemotherapy process?

Handy Hint: You might find the HSE 'Safe handling of cytotoxic drugs' information sheet number MISC615 helpful (09/03). It's available on the internet at www.hse.gov.uk/pubns/misc615/pdf

Protective clothing

Protective clothing such as gowns and aprons can help prevent contamination of clothes and subsequently the skin. The choice of material is important as absorptive properties vary.

Aprons must be worn for the administration and handling of chemotherapy or patients waste (Brighton and Wood 2005).

Learning Point

Describe the type of gown or apron that should be used when handling chemotherapy:

Describe the type of gown or apron that should never be used when handling chemotherapy:

Spillage

Each SACT delivery area should have clear procedures in place for dealing with spillages and accidental exposure of people. All staff involved in handling SACT should be familiar with these procedures (HSE 2003, RCN 1998).

Learning Point

Where would you go to find information on how to manage a SACT spillage?

Where would you find a spillage kit and eyewash if you needed one?

It is important that:

- Spillage is managed promptly.
- A spillage kit and eyewash are available in every clinical area where SACT is delivered.
- There is easy access to protective equipment where SACT is given.
- Spillage kits contain advice on how to handle waste (RCN, 1998).
- Guidance is given to patients who have chemotherapy at home on how to manage spillage if it occurs.
- A procedure for recording the event is followed after every incidence of spillage.

Learning Point

What action would you take on discovering a spillage of Cisplatin chemotherapy?

Waste Disposal

Each SACT delivery area should have clear procedures in place for dealing with safe disposal of cytotoxic waste. All staff involved in handling SACT should be familiar with these procedures (HSE 2003, RCN 1998).

Learning Point

Where would you go to find out information on how to manage safe disposal of cytotoxic waste?

Patients' waste products

Learning Point

How long are patient body fluids and waste contaminated for following chemotherapy?

What precautions must you take when handling patient waste?

What advice would you give to a patient to raise their awareness of the risks from their waste to others in their home?

New and expectant mothers working with SACT

The law requires every employer to assess workplace risks for all their employees and take practical action to control those risks. Employers must take particular account of risks to new and expectant mothers (someone who is pregnant, has given birth within the last six months or is breastfeeding). Employers must identify hazards in their workplace that could pose a health or safety risk to new and expectant mothers and take appropriate action to remove or reduce the risk.

Each SACT delivery area therefore, that employs women of childbearing age should have a risk assessment completed which assumes that there may be a new or expectant mother working in the environment in the following 12 months. In addition, at the point where an employee discloses pregnancy, a risk assessment specific to that person should be carried out and any appropriate action taken. More information can be found on the HSE website, New and Expectant Mothers at Work: http://www.hse.gov.uk/mothers/index.htm#?eban=rss-mothers

When undertaking risk assessments, it is considered that exposure to SACT must be reduced to as low a level as is reasonably practical for new and expectant mothers. Any assessment of risk should look particularly at preparation of the drug for use, administration of the drug and disposal of waste (human and chemical).

Learning Point

At what point should you inform your manager if you discover you are pregnant and your role requires you to handle SACT?

What tasks specifically relating to cytotoxic chemotherapy exposure should be avoided by new and expectant mothers?

What tasks specifically relating to monoclonal antibody exposure should be avoided by new and expectant mothers?

What is your organisational policy on the administration of chemotherapy by new and expectant mothers?

The importance of infection control

Patients receiving chemotherapy are at risk of becoming severely ill if they are exposed to infections when they are neutropenic. Chemotherapy treatment itself can increase patients' risk of sepsis as it involves invasive procedures such as cannulation, catheter insertion and catheter manipulation. It is particularly important that safe practices are adhered to, to minimise the risk of infection.

Learning Point

List some useful sources of reference which concentrate on offering guidance to reduce infections in hospitals, including advice on managing central venous catheters?

List some of the key recommendations relevant to your practice.

Communication and Information Giving

In this section we will cover the essentials you need to know about communicating with SACT patients and giving them the information they need.

At the end of this section you should be able to:

- Understand how a diagnosis of cancer can affect communication with patients
- Understand the information needs of patients receiving SACT
- Understand where to find sources of SACT information.

Here is some of the information which may help you read about this subject:

- Brennan J (2004) Cancer in Context Oxford: OUP
- Chapman K, Abraham C, Jenkins V, Fallowfield L (2003). Lay understanding of terms used in cancer consultations. *Psycho-Oncology 12(6) : 557-566*
- Cox A, Jenkins V, Catt S, Langridge C, Fallowfield L (2006). Information needs and experiences: An audit of UK cancer patients. *European Journal of Oncology Nursing*
- Fallowfield L, Jenkins V (2004). Communicating sad, bad, and difficult news in medicine. *Lancet.363 : 312-19*.
- Stead ML, Brown JM, Fallowfield L, Selby P (2003). Lack of communication between healthcare professionals and women with ovarian cancer about sexual issues. *British Journal of Cancer*. 88 : 666-671.
- www.dh.gov.uk
- www.kentmedwaycancernetwork.nhs.uk

Communicating with SACT patients

Communicating with patients who have cancer isn't always easy. Patients often receive SACT soon after diagnosis and for some; coming to terms with big impact changes can be a difficult journey.

With SACT, comes the need for a patient to understand enough information to be able to make an informed decision about treatment. Information is also vital to ensure that patients understand the side-effects of their treatment and what to do if they have problems at home. Therefore, helping patients manage, interpret and understand new information, at a very difficult time in their lives is one of the great challenges of SACT nursing.

Learning Point

List some of the other benefits to patient care and well-being that are promoted by the use of clear communication and information giving:

Communication may easily be compromised if it is not offered at a level and pace appropriate to a patient. A patient's cultural background may complicate things further, as beliefs about illness may lead to incorrect interpretation of the information being given. Even when a language is well understood by all parties, words may have different meanings for different people and incorrect assumptions may lead to inaccuracies.

Learning Point

What are some of the considerations which should be taken into account before communicating information to patients?

Learning Point

What is meant by the term “Culturally Competent Care”?

It is possible to overcome some of the common barriers to communication, ensuring communication takes place in an area away from distractions is one example.

Learning Point

List some of the other things you could do to improve patient communication, where understanding was a problem?

What support is available in your organisation to assist with patient information needs?

How would you access this support if it was needed?

SACT information requirements

There are national requirements in the Manual of Cancer Services (2008), www.dh.gov.uk, which identify that patients must be given:

- Information on the action they should take if they experience SACT complications/side-effects following treatment.
- Information on who they should contact for 24hr advice.
- Information about the person who is their key worker.

Learning Point

Who is responsible for making sure your SACT patients receive this information?

When and how are they given this information?

Who is responsible for making sure it is up to date?

Where would you find a copy of this information?

Sources of information

Information can be accessed in many forms, from electronic to paper based resources. It is important to remember that it is good practice not to photocopy patient information material. It should always be obtained from source. This guidance increases patient safety by reducing the potential for circulation of out of date or inaccurate material. Patients should be guided to information that is from a reliable source, particularly if they plan to access the internet.

Learning Point

What resources are available to help patients with their information needs within your organisation?

Which electronic resources would you feel confident to recommend to a patient having SACT?

How would you assess the reliability of on line sources of SACT patient information?

Patient Assessment

In this section we will cover SACT assessment and the particular points you need to know about in order to ensure SACT is given safely.

At the end of this section you should be able to:

- Understand the importance of assessment in ensuring the safe administration of SACT.
- Understand the process of assessment for SACT and identify risk factors.
- Identify when assessment should take place.
- Identify appropriate tools used for patient SACT assessment.
- Identify support services available for patients receiving SACT.

Here is some of the information which may help you read about this subject:

- KMCN chemotherapy administration guidelines
- Clinical practice guidelines: The administration of cytotoxic chemotherapy (1998). RCN
- www.medicines.org.uk

Patient assessment

Patient assessment prior to SACT is an essential part of the nursing process. As services develop it is increasingly common to find nursing staff taking a more prominent role in the assessment of patient suitability for SACT. It is vital that time is spent prior to SACT delivery assessing patients for any complications that may compromise their ability to receive treatment.

Learning Point

What are the potential consequences of administering SACT to a patient who is not fit for treatment?

Learning Point

Use the words at the bottom of the box to fill in the spaces:

1) It is important that a patient's _____ and _____ are checked for accuracy when SACT prescriptions are prescribed.

2) Blood test results must be within agreed protocol parameters prior to chemotherapy. A full blood count result should be checked for signs of anaemia, _____ and _____. Local protocols apply. Parameters may depend on the chemotherapy being given and a patient's _____.

3) SACT side-effects may be complex. It can sometimes be difficult to distinguish between the effects of SACT and the effects of the patient's _____. It is important before SACT begins that a baseline _____ assessment is recorded.

4) Some side-effects can be so severe that a patient will require a dose _____ or _____. In some circumstances, SACT will be _____ altogether.

5) It is important not to _____ SACT when a patient has severe side-effects until _____ advice has been obtained.

Administer, patient, deferral, increase, disease, medical, urinalysis, height, cancer, stopped, hypocalcaemia, nursing, stop, thrombocytopenia, continue, started, reduction, neutropenia, alopecia, cytotoxic, chemotherapy, toxicity, mucositis, quality, weight, nursing

Patient Concordance

Patient concordance is an important factor when assessing the effects of SACT. It is not unusual for patient's to forget the severity of effects they have experienced. Some patients prefer to use a diary to help them remember.

Learning point

What other assessment tools/documents are available to help patients document their experience of SACT?

It is also not unusual for patients to live with symptoms, rather than report them. Reporting symptoms may mean that SACT is delayed or stopped. Patients wanting to avoid this may battle on with symptoms unnecessarily. It is important that patients are encouraged and reminded to report symptoms which may affect their health and well-being.

Learning Point

Mark the appropriate number at the side of each of the following patient symptoms where:

1) Indicates an in-depth assessment is needed. SACT may need to be adjusted, deferred or discontinued.

2) Indicates further information is required but it is likely the symptoms may be managed with pharmaceutical or supportive interventions. SACT is likely to continue.

Bleeding gums	Arthralgia
Fever	Watery eyes
Fatigue	Anaemia
Excessive sweating	Breathlessness
Hair loss	Bruising
High white cell count	Nausea
Chest infection	Diarrhoea
Low platelet count	Low neutrophil count
Phlebitis	Anxiety
Mucositis	Constipation
Cystitis	Rash
Vomiting	Taste change
Skin reaction	peripheral neuropathy

Referral process

During the assessment process, patients may describe or present with a symptom which causes the assessor concern. It is important symptoms are reported to the appropriate person especially where continuing with SACT may put the patient at risk.

Learning Point

Where would you refer a patient if you thought an assessment relating to symptoms and decision to treat was required?

How would you organise this?

How would you manage a patient requiring pharmaceutical intervention for side-effects?

How would you organise this?

The purpose and process of assessment

Assessment prior to SACT administration not only helps identify side-effects which compromise a patient's safety, it also:

- helps improve morbidity and quality of life
- monitors patient response to treatment
- offers an opportunity for patient support
- allows patients an opportunity to ask questions

Patients should play an active part in assessment and should be offered the choice of having a relative or carer with them. Assessment should take place in a suitable location, preferably where privacy and confidentiality can be respected and interruptions are minimised.

Learning Point	Agree	Disagree
Indicate whether you agree or disagree with the following statements:		
1) Patients require a baseline toxicity review before they receive SACT for the first time.		
2) Patient assessment for SACT should not contain a holistic assessment.		
3) Prior to assessment, patient records need not be reviewed for areas of previous concern.		
4) A patient's response to SACT should be based entirely upon the last cycle they were given.		
5) Patient assessment for SACT must contain a toxicity review.		
6) Nurses have a responsibility to check patient toxicities prior to SACT even if the patient has recently been seen by a doctor.		
7) Nursing staff do not have a responsibility to satisfy themselves a patient is fit for treatment when a patient has recently seen a doctor.		
8) SACT toxicity should be measured at face value, as the patient describes it. Taking into account their normal level of functioning invalidates the use of toxicity assessment tools.		
9) Patient assessment must be documented in patient records.		
10) It is always appropriate to consult a junior doctor on the results of assessment findings which are of concern.		
11) It is not necessary to ensure that a recent blood test has been reviewed prior to SACT administration, providing a dated SACT prescription is available.		
12) As medical advances improve, the incidence of severe toxicities is decreasing.		
13) It is becoming more unusual to identify toxicities severe enough to delay treatment.		
14) Toxicity assessment should take into account the patient experience on the day of SACT, not their experience of the whole treatment cycle.		
15) Out-patient SACT has less severe side-effects, so it is particularly important that in-depth assessments are concentrated on in-patient treatments.		

Assessment strategies

Recent evidence has suggested that patients find it difficult to recall the severity of side effects and symptoms related to their SACT at their next appointment and often under-report or diminish the effect of these on their quality of life (Coolbrandt et al 2011).

What strategies can you think of to assist patients with recall of the quantity and severity of side effects and symptoms of SACT between treatment appointments?

The timing of SACT assessment

Patient assessments in relation to SACT should take place before the first SACT, prior to each subsequent treatment, and for the whole delivery cycle, for both in-patient and out-patient treatments and not just the day of delivery. It is important that the assessor is familiar with toxicities likely to be caused by the drugs commonly used in their areas so that assessments can be directed appropriately.

Learning Points

Which is the most common chemotherapy treatment given in your area?

What toxicities are particularly experienced by patients receiving that treatment?

When do these toxicities occur, immediate, short term, delayed, long term?

Which is the most common targeted therapy given in your area?

What toxicities are particularly experienced by patients receiving that treatment?

When do these toxicities occur?

If you were unfamiliar with a particular chemotherapy or targeted therapy, where could you find information on the toxicities associated with specific drugs?

The implications of SACT assessment

It is not unknown for the findings of a patient assessment to indicate that admission to hospital will be needed as a matter of clinical urgency.

Learning Point

What is the most common reason for urgent hospital admission following chemotherapy treatment?

Name the common clinical signs and symptoms.

What is the most common reason for urgent hospital admission following targeted therapy treatment?

Name the common clinical signs and symptoms.

The holistic side of patient assessment

Patient assessment must not only concentrate on the physical aspects of well-being, it should be remember that holistic assessment has been recognised nationally as an integral and essential part of the process (Manual of Cancer Services, 2008).

Learning Point

Find the words of phrases within the grid which describe areas to be discussed and addressed in the holistic assessment of SACT patients: There are 11 in total.

C	O	P	I	N	G	Y	G	O	F	M	K	L	H
V	M	U	P	Z	C	Q	S	N	B	P	G	S	M
D	S	N	A	i	E	H	T	G	E	S	K	Y	S
Y	T	D	E	L	W	O	R	K	M	Y	E	J	J
T	M	E	R	X	I	M	L	D	K	C	M	S	H
I	B	R	U	C	B	E	S	F	N	H	O	A	F
L	E	S	C	V	M	Z	A	A	M	O	T	C	N
A	B	T	H	F	W	L	N	W	P	L	I	X	S
U	J	A	S	V	Y	I	X	J	A	O	O	Q	E
T	T	N	W	A	F	F	P	U	L	G	N	G	X
I	T	D	J	P	R	E	W	O	M	I	A	F	U
R	S	I	E	A	P	K	W	G	I	C	L	R	A
I	W	N	B	O	D	Y	Y	I	M	A	G	E	L
P	Q	G	E	P	Z	F	L	R	A	L	R	V	I
S	O	C	I	A	L	Q	S	U	P	P	O	R	T
D	W	I	R	F	L	E	P	I	L	A	T	K	Y

It is well documented that cancer patients experiences changes in their mental health as a result of their cancer diagnosis and the subsequent treatments of their cancer

Learning point

Outline some of the key psychological complications of undergoing SACT

How would you assess for these

Describe key social consequences of undergoing SACT

How would you identify these

Supportive Measures

Patients can be helped to manage the psychological and social impact of their disease and treatment in a variety of ways. The supportive skills of nurses administering SACT can be combined with support from other agencies, organisations and roles. The nurse may be required to direct a patient to other sources of help or to refer them appropriately to other services when specialist skills are required.

Learning Point

List some of the sources of support available to SACT patients within your area and indicate how you would contact them:

References:

Coolbrandt A et al. (2011) Immediate versus delayed self-reporting of symptoms and side effects during chemotherapy: Does timing matter? European Journal of Oncology Nursing 15; 130-136

SACT side-effects

In this section we will cover the SACT side-effects you need to know about in order to give SACT safely.

At the end of the section you should be able to:

- Understand the nursing role in monitoring SACT side-effects.
- Identify the common side-effects associated with SACT.
- Identify patient risk factors, including neutropenia and its management.
- Understand what action should be taken to manage side-effects.
- Increase your awareness of the long-term effects of SACT.

Here is some of the information which may help you read about this subject:

- KMCN chemotherapy administration guidelines
- Skeel R Khlief S (2011) Handbook of Cancer Chemotherapy 8th Ed Philadelphia: Lippincott Williams and Wilkins
- Wilkes G (2011) Targeted Cancer Therapy Sudbury Jones and Bartlett Publishes
- www.bcshguidelines.com.
- British National Formulary (BNF).

Chemotherapy

The effects of chemotherapy

Chemotherapy is rarely cell specific and consequently the side-effects of treatment are systemic. Rapidly dividing cells are most vulnerable to the effects of chemotherapy; in addition some drugs have specific effects on specific organs. The prevention, detection and management of the side-effects of chemotherapy are vital nursing roles.

Learning Point

Name 3 areas of the body, containing rapidly diving cells that are commonly affected by chemotherapy.

1.

2.

3.

The side-effects of chemotherapy can be acute or long-term. Acute side-effects usually occur within a couple of weeks of chemotherapy administration. Immediate occurring side-effects are usually hypersensitivity reactions. Long-term effects relate to the combination and dosage of drugs given and can manifest years after the end of treatment.

Learning Point

Sort the following into acute and long-term effects of chemotherapy:

Anaemia	**Mucositis**
Alopecia	**Reduced fertility**
Nausea	**Hearing loss**
Secondary malignancies	**Diarrhoea**

Acute	Long term

Gastrointestinal Tract

Side-effects of chemotherapy are seen throughout the GI tract, range from mild to severe and may become life-threatening. They include mucositis, nausea, vomiting and diarrhoea. These result in pain, reduced oral intake, anorexia, fluid and electrolyte imbalance and an increased risk of infection.

Learning Point

Explain the terms:

Stomatitis:

Mucositis:

Emetogenic :

Anorexia:

Nausea and Vomiting

Incidence and severity of nausea and vomiting relates to the emetogenic potential of the chemotherapy drug; however, other factors such as anxiety can affect how nauseous the patient becomes. Anti-emetic drugs can be used to minimise the effect of nausea and vomiting if they cannot completely alleviate the symptoms. "Control of nausea and vomiting is more readily maintained by prevention than by increasing therapy once it has become established" (Pinkerton et al 2004, p.624). Non-pharmacological therapies can be used, such as visualisation and relaxation techniques.

Learning Point

Name an anti-emetic drug that falls into each of the following classifications:

$5HT_3$ Antagonists:

Corticosteroids:

Antihistamines:

Benzodiazepines:

Antidopaminergic Agents:

NK1 Antagonist:

Mucositis

The management of mucositis will depend on the section of the GI tract that is affected. Oral mucositis normally occurs from 5-7 days post the start of chemotherapy. Epithelial cells within the mouth are damaged and this results in ulceration, inflammation, pain and dry, cracked lips. The risk of infection is increased by the concurrent effects occurring to the bone marrow. Whilst there are no universally agreed guidelines for managing oral mucositis, most strategies include; good oral hygiene, pain relief and the use of topical preparations such as Orabase or 'Gelclair'. Local organisations should have their own guidelines for management.

Two recent Cochrane reviews have been published on the prevention and treatment of oral mucocitis (Worthington et al 2008 and Clarkson et al 2008 respectively)

Learning Point

Are the following true or false?

Teeth should be cleared with a soft toothbrush	**T**	**F**
Taste alteration can occur following chemotherapy	**T**	**F**
Morphine may be required for pain relief when a patient has oral mucositis	**T**	**F**
Brushing teeth is the most effective way of keeping the mouth clean?	**T**	**F**
Oral mucositis can be a dose-limited side-effect of chemotherapy.	**T**	**F**

Bone Marrow Suppression

Many, but not all, chemotherapy drugs cause myelosuppression and this is often the dose-limiting toxicity for chemotherapy regimes. It may lead to the patient becoming anaemic, thrombocytopenic and/or neutropenic. Bone marrow suppression must be carefully managed to avoid potentially fatal complications. Patients may also present with pancytopenia due to the effect of the disease process.

Learning Point

Define the following terms:

Myelosuppression:

Anaemia:

Thrombocytopenia:

Neutropenia:

Pancytopenia:

Anaemia

Anaemia following chemotherapy is usually caused by a reduction of red blood cells rather than the rapid loss of blood (Pinkerton et al 2004); repeated blood sampling does however have an effect (NB this is more applicable in the paediatric setting as children have a smaller circulating blood volume than adults). The signs and symptoms of anaemia will vary depending on severity and speed of onset, however, they may include: dizziness, shortness of breath, headaches, pallor and fatigue.

Anaemia can be corrected by the use of packed cell transfusions. "However, there is no consensus on the precise indications for their use and there is evidence of very significant variation in the use of red cell transfusions" (BCSH, 2001). Individual units should have guidance on when to transfuse their patients based on haemoglobin values and clinical assessment. The benefits of the transfusion need to be balanced against its associated risks.

Learning Point

What do your local guidelines say about when the administration of packed cells is indicated.

Erythropoietin (EPO) is an alternative strategy for treating anaemia in patients requiring chemotherapy. It has been found to increase the haemoglobin concentration and sustain this increase, rather than the fluctuations achieved with regular transfusions (BCSH 2001). Whilst it is expensive and consequently selectively used, there are benefits to using EPO with Jehovah's Witness patients to alleviate any need for blood transfusions.

Thrombocytopenia

Thrombocytopenia may occur after chemotherapy due to a reduction in platelet production. As platelets only have an average life-span of 8-11 days, a drop in a patient's platelet count can be seen more rapidly than a drop in haemoglobin; red cells having an average life-span of 120 days (Pinkerton et al 2004). It is important that a patient and their family are taught to look for the signs of thrombocytopenia so that treatment can be given to eliminate any risk of haemorrhaging.

Learning Point

List three signs of thrombocytopenia:

1.

2.

3.

Platelet transfusions can be given to support a patient until their own count recovers. A low platelet count can cause a delay to chemotherapy as many protocols require an unsupported count above a certain level.

Learning Point

What is the recommended threshold for transfusing platelets?

_____ $X10^9$/l

Handy Hint: You may find it useful to look at the BCSH (2003) Guidelines for the use of Platelet Transfusions, British Journal or Haematology 122 pp 10-23. It's available at www.bschguidelines.com.

Neutropenia

Neutropenia is a potentially life-threatening side-effect of chemotherapy. The main risk occurs when a patient shows signs of infection which may be of a viral, bacterial or fungal origin. Skin and gut flora from the patient themselves is a likely source of infection that is able to enter the body through devices such as central venous catheters or through damaged mucosal linings.

Pyrexia may be the only sign that a patient has an infection. Other signs of infection, such as, swelling, pain and erythema may be less than would be expected or absent due to the lack of neutrophils to mount an inflammatory response (Pizzo et al, 2006). The absence of fever does not rule out the presence of infection.

The patient is most at risk of a febrile and neutropenic episode at the chemotherapy nadir. Further myelosuppressive chemotherapy may be delayed in the patient remains neutropenic. Organisations and services may have protocols which offer different definitions for the level at which a patient is no longer neutropenic. The most commonly sited figures are 0.5 $X10^9$/l. 0.75 $X10^9$/l and 1.0 $X10^9$/l.

Learning Point

What is the meaning of chemotherapy nadir?

When is the chemotherapy nadir most likely to occur?

A patient presenting with a febrile and neutropenic episode must be assessed an investigations should include taking blood cultures from each lumen of any indwelling venous access device. Other investigations to be considered are urine analysis, stool cultures, throat swabs, wound and central line swabs and a chest x-ray. These investigations will depend on unit policy and the presenting signs of the patient. Routine full blood counts and biochemistry profiles should be obtained, "to ensure effective supportive care as well as safe administration of antimicrobials and other needed medications" (Pizzo et al, 2006).

Febrile and neutropenic patients should be commenced on broad spectrum antibiotics. The choice of drugs used will depend on local policy. If specific organisms are isolated from cultures and swabs, the appropriately sensitive drug can be added. The febrile and neutropenic patient needs close monitoring as neutropenic sepsis can develop quickly and is a life-threatening event.

Learning point

Outline the immediate care of a patient admitted from home to an inpatient facility with febrile neutropenia, giving time frames for actions

The use of growth factors such as G-CSF to reduce the severity and duration of neutropenic episodes have been shown to help in certain circumstances. These drugs are given either intravenously or subcutaneously.

Learning Point

Circle the statements you agree with:

1. Patients always have a febrile neutropenic episode after each course of chemotherapy.
2. All febrile and neutropenic patients should be given IV antibiotics.
3. Neutropenic sepsis is a life-threatening medical emergency.
4. Chicken pox and measles are life-threatening infections for immuno-compromised patients.
5. Courses of chemotherapy may be delayed if the patient remains neutropenic.

Neurotoxicity

Damage to the nervous system can occur as a direct or indirect effect of chemotherapy and includes; loss of balance, tremor, peripheral neuropathy or visual impairment. These effects can be temporary but may result in long term disability (Brighton and Wood 2005)

Learning point

List the chemotherapy drugs which may cause neurotoxicity

Chemotherapy drug	Neurotoxicity

Learning point

Outline the advice you would give a patient at risk of developing peripheral neurotoxicity from chemotherapy

Alopecia

Alopecia is a common and distressing side-effect of chemotherapy. It can affect all body hair and may begin 2-3 weeks following the start of chemotherapy. Hair loss is gradual and can cause distress as loose hair gets in the eyes, mouth and on clothes and sheets. Hair will begin to grow back 2-3 weeks after the end of chemotherapy. Not all chemotherapy agents cause hair loss.

Supportive care includes advising patients on the availability of wigs, wearing hats and bandanas. Patients also need to be told of the need to protect their head from sunlight. Scalp cooling may be offered to some adult patients to minimise the amount of hair lost, but is not appropriate for use with all chemotherapy that causes alopecia.

Learning Point

How would you support a patient experiencing alopecia?

How does scalp cooling work?

Why is scalp cooling only suitable for use with some and not all chemotherapy that cause alopecia?

Patients with certain malignancies should not be offered scalp cooling. Which malignancies are they and why?

Handy Hint: You may find it helpful to look at the local policy on scalp cooling which should be available within acute services.

Fertility Issues

Gonadal toxicity and subsequent infertility is a big worry for many cancer patients undergoing chemotherapy. Not all chemotherapy drugs will affect fertility, the alkylating agents being the most likely to have an effect. There are options available for fertility preservation although these methods are not necessarily suitable for all patients; neither can they be offered if treatment needs to commence immediately.

Patients need to access timely, appropriate information to enable them to make informed choices about treatment and fertility preservation (Foster, 2002). Contraception advice also needs to be sensitively discussed with patients and partners. This is to prevent pregnancy during treatment and to prevent the possibility of chemotherapy metabolites being passed to a partner through bodily secretions.

Learning Point

What are the methods of fertility preservation for men and women?

Men:

Women:

What type for contraceptives should be advised for chemotherapy patients?

Handy Hint: You may find it useful to read Foster R (2002) Fertility issues in patients with cancer Cancer Nursing Practice 1(1) pp 26-30.
Available at http:/www.nursing-standard.co.uk/archive/search_fr.asp?=-1&JID=(&LoginCode=712647752|120849.

Late-effects

There are many late-effects of chemotherapy; the ones that manifest will depend on the combination of drugs and the dosage used. Effects may be further exacerbated by the use of surgery and radiotherapy. The effects may be seen in any of the organs of the body; lungs, heart, kidneys, urinary tract, liver, brain etc. These effects will vary in severity from person to person and some patients appear to survive chemotherapy relatively unscathed.

One possible late affect of chemotherapy is that of developing a secondary malignancy. This is also a possible late-effect of radiotherapy. The risk of secondary malignancy will depend on the 'nature of treatment received and possible genetic susceptibility' (Pinkerton et al, 2004). Alkylating agents (eg cyclophosphamide, cisplatin, busulphan) and epipodophyllotoxins (eg etoposide) are linked to the development of leukaemia (Pinkerton et at, 2004).

Learning Point

Pick three chemotherapy drugs that are commonly used in your area of practice and find out what long-term side-effects they may have.

1.

2.

3.

Targeted Therapy

Targeted therapy includes monoclonal antibodies, small molecular inhibitors of tyrosine kinases and mToR inhibitors. Their modes of actions and side effect/toxicity profiles are diverse.

Learning point

Consider the following monoclonal antibodies and identify their associated side effects and toxicities

Bevacizumab

Cetuximab

Panitumumab

Rituximab

Trasatuzumab

Learning point

What advice should patients be given regarding adverse reactions to monoclonal antibodies?

Tyrosine Kinase inhibitors (TKI's) commonly cause skin reactions that are similar to ache in appearance. This can be painful and highly distressing to the patient.

Learning point

Explain why TKI's cause skin reactions

Identify 5 TKI's associated with skin reactions and outline the measures that can be taken to reduce the psychosocial impact of this for the patient and alleviate the physical symptoms associated with this side effect

References

Brighton D, Wood M (2005) The Royal Marsden Hospital Handbook of Cancer Chemotherapy Edinburgh Elsevier

British Committee for Standards in Haematology, Blood Transfusion Task Force (2001) Guidelines for the clinical use of red cell transfusions. British Journal of Haematology 113; 24-31 (DUE FOR UPDATE APRIL 2012)

British Committee for Standards in Haematology (2003) Guidelines for the Use of Platelet Transfusions British Journal of Haematology 122 pp10-23. (DUE FOR UPDATE MARCH 2012)

Foster R (2002) Fertility issues in patients with cancer Cancer Nursing Practice 1(1) pp26-30.

Murphy L, Murphy F (2005) Oral mucositis; a challenge for nurses Cancer Nursing Practice 4(6) pp 21-24.

Pinkerton R, Plowman P, Pieters R (2004) Paediatric Oncology Arnold, London.

Pizzo P, Poplack D (2006) Principles and Practice of Pediatric Oncology Lippincott Williams and Wilkins Philadelpha.

Skeel R Khlief S (2011) Handbook of Cancer Chemotherapy 8th Ed Philadelphia: Lippincott Williams and Wilkins

Wilkes G (2011) Targeted Cancer Therapy A handbook for nurses Sudbury: Jones and Bartlett Publishers

Equipment in SACT: central venous catheters and infusion devices

In this section we will cover the essentials you need to know to safely care for and manage the equipment needed for the administration of SACT. This section particularly concentrates on central venous catheters and infusion devices and looks briefly at other equipment you may be required to use.

At the end of the section you should be able to:

- Identify the common central venous catheters used for SACT administration and explain their differences.
- Understand the indications for use, care and maintenance of central venous catheters.
- Recognise common complications of central venous catheters and know where to find advice on management.
- Understand and minimise the risks associated with infusion devices when delivering SACT.
- Recognise risk factors associated with other equipment used during SACT administration.

Here is some of the information which may help you read about this subject:

- KMCN chemotherapy administration guidelines
- Dougherty L (2007) Central Venous Access Devices Care and Management John Wiley and Sons
- Department of Health (2008). The Health and Social Care Act 2008 Code of Practice on the prevention and control of infections and related guidance. London: DH
- Royal College of Nursing (2005). Standards for Infusion Therapy.
- www.ivteam.com
- www.cancernursing.org

Different types of central venous catheters (CVC's)

There are a number of central venous catheters used commonly to deliver intravenous SACT. These include skin-tunnelled catheters (Hickman catheters form part of this group), peripherally inserted central catheters (PICC's) and totally implanted ports.

Not all patients receiving SACT will require a catheter as part of their treatment. Once it has been decided a patient requires a catheter, the most appropriate device should be selected to meet the needs of the patient and the treatment that is planned.

Learning Point

List four reasons why a patient may require a CVC for SACT?

1.

2.

3.

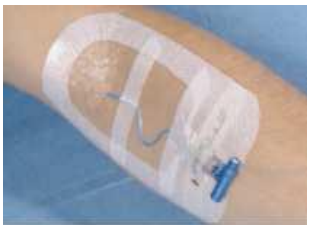
4.

Learning Point

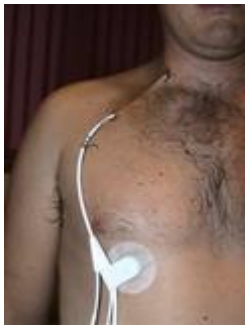
Use the pictures below to identify the following catheters:

1) PICC 2) Port 3) Skin-tunnelled

a)



b)



c)

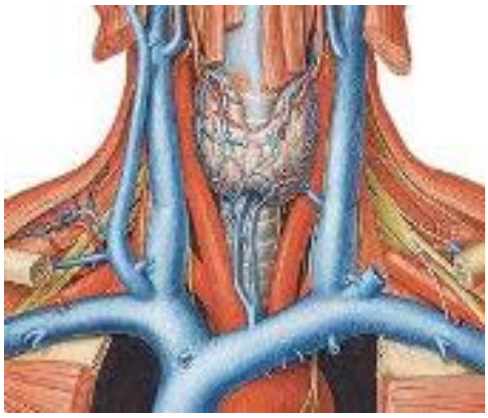
Skin-tunnelled catheters

Skin-tunnelled catheters are the most commonly used catheter for the delivery of SACT. They are usually inserted in radiology or theatre and the procedure may be assisted with the use of sedation.

Skin-tunnelled catheters are partially tunnelled under the skin and usually inserted into either the internal jugular or subclavian vein. The skin tunnel acts as a barrier to infection: Skin-tunnelled catheters may be open ended, eg a Hickman-type catheter, or valued, eg a Groshong catheter.

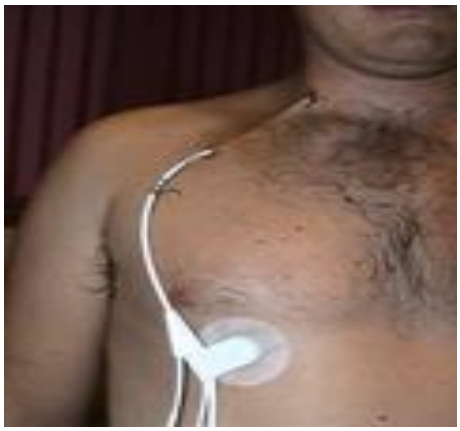
Learning Point

Indicate on the pictures below:



a) The subclavian vein

b) The internal jugular vein



c) A skin tunnel

d) The venotomy site (the point at which a catheter is inserted into a vein)

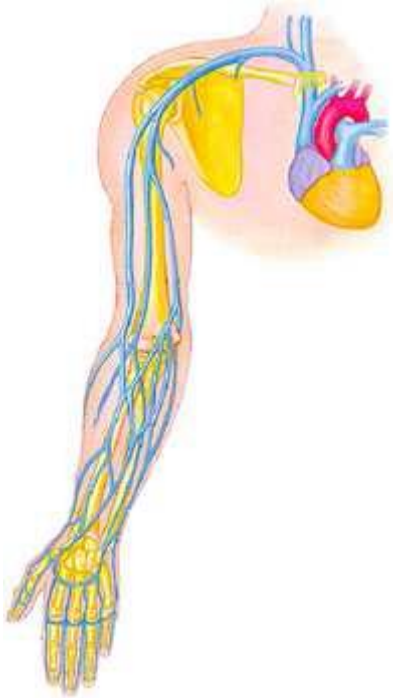
e) The catheter exit site

Peripherally inserted central catheters (PICCs)

PICC's are central catheters which are inserted peripherally into the basilica, cephalic or median cubital vein. PICC's may be open ended or valved. They are usually inserted by specialist nurses in clinical areas. The procedure does not require theatre time or sedation.

Learning Point

Indicate on the diagrams below:



a) The basilic vein

b) The cephalic vein

c) The median cubital vein

d) The catheter exit site

e) A catheter securement device

f) A positive pressure device (used to maintain patency)

Ports

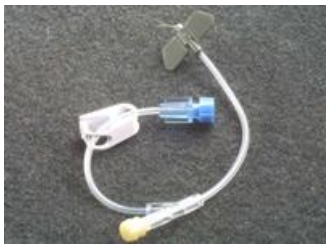
Ports are totally implantable central catheters which are inserted into the subclavian vein and accessed via a chamber which sits under the surface of the skin, in a surgical pocket. They are inserted in theatre under anaesthetic. Ports have the lowest rate of associated infection, but are also the most costly of the catheters available and can be awkward to access particularly in patients who have lots of subcutaneous tissue.

Learning Point

Using the diagrams below:

a) What is this piece of equipment:

b) Where would you find it?



c) What is this piece of equipment?

d) How would you use it?

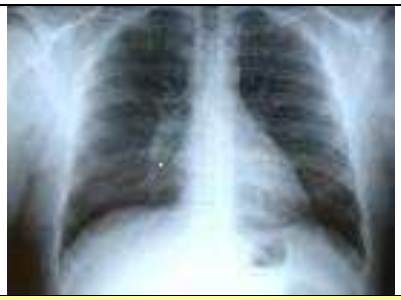
e) Indicate where a port access chamber is likely to be located.

Catheter tip placement

Regardless of the type of catheter selected and the route of insertion, location of the catheter tip should always be the same. It is of paramount importance that catheters are not used if the catheter tip has migrated from its recommended position. Use of an inappropriate placed catheter can result in chemotherapy extravasation.

Learning Point

Use this x-ray to indicate where the tip of a central venous catheter should be located



The differences between CVC's

CVC's vary in many ways. These include:

- the material they are made from
- the method of insertion
- the risk of complications
- the features of the device
- the length of time they should be used for

It is important these differences are understood as they influence the care a catheter requires and the correct choice of catheter for a given situation.

Learning Point

Tick the statements you agree with for each catheter

	PICC	Skin-tunnelled catheter	Port
May be double or single lumen			
May be valved or open-ended			
Always has a clamp			
Never has a clamp			
Always has a cuff			
Is totally implantable			
Has no integral means of securement			
Suitable for all chemotherapy regimens			
Unsuitable for long-term regimens (over 6 months duration)			
Tip must reside in the lower 3rd of the SVC			
Tip must reside in the upper 3rd of the SVC			
Placement must be confirmed radiologically before use			
It is unnecessary to confirm tip placement before use			
There is an increased risk of pneuemothorax during insertion			
Insertion may result in nerve injury			
Poor insertion technique may result in phlebitis			
Device is at high risk of migration if incorrectly managed			
Device requires surgical removal in theatre			
Device is easily removed by trained nurses			

Care and maintenance of CVC's

All catheters require routine care and maintenance which includes:

- Removal of sutures post insertion
- Replacement of fixation devices
- Dressing replacement
- Flushing

Manufacturer's guidelines vary from catheter to catheter and should be followed. Organisations in the KMCN should refer to the KMCN Central Venous Catheter guidelines for information upon which to base their practice. However, some basic principles apply to all catheters, these include:

- Syringes no smaller than 10mls in size should be used with any CVC due to an associated increased pressure on the device and risk of rupture.
- Catheters must always be flushed promptly after interventions are performed to avoid the risk of occlusion.
- Flushes must always be administered under positive pressure to avoid partial and complete occlusion. This can be achieved in a number of ways dependent on the device.
- It is unnecessary to check for and obtain blood withdrawal prior to routine line flushing.
- It is of paramount important that blood withdrawal is observed prior to the administration of chemotherapy.
- PICC's must be dressed with an appropriate dressing at all times to avoid infection and migration.

Learning Point

Complete the table for the catheters used in your organisation.

	PICC	**Skin-tunnelled catheter**	**Port**
How often should this device be routinely flushed?			
What flush solution should be used?			
How often should this device be routinely redressed?			
What dressing should be used?			
How many days post insertion should insertion site suture be removed?			
How many days post insertion should exit site sutures be removed?			
How often does the fixation device require replacement?			

Post insertion complications

CVC's are associated with a number of potential post-insertion complications. Some complications, for example line sepsis, and can be life-threatening, particularly in the neutropenic patient. Therefore, safe management of patients who have CVC's requires a practitioner to have a good knowledge of the signs and symptoms of common complications and an understanding of their management.

Learning Point

Tick the complications you agree are associated with CVC's, then identify a common sign/symptom of that complication using the list at the bottom of the chart:

	A complication of CVC's (please tick)	**Common sign/symptom (use list below)**
Snip-cath syndrome		
Line sepsis		
Pinch-off syndrome		
Occlusion		
Diabetes		
Thrombosis		
Cardiac temponade		
Exit site infection		
Phlebitis		
Cellulitis		
Persistent withdrawal occlusion		
Bio film formation		

1. Resistance to catheter flush
2. High blood sugar level
3. Fracture of the catheter
4. Pyrexia
5. Oedema around exit site
6. Distended chest and neck veins
7. Erythema and swelling above exit site, possible tracking
8. Rigor post catheter flush
9. Positional catheter occlusion, relieved by raiding arm
10. Erythema at exit site
11. Lack of blood withdrawal but catheter flushes freely

Management of post insertion complications

The management of post insertion complications varies slightly between organisations. Network wide guidance can be found in the KMCN Vascular Access Guidelines. It is important practitioners are also aware of and understand their local policies and processes.

Causes and symptoms of complications are universal and should be understood by all practitioners engaged in administering SACT via CVC's.

Learning Point

Match up a statement from the left with one from the right:

a)	The management of thrombosis requires:	*i)*	*if the catheter tip has migrated into an area of reduced blood flow*	a) ___
b)	The possibility of thrombosis should be investigated when a patient presents with	*ii)*	*oral antibiotics, eg flucloxacillin*	b) ___
c)	Infection can be localised or systemic and may be attributed to	*iii)*	*immediate medical intervention and usually results in line removal*	c) ___
d)	An exit site infection may be treated with	*iv)*	*a CVC that flushes freely but will not bleed back*	d) ___
e)	A systemic line infection requires	*V*	*poor dressing removal technique*	e) ___
f)	An infected line when flushed may cause a patient to develop	*vi)*	*poor flushing technique*	f) ___
g)	Fracture (breakage) of CVC's is most common in	*vii)*	*urokinase or alteplase*	g) ___
h)	A CVC should not be used	*viii)*	*PICC's*	h) ___
i)	A common cause of PICC accidental removal is	*ix)*	*oedema of the arm, neck and/or face*	i) ___
j)	Occlusion is a common complication of CVC's and is most commonly caused by	*x)*	*poor aseptic or handwashing technique*	j) ___
k)	Pinch-off syndrome is caused by:	*xi)*	*intravenous antibiotics*	k) ___
l)	Occlusion may be managed by the use of	*xii)*	*applying heat and prescribing anti-inflammatory medication*	l) ___
m)	Phlebitis with PICC's is caused by	*xiii)*	*a fribrin sheath*	m) ___
n)	Phlebitis is managed by	*xiv)*	*urokinase or alteplase*	n) ___
o)	Persistent withdrawal occlusion denotes	*xv)*	*pyrexia*	o) ___
p)	Persistent withdrawal occlusion is most commonly caused by	*xvi)*	*irritation to the vein lining*	p) ___
q)	Persistent withdrawal occlusion is treated with	*xvii)*	*Poor placement technique. Catheters exhibiting this characteristic must be removed.*	q) ___

Equipment used in the administration of SACT

Staff in roles administering SACT requires the knowledge and skills to manage equipment and products other than CVC's. This includes:

- Infusional devices
- Intravenous sets
- Scalp cooling devices
- Cannulae
- Dressings etc

All products have associated manufacturer's guidance which should be followed. Staff have a responsibility to familiarise themselves with all equipment/products before use. In-house training programmes may be available in some areas, e.g. for infusion devices.

Learning Point

List 3 of the infusion devices used in your clinical area and describe whether they are a volumetric (V), peristaltic (P), syringe (S) or elastomeric (E) device:

1)

2)

3)

How and when were you trained on their use?

Types of infusion devices

Infusion devices have different modes of action and may be described using this terminology. For instance, an elastomeric pump is one which delivers chemotherapy by deflating over time is none mechanical. A common example is a Baxter LV5 infusor. Whereas, a peristaltic device uses a wave like motion to infuse the chemotherapy. A common example would be a Walkmed ambulatory infusor.

Regardless of which device is used, all devices have common characteristics including a method of generating sufficient pressure to infuse fluid and a fluid container.

Learning Point

Complete the following sentences on infusion devices:

a) You must always respond promptly to a device a_____ to prevent cannula and catheter occlusion.

b) Do not reset alarming or o_____ devices without assessment of cause.

c) It is good practice to check the i_____ rate with two nurses.

d) Infusion devices should not be used to delivery v_____ chemotherapy peripherally.

Scalp-cooling

Scalp-cooling may be offered to patients to reduce hair loss with chemotherapy; however it is not suitable for use in all situations. A number of scalp-cooling devices are available, ranging from ice-caps to mechanical refrigeration units. The use of scalp-cooling extends a patient stay so can have implications for capacity and service provision.

Learning Point

1) The following points should be considered before scalp-cooling is offered to a patient:

   a)

   b)

   c)

2) Where would you locate your local policy on scalp-cooling?

3) How and when were you trained on the use of scalp-cooling equipment?

SACT Administration

In this section we will cover what you need to know to safely administer SACT. This section covers intravenous, oral and subcutaneous administration. You may only need to complete the areas that are applicable to your particular practice. Your assessor will be able to advise you on this.

At the end of this section you should be able to:

- Explain the checking process that must be followed prior to SACT administration.
- Understand the risks associated with administering oral, intravenous and subcutaneous SACT and how to minimise these.
- Understand the mechanism of extravasation and how this relates to intravenous SACT administration.
- Explain where to find key guidance documents.

Here is some of the information which may help you read about this subject:

- KMCN chemotherapy administration guidelines
- Skills for Health National Occupational Standards for Chemotherapy www.skillsforhealth.org.uk
- Brighton D, wood M (2005) RMHH of Cancer Chemotherapy Edinburgh Elsevier
- Royal College of Nursing (2005). Standards for Infusion Therapy.
- www.ivteam.com

Pre SACT checks must adhere to local policy for SACT administration and local medicine codes. Further guidance can be found in the KMCN chemotherapy administration guidelines.

Learning Point

Indicate which of the *drug* related checks are an *essential* part of ensuring patient safety before SACT is supplied and administered

Drug related check	Yes	No
Drug type		
Date of manufacture		
Dose		
Date of expiry		
Route of administration		
Time of expiry		
Volume		
Number of items		
In oral chemotherapy, number of tablets dispensed		
Duration of treatment		
Potential to cause skin damage, eg Vesicant, irritant etc		
Cycle number		
Drug appearance		
Previous dose reductions		
Drug potential to cause a reaction		

Prescription of SACT

The Manual of Cancer Services (2008), outlined that first cycles of SACT should be prescribed and consented by a specialist registrar, specialised staff grade or consultant. Prescriptions must not be accepted unless these criteria have been met.

Learning Point

How would you verify a prescription for 1st cycle SACT meets the above criteria within your organisation?

What action would you take if you found a 1st prescription contravened this guidance?

Checking vein integrity prior to peripheral SACT administration

When SACT is administered peripherally, the practitioner taking responsibility for the procedure must be confident that vein integrity is maintained throughout. When vein integrity is compromised there is a potential for SACT to extravasate, which may result in severe tissue damage and treatment delay.

Administering SACT peripherally relies on the practitioner recognising signs which may indicate intervention is needed, before a clinical situation leads to more serious consequences. Care must be taken to ensure appropriate checks are performed to assess vein integrity and cannula performance before SACT begins.

Learning Point

Choose the most appropriate answer for each of the following scenarios:

1) *Non-vesicant chemotherapy is due to be given to a patient who has an existing cannula. The cannula was sited 24 hours ago. Should you:*

   a) Assess the existing cannula for venous return. If evident, cannula may be used

   b) Re-cannulate the patient.

   c) Use the existing cannula.

2) *You are assessing a patient's newly cannulated vein for patency before commencing chemotherapy; however, no blood return is evident. There is no evidence of haematoma and the patient is experiencing no pain. Should you:*

   a) Use the cannula cautiously, as it has been new inserted and there is no obvious evidence of a problem.

   b) Set up a giving set of 0.9% Sodium Chloride and re-assess for blood return after 5 minutes. If no blood return is evident, patient should be re-cannulated before chemotherapy.

   c) Re-cannulate the patient immediately.

3) *You have commenced a giving set of 0.9% Sodium Chloride prior to chemotherapy administration and are completing a final check. You notice, blood return is still evident from the cannula, however, drip rate on gravity is slowing. The patient is in no pain. There are no other symptoms. You should:*

   a) Re-cannulate the patient immediately.

   b) Allow the drip to run a little longer and possibly apply some heat to the vein before reassessing the situation. The vein may be in spasm and normal function may resume.

   c) Continue as blood return is evident.

Venous return alone does not provide confirmation of correct cannula placement; equally, lack of venous return does not necessarily mean that a cannula is no longer in a vein. Patient assessment of vein function is dependent upon:

- The presence or absence of blood return
- The amount of blood return
- Drip rate on gravity
- Patient discomfort
- Visible changes around cannula site

When first administering SACT, it is important to refer to more experienced colleagues for advice when venous assessment is complex. This is especially important as some drugs have a high potential for tissue damage (eg vesicants) and must be managed with extreme caution. Other drugs may irritate the vein and exacerbate vein spasm or phlebitis. Always exercise caution when there is evidence of a slowing drip rate or a lack of blood return.

If in doubt, re-cannulate.

Peripheral SACT administration

Basic principles should be applied to all situations where SACT is administered. SACT is checked to see whether it should be protected from light or whether it requires specialist equipment (such as filtered giving sets) for administration.

Learning Point

Tick the statements you agree with for each catheter:

Statement	Agree	Disagree
SACT should be administered according to its prescribed rate and must not be speeded up.		
It is acceptable for patients to experience discomfort, particularly when drugs are known to cause venous irritation.		
Infusion devices may routinely be used to deliver vesicant chemotherapy peripherally.		
Irritant chemotherapy may not be delivered routinely via an infusion device.		
Cannula sites must be checked *throughout* an infusion for signs of swelling and erythema		
Chemotherapy infusions should not be disturbed once underway by reassessing a vein for blood return and patency.		
It is only necessary to check for venous return during bolus administration of chemotherapy when a vesicant drug is being administered.		
Cannulae must be flushed well between drugs and after completion of treatment.		
A slowing drip rate should always be managed by the application of heat to the vein.		
It is acceptable to experience discomfort at the cannula site when monoclonal antibodies are being administered		
It is permissible to allow monoclonal antibodies to infuse via gravity		

Bolus chemotherapy administration

Chemotherapy regimens often include the need to administer chemotherapy bolus drugs. Bolus chemotherapy should be given in a standard sequence relating to potential to cause tissue damage, with drugs with the highest potential to cause damage being given first. Drugs are classified as follows:

- Vesicant
- Exfoliant
- Irritant
- Inflammitant
- Neutral

Learning Point

a) Which of the drug classifications above indicates a group of drugs with the greatest potential for tissue damage?

b) Which of the drug classifications above indicates a group of drugs with the least potential for tissue damage?

c) Why should drugs with the great potential for tissue damage be given first?

d) Thinking about the most common regimen used in your clinical area incorporating multiple bolus drugs:

i) What are the bolus drugs in the regimen?

ii) In relation to tissue damage, what classification are these drugs?

iii) In what order should they be administered?

Chemotherapy administration via a central venous catheter

Chemotherapy administration via a central venous catheter should only be commenced after a catheter has been assessed for suitability and fitness for use. This should be done by establishing a gravity feed infusion prior to treatment. The following signs/symptoms should be investigated:

- Persistent withdrawal occlusion (lack of blood return, catheter flushes freely).
- Pinch off syndrome.
- Partial/total occlusion.
- Infection.
- Migration.
- Swelling of insertion site or skin tunnel.
- Leakage from catheter exit site.
- Pain/discomfort in the neck, shoulder or chest.

Learning Point

What are the potential consequences of proceeding with chemotherapy when the following are evident:

	Consequence
Persistent withdrawal occlusion	
Pinch off syndrome	
Partial/total occlusion	
Infection	
Migration	
Swelling of insertion site or skin tunnel	
Leakage from catheter exit site	
Pain/discomfort in the neck, shoulder or chest	

Providing sufficient blood return is evident from a catheter before treatment commences:

- Vesicant chemotherapy may be delivered via an infusion device.
- There is no need to assess the catheter for blood return during chemotherapy administration.

Extravasation

Extravasation is the inadvertent administration of vesicant fluid into the surrounding tissue.

It can be distinguished from infiltration which is the inadvertent administration of non-vesicant fluid into the surrounding tissue.

It is a common misconception that the majority of extravasations/infiltrations occur as a result of a displaced cannula or a burst vein.

Learning Point

What is the main cause of extravasation?

What are the three main types of phlebitis?

1)

2)

3)

Preventing Extravasation

Good SACT care requires a practitioner to undertake the procedure with a thorough understanding of how to minimise the possibility of phlebitis and to practise with attention to this detail throughout.

Many of the basic principles are well understood, for example, ensuing good hand hygiene and skin preparation prior to cannulation.

Increasing the number of these measures put in place will reduce the possibility of extravasation.

Measures put in place to reduce mechanical phlebitis concentrate on reducing cannula movement so that venous irritation is minimised. Reduction of chemical phlebitis involves considering the irritant nature of the drugs being given and reducing their impact on the vein lining. Reducing infective phlebitis centres on the prevention of bacterial contamination which inflames veins.

Learning Point

At the bottom are lists of measures which are helpful in reducing phlebitis. Indicate on the table below whether the measures are useful in preventing chemical, mechanical or infective phlebitis:

Chemical	Mechanical	Infective
1)	1)	1)
2)	2)	2)
	3)	3)
	4)	

a) Avoiding the use of ported cannulae.

b) Using the correct choice of dressing.

c) Cannulating using the smallest cannula possible for the outcome.

d) Cannulating using the biggest vein possible.

e) Using an aseptic/no touch technique.

f) Cannulating away from joints.

g) Flushing cannulae well during and after bolus delivery.

h) Using a cannula extension set.

i) Securing a cannula dressing well.

Signs of peripheral extravasation

There are occasions where SACT administration causes discomfort to a patient due to the irritant nature of the drug being delivered. It is easy to mistake this for extravasation, particularly for inexperienced practitioners. It is important that you are aware of drugs given in your area which have this potential.

Learning Point

List the drugs in your area which have the potential to cause discomfort when administered:

Learning Point

Circle the signs which could indicate extravasation:

a) Itching sensation.
b) Burning sensation.
c) Urticaria.
d) Lack or absence of blood return.
e) Swelling.
f) Aching joints.
g) Pins and needles.
h) Stinging sensation.
i) Erythema.

Signs of central catheter extravasation

Diagnosing extravasation from a central catheter can be difficult. Symptoms are often vague and easily overlooked. Aching and discomfort in the shoulder and/or neck is the most common symptoms. Other symptoms include:

- Leakage from the catheter exit site.
- Swelling o the chest wall.
- Aching/discomfort in the chest.

Management of extravasation

All areas delivering chemotherapy must have a local policy for the management of extravasation. The KMCN also have a policy which can be found at www.kentandmedwaycancernetwork.nhs.uk

Learning Point

Where would you find a copy of your local extravasation policy?

Where would you locate an extravasation kit in your clinical area?

What reporting procedures would you follow in the event of an extravasation?

The treatment of extravasation is often painful and patients are likely to require much reassurance and support. The full extent of extravasation damage may not become apparent for some time after the incident occurs so appropriate aftercare is important.

Learning Point

What follow-up and aftercare would you organise for a patient who has experienced an extravasation?

Practical tips to minimise extravasation

Always practice intravenous chemotherapy administration following key principles.

Learning Point

Complete the following sentences:

a) Maximise the measures put in place to reduce p _ _ _ _ _ _ _ s.

b) Avoid the administration of chemotherapy into the a _ _ _ _ _ _ _ _ _ l fossa.

c) Be aware that l _ _ _ s with reduced sensitivity are at greater risk of extravasation.

d) Do not c _ _ _ _ _ _ _ E a vein that has recently been punctured unless it is proximal to the puncture.

e) Use a t _ _ _ _ _ _ _ _ _ t cannula dressing.

f) Do not use b _ _ _ _ _ _s to cover a cannula.

g) Avoid topical a _ _ _ _ _ _ _ _ _s.

h) Consider how long a cannula has been in s _ _u. Is the site phlebitic, infected, painful?

Oral SACT

Oral SACT is increasingly prevalent. Whilst this has its benefits, such as allowing a patient to have their treatment away from the healthcare setting, it also has its limitations. Patients must be appropriately assessed for their level of compliance and understanding of the treatment regimen. Practitioners must place a high priority on ensuring patients are well informed and supported throughout their treatment process.

Practitioners dispensing cytotoxic drugs are a healthcare setting must be aware of the need to handle them using a no-touch technique. Patients should be requested to take their medication immediately that it is given to them.

Learning Point 18

Add to the following list of factors to be checked/considered when a patient commences oral SACT:

a) Patient understand SACT schedule.

b) Correct number of tablets dispensed.

c) _____

d) _____

e) _____

f) _____

g) _____

Learning point

Describe initiatives that can be used to enhance patient concordance with oral therapy

Subcutaneous SACT

Some SACT can be given subcutaneously and on occasions this is performed in a patient's home setting. Where SACT is given at home and requires refrigeration, it should be removed from the fridge 30 minutes prior to administration to facilitate patient comfort.

Learning Point

List SACT agents that can be given subcutaneously

Learning Point

Indicate which of the following statements you agree with:

a) Other household members should be asked to leave the room when the injection is given.

b) Air should be expelled from syringes prior to administration.

c) A suitable injection site should be chosen, ensuring that site is rotated each time.

d) Following injection, the needle should be left in place for a few seconds before withdrawal to minimise drug contamination to the environment.

e) The equipment may be disposed of into a regular sharps bin.

Congratulations
You have completed the SACT Administration section of this workbook

Monitoring the patient having SACT

In this section we will cover the essentials you need to know to safely monitor and manage a patient receiving SACT.

At the end of this section you should be able to:

- Explain the common symptoms of hypersensitivity.
- Explain the management of hypersensitivity of SACT.
- Understand the action to be taken in the event of an anaphylactic reaction.
- Identify the location of key supporting documents.

Here is some of the information which may help you read about this subject:

- KMCN Guidelines on managing adverse reactions http://www.kentmedwaycancernetwork.nhs.uk/home-page/for-professionals/medicines-and-prescribing-incorporating-sact-pathways/network-chemotherapy-prescribing-documents/.
- Resuscitation Council (UK). www.resus.org.uk.
- www.medicines.org.uk

Monitoring a patient having chemotherapy

Patient observations can provide useful information when a patient becomes unwell during SACT (or related treatment) administration:

Learning Point

Circle the statements you agree with:

Patient observations should be recorded:

1. As a baseline, pre-treatment.
2. At periodic intervals throughout treatment.
3. At periodic intervals throughout treatment only when the drug is known to increase risk of hypersensitivity/anaphylaxis.
4. Only if the patient feels unwell.
5. At the end of treatment, prior to discharge.

Give a brief rationale for your answers:

Learning Point

Which observations should be recorded and why?

Hypersensitivity (allergic) reactions

A hypersensitivity reaction is an overactive or misdirected immune response that results in local tissue injury or changes throughout the body in response to a foreign substance. Hypersensitivity reactions are classified into four types: Types I, II, III and IV. Type I reactions are most commonly associated with allergic reactions to drugs.

Learning Point

Name some of the symptoms you would expect to see if a patient was experiencing a Type I mild hypersensitivity reaction to SACT?

1)

2)

3)

4)

5)

Most hypersensitive reactions if mild, resolve with basic intervention:

Learning Point

List the steps that should be taken to manage a mild hypersensitivity reaction:

At which point would you request medical intervention?

When a patient has recovered from a hypersensitivity reaction, it may be necessary to amend or review the treatment plan.

Learning Point

What considerations might be necessary in order for the patient to be able to proceed with treatment?

Some treatments are more likely than others to cause hypersensitivity reactions, although as with all medication, the potential for reaction exists across the range of drugs available. Reactions, to a lesser or greater degree have been reported with almost all SACT (or related) treatments.

Learning Point

Reflecting on your own practice area(s):

1) List any treatments which have are known to have an increased potential for causing hypersensitivity reactions.

2) What pre-medication is routinely given with these drugs to minimise reactions?

3) List some treatments which are seldom responsible for causing hypersensitivity reactions.

Learning point

Outline the monitoring required of a patient receiving Rituximab treatment

Severe hypersensitivity reactions

Hypersensitivity reactions range from mild to severe, therefore it is important to be able to identify a severe reaction that may compromise health or be life-threatening.

Learning Point

How would a patient experiencing a severe hypersensitivity reaction present?

What steps should be taken to manage the situation?

At which point should medical intervention be requested?

Anaphylaxis

Anaphylaxis is the term given to a severe hypersensitivity (allergic) reaction which can cause shock, low blood pressure and death. Anaphylaxis requires immediate medical intervention. A clinical response to this situation should include provision of life support measures if necessary.

Learning Point

What essential equipment should be provided in the event of a severe hypersensitivity reaction (anaphylaxis)?

Learning Point

If you were involved in the management of a patient experiencing anaphylaxis in your area of practice, where would you locate the necessary equipment?

In order to safely monitor and manage the reactions of patients receiving SACT, it is imperative that you remain updated and are aware of the content of key documents to help inform your practice.

Learning Point

Where would you find guidance on the management of anaphylaxis and cardiac arrest?

When did you last receive basic life support training?

Congratulations
You are completed the Monitoring the Patient Having SACT section of this workbook

Workbook Evaluation

Congratulations on reaching the end! Please could you spend a few moments evaluating this workbook using the form below, so that this information can be used to improve it in the future. Many thanks.

		Excellent	Good	Satisfactory	Poor
Legal and professional issues	Presentation				
	Learning points/exercises				
	Overall Content				
Any other comments					

		Excellent	Good	Satisfactory	Poor
Cancer and SACT	Presentation				
	Learning points/exercises				
	Overall Content				
Any other comments					

		Excellent	Good	Satisfactory	Poor
Health and Safety Issues	Presentation				
	Learning points/exercises				
	Overall Content				
Any other comments					

		Excellent	Good	Satisfactory	Poor
Communication and information giving	Presentation				
	Learning points/exercises				
	Overall Content				
Any other comments					

		Excellent	Good	Satisfactory	Poor
Patient Assessment	Presentation				
	Learning points/exercises				
	Overall Content				
Any other comments					

		Excellent	Good	Satisfactory	Poor
SACT side-effects	Presentation				
	Learning points/exercises				
	Overall Content				
Any other comments					

		Excellent	Good	Satisfactory	Poor
Equipment in SACT	Presentation				
	Learning points/exercises				
	Overall Content				
Any other comments					

		Excellent	Good	Satisfactory	Poor
SACT administration	Presentation				
	Learning points/exercises				
	Overall Content				
Any other comments					

		Excellent	Good	Satisfactory	Poor
Patient monitoring	Presentation				
	Learning points/exercises				
	Overall Content				
Any other comments					

		Excellent	Good	Satisfactory	Poor
Overall evaluation of the training	Presentation				
	Learning points/exercises				
	Overall Content				
Any other comments					