PALLIATIVE CARE IN PAEDIATRIC ONCOLOGY

Introduction

Over 80% of children with cancer live in developing countries and have limited access to anti-cancer treatments and consequently have a very poor chance of cure.
During the course of their illness, almost all children with cancer experience pain.
and they do not need to suffer unrelieved pain. Effective pain management and palliative care are major priorities of the World Health Organisation (WHO) cancer programme, together with early detection and treatment of curable cancers.

Palliative care – definition

WHO's definition of palliative care, appropriate for children and their families, is ***"the active, total care of the child's body, mind and spirit and also involves giving support to the family. It begins when cancer is diagnosed, and continues regardless of whether or not a child receives treatment directed at the disease. Health providers must evaluate and alleviate a child's physical, psychological, and social distress. Effective palliative care requires a broad multidisciplinary approach that includes the family and makes use of available community resources; it can be successfully implemented even if resources are limited. It can be provided in tertiary care facilities, in community health centres and even in children's homes."***

"Control of pain, of other symptoms and of psychological, social and spiritual problems is paramount….and encompasses ongoing grief and bereavement support for the family and friends. The goal of palliative care is achievement of the best quality of life for patients and their families"

The WHO also states that ***"nothing would have a greater impact on the quality of life of children with cancer than the dissemination and implementation of the current principles of palliative care, including pain relief and symptom control"***

Symptom management

The management of symptoms of a dying child and their family will greatly influence quality of life and also the ability of the parents, siblings and community to cope with the child's death. The approach must be individualised, taking into account the understanding of the child and family, the cultural and social background, and an understanding of the underlying disease process.

Approach to Symptom Management

1. Obtaining a history and assessment
2. Identification of the cause (if possible)
3. Ongoing communication with the child and family
    - Explanation of symptoms and treatment options
    - Establishment of goals of therapy (eg pain relief)
4. Implementation of therapy
    - Reduction of underlying disease (if practical)
5. Regular review and modification of treatment as required

Pain

Pain is the most frequently experienced symptom in children with cancer, occurring as a result of the cancer itself, treatments, procedures or incidental causes

WHO states ***"that in the developed world, the major sources of pain in children's cancer are diagnostic and therapeutic procedures. In the developing world, most pain is disease related."***

Aetiology of cancer pain

- Tumour involvement
  - direct tissue/nerve damage
  - bone marrow infiltration
  - infiltration of tissues
  - compression of tissues
  - nerve compression
  - raised intracranial pressure
- Chemo/radiotherapy related
  - infection
  - mucositis
- Procedure related
  - venepuncture
  - lumbar puncture
  - bone marrow aspirate
  - injections
- Incidental causes

The fear of uncontrolled pain is also recognised as a source of anxiety for both children with cancer and their families. Anxiety and other psychosocial factors will contribute to the total pain experienced by the child and family and must be acknowledged and managed.

Types of pain

Pain can be classified by its origins and pathway of transmission to the brain into two broad categories, ***nociceptive*** (somatic and visceral) and ***neuropathic*****.**

Invasion of bone and bone marrow is the most common cause of pain in the child with cancer and is typical of somatic ***nociceptive*** pain. This pain is typically described as constant, irritating with no parasthesia.

Neuropathic pain is typically associated with burning, throbbing sensations with altered sensory perception either parasthesia or a heightened sensitivity to touch or weight bearing.

Dispelling the myths

Until recently, it was believed children; particularly young children experienced less pain than adults. Similar myths suggested children tolerated pain better and there was rarely a requirement for opioid analgesia. Many clinical studies have now challenged these "beliefs" and have demonstrated that children and infants experience similar degrees of

pain to adults and as a consequence of differences in pharmacokinetics, may actually require higher doses per kg than adults. Another concern that may arise is the fear of addiction to opioids. Addiction is predominantly a psychological dependence and patients with cancer requiring titrated doses of morphine do not become addicted.

Principles of pain management

The aims of cancer pain management are to relieve pain at rest and during activity, and to ensure comfort during sleep with minimal side effects. The approach is:

- to obtain an accurate history
- assessment
- identification of cause
- develop and implement a treatment plan
- communication
- reassess and modify treatment if necessary.

Assessment of pain

The evaluation of pain in the child is dependent upon the age, developmental stage, and previous life experiences. It is therefore often difficult to obtain qualitative and quantitative descriptions pain from children. The use of a number of different parameters is helpful in determining position, nature and severity of pain. Simple observation of the child's level of activity and behaviour is useful. Any change in behaviour, such as irritability, fractiousness or withdrawal may indicate discomfort.

Assessment can be enhanced with the use of visual analogue tools, including the smiling faces/thermometer scale (Figure 1)

The use of a body outline, completed with the child and parent, may also aid in determining the position of the pain and intensity can be highlighted by different shades of colours.

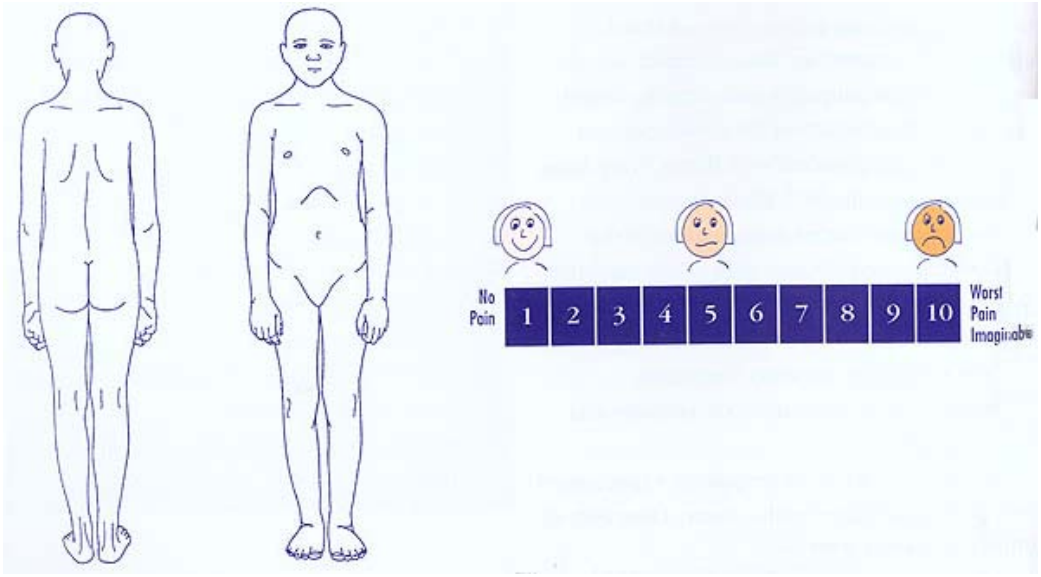

Figure 1 **Visual Analogue Scales and Body Outline**

Treatment

The WHO, Cancer Pain Relief Program, has declared that drug therapy is the mainstay of treatment and given the correct drug, dose and interval, pain relief is possible for most patients. The general strategy for treatment is to keep it simple and to administer the drug(s):

- ***By the mouth*** - the oral route is convenient, non-invasive and cost effective
- ***By the clock*** - regular scheduling ensures a steady blood level, reducing the peaks and troughs of *prn* dosing
- ***By the ladder*** – enabling a stepwise approach to treatment commencing with non-opioid analgesia and increasing to opioids (Figure 2)
- ***By the child*** – doses of all medications must be individualized; the opioid dose that effectively relieves pain varies widely between children and in the same child at different times

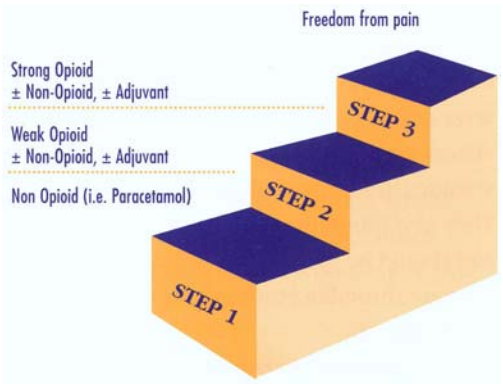

Figure 2 **WHO 3 Step Analgesic Ladder**

Analgesic agents

The analgesics can be broadly classified into two groups:

- *Primary analgesics*
  - Non-opioid and non-steroidal anti-inflammatory drugs
  - Weak opioids
  - Strong opioids
- *Secondary analgesics/Adjuvant drugs*
  - Antidepressants
  - Anticonvulsants
  - Corticosteroids

Which drug to prescribe is dependent upon the nature and severity of pain. A step-wise approach to drug administration is shown with the WHO ladder commencing with simple non-opioid drugs and progressing to opioids at appropriate doses to control increasing pain. (Figure 2)

Primary analgesics

Non-opioids

The non-steroidal anti-inflammatory drugs (NSAIDs) are weak primary analgesics whose main action is to suppress inflammation by their anti-prostaglandin activity. Drugs such as **aspirin, ibuprofen and diclofenac** are such examples and are effective at reducing fever and bone pain. NSAIDs can have significant side effects of nausea, vomiting, gastric irritation and ulceration, particularly in children. They can also interfere with platelet function and should be used cautiously in children with low platelet counts, as bleeding may be enhanced.

Sensory input of pain can also be reduced by the administration of regular **paracetamol.** This drug has a mild anti-inflammatory effect and is useful for musculo-skeletal pain. It is also an effective antipyretic. Paracetamol is generally well tolerated by children and is available in oral (tablet/capsule/syrup) and rectal formulations.

Opioids

The opioids are the main stay of treatment for the majority of patients with cancer pain. If pain is not controlled with paracetamol, low dose morphine, is preferred in the younger child. An alternative to morphine is **methadone**.

Morphine use

Morphine is available in oral (mixture, tablets, immediate/controlled release formulation), parenteral, spinal and rectal preparations. The preparations and availability will vary across the world. The oral route is the preferred route of administration as it is readily absorbed and tolerated by most children. The aqueous solutions of morphine are quite bitter and are more palatable to the child if mixed with a flavoured syrup. Morphine solutions should also be stored in a dark bottle, out of direct sunlight and in a cool place. Addition of an antimicrobial preservative may be necessary, particularly in warmer conditions.

Liquid morphine, in the appropriate dose, provides 4-6 hours of pain relief and it should be prescribed as a regular dose every 3-4 hours. There is **no** role for *prn* dosing in the palliative patient, as breakthrough pain is distressing and more difficult to control. There is no upper limit to the dose of morphine and it should be increased to the dose required to alleviate pain.

Pain that is only marginally controlled with the commencing dose of morphine (0.2-0.5mg/kg/dose q4h) is an indication to increase the dose. Incremental increases of 30-50% per dose may be required within 24 hours. Once the appropriate 24 hour dose of morphine is determined, transfer to controlled-release morphine preparations may be possible, dependent upon availability. The controlled-release preparations, have a slower onset of action, but have a longer duration of action and are available in tablet, granule, or capsule formulations. It is important not to crush or score the tablets as this will result in loss of “control” of morphine release.

Dose of controlled release morphine is determined by calculating the total daily amount of morphine (6 x regular dose).
For example 5mg of morphine mixture every 4 hours is a total daily dose of 30mg, which is converted to 15mg twice daily of a controlled-release preparation such as MS Contin.
Immediate release morphine should be available for "breakthrough pain" which may occur.
The "breakthrough" dose is equivalent to one-sixth of the total dose.
Using the same example, this would equal 5mg of morphine mixture.

If repeated doses of breakthrough morphine are required, this is an indication to increase the dose of controlled-release morphine to the total dose of morphine required in the preceding 24 hours. Concurrently the breakthrough dose will also require increasing. For example, if the total daily dose of morphine required for pain relief increases to 120mg/day, the dose of twice daily controlled-release morphine will be 60mg twice a day and the breakthrough dose of immediate release morphine mixture will be 20mg.

If the child is unable to take drugs orally, alternative routes of drug delivery are available. In the acute situation, a subcutaneous injection of morphine (0.05-0.1mg/kg) is easily administered and has a rapid onset of action. .
The 24 hour dose of parenteral morphine is equivalent to 1/3 of the total oral dose.
For example a child receiving 150mg of oral morphine per day would require 50mg of morphine delivered as a continuous subcutaneous infusion per 24 hours.

Methadone is a synthetic, long-acting opioid and may play a role in children who experience unwanted side effects or allergy to morphine. Because of its long half life (12-60 hours) accumulation of the drug can occur leading to unwanted sedation. Consequently, close assessment of the child should occur for the first few days after initiating methadone or when there is a significant dose increase. Methadone is however useful because of its long half life, when controlled-release morphine is unavailable.

Side effects and precautions of opioids
All preparations of morphine have side effects and constipation is the main problem. **Laxatives should always be prescribed whenever opioids are used**.
Unlike many of the other side effects, in particular nausea and drowsiness, tolerance to constipation does not occur.
Nausea and vomiting can occur upon initiation of treatment and an antiemetic may be required.
After administration of breakthrough doses of morphine it is not unusual for drowsiness to occur, but once a stable dose of morphine is achieved this becomes less problematic and children are likely to be more active and alert with good pain relief.
Itch is not uncommon and can be relieved by adding an antihistamine.

Opioids will cause respiratory depression if given in an inappropriate dose, which is usually above that required for analgesia. Drowsiness and respiratory depression are more common if there is concomitant renal insufficiency. Careful supervision of dosing is required and a lower initial dose should be prescribed and titrated according to response.

Similarly, a lower initial dose should be used for children with liver failure as bioavailability of morphine is increased.

While morphine is the gold standard for treatment of cancer pain, not all pain is opioid sensitive.

Causes of opioid resistant pain

- Relative resistance:
  - Under-dosing
  - Poor absorption orally
  - Lack of emotional support
- Semi-resistant pain:
  - Soft tissue/muscle infiltration
  - Bony metastases
  - Raised intracranial pressure
  - Neuropathic pain
- Resistant pain:
  - Neuropathic pain
  - Muscle pain

Relative resistance can be overcome by increasing the dose, improving support of the child and family or using an alternative route of drug delivery. The addition of a non-steroidal anti-inflammatory drug or paracetamol may alleviate pain related to soft tissue or bony metastases.

Neuropathic pain tends to be relatively resistant to the above approaches and is due to the compression or infiltration of nerves, or to neuropathy, which may be, tumour or treatment related. Adjuvant drug therapy is usually required.

Secondary analgesics

Antidepressants in low dose are useful for neuropathic pain, particularly painful paraesthesia, peripheral neuropathy or deafferentation pain. As well as having a direct analgesic effect, they potentiate opioid analgesia via adrenergic or serotinergic mechanisms. A low dose of **amitriptyline** at night usually has an effect within 48-72 hours.

Anticonvulsants, such as **carbamazepine** or **sodium valproate** are useful for pain related to nerve infiltration/compression, which is often periodic or spasmodic. The anticonvulsants have a stabilising effect on excitable cell membranes and prevent the spread of neuronal excitation

Corticosteroids either alone or in combination with an anticonvulsant effectively reduce swelling associated with nerve compression/infiltration. They can also alleviate some of the symptoms related to raised intracranial pressure. Low dose steroids act as anti-inflammatory drugs and can reduce bone pain. Dosing should be restricted, however, as

significant side effects occur, including excessive weight gain, nausea, gastric irritation and susceptibility to infection.

Other drugs recognised as secondary analgesics include; antispasmodics and anxiolytics. Low dose **diazepam** is effective treatment for muscle spasms and myoclonus.

Antibiotics or **antifungal agents** will improve pain control when there is an underlying infection such as cellulitis or mucositis. Consideration should be given to practical, oral anti-infective therapy in these situations.

Complementary therapy
Fear and anxiety will aggravate pain and communication with the child and family about symptoms and treatment will assist in management. Simple measures of distraction, play and music are helpful. Touch and massage will facilitate relaxation in many children. Older children and adolescents are also able to learn different relaxation techniques. These non-invasive measures allow regaining of control and will aid in total pain relief for the child.

Gastrointestinal symptoms

Oral problems
Mouth care
All children who are debilitated, or have poor oral intake or poor oral hygiene are susceptible to mouth problems. Regular mouth care can prevent many oral problems. Twice daily teeth cleaning with a soft tooth brush and mouth washes with **bicarbonate of soda** (1 tsp dissolved in a cup of warm water) or **chlorhexidine** are beneficial.
Gentle irrigation of the mouth with warm 0.9% saline solution will help remove debris and is also soothing to the mouth.

Xerostomia
Xerostomia or dry mouth is a common problem and results from, mouth breathing, dehydration, anxiety, drugs and infection. Simple measures such as sucking ice, ice cubes, frozen juices and drinks will moisten the mouth and relieve thirst. Chewing or sucking unsweetened pineapple pieces can also help clean the mouth as it contains ananase, a proteolytic enzyme.

Mucositis
Mucositis can occur as a consequence of poor oral hygiene, neutropaenia and infection. Apthous ulcers are small shallow painful ulcers that will be relieved with simple analgesic mouth wash, such as difflam. Xylocaine viscous may also be used.

Herpetic ulcers are painful, larger ulcers and can also cause clinically significant oesophagitis. Oral **acyclovir** in addition to analgesic mouthwash should be used. With severe ulceration and pain, oral or parenteral morphine may be required.

Candidiasis may present as stomatitis and the obvious white plaques may not be evident. Oral **nystatin** (100,000 U/ml) 1-2mls or lozenges q4h could be used.

Improving mouth care and treating or preventing infection can also reduce mucosal bleeding. Thrombocytopaenia will aggravate bleeding and platelet transfusion should be considered depending upon the stage of disease

Nausea and vomiting

The most common cause of nausea and vomiting is related to opioid use. Other causes include:

- Other drugs
- Upper GI inflammation
- Raised intracranial pressure
- Metabolic
- Constipation
- Infection

Vomiting is coordinated by the vomiting centre in the reticular formation of the medulla and is stimulated by the chemoreceptor trigger zone (CTZ), autonomic afferents from the viscera and higher centres.
The antiemetic drugs have different effects upon these sites and choice of agent is dependent upon the probable aetiology of vomiting.

Choice of antiemetic therapy

Site	Aetiology	Antiemetic
CTZ	Drugs (opioids), Metabolic (hypercalcaemia)	Ondansetron (0.15mg/kg q6h) Metoclopramide* (0.15mg/kg q6-8h) Prochlorperazine* (0.2mg/kg q6h)
Vomiting centre	Direct input – pain, Fear Viscera – gut obstruction, Raised ICP	Promethazine (0.2-0.5mg/kg q8h) Hyoscine (60-100μg/kg q6h)
Gastric outlet	Opioids	Metoclopramide
GI Inflammation	Gastritis (secondary to NSAIDs, steroids)	Mylanta 10-20mls qid Ranitidine (2mg/kg q12h)

If possible, as for pain relief, the oral route is preferable. An initial parenteral antiemetic may be required to obtain control before transfer to the oral route. Many agents can be administered subcutaneously.

Other causes of vomiting include severe constipation and will be relieved with adequate treatment of the constipation. Raised intracranial pressure will cause vomiting and is usually associated with headache. Steroids will alleviate these symptoms temporarily.

*The phenothiazines can cause dystonic reactions in children. These reactions are easily recognised and more common in the dehydrated child and can be treated with an antihistamine such as diphenhydramine (0.5-1mg/kg).

Constipation
Normal bowel function requires coordination of motility, mucosal transport and defaecation reflexes. When segmental non-propulsive motility predominates, constipation develops. Constipation refers to difficulty, discomfort or delay in the passage of stool. It is an extremely common symptom and can contribute to abdominal pain, anorexia, nausea, and vomiting and overflow diarrhoea

Causes of constipation

- Primary: intra-abdominal compression eg., pelvic masses

  neurological involvement eg.,local or cord

- Secondary:more common
  Drugs - reduce peristalsis
  - reduce bowel contractions
  - direct neural toxicity
- Exacerbating factors:
  Poor dietary intake
  Poor fluid intake
  Immobility
  Local factors – anal fissures/infection
  Previous constipation
  Electrolyte disturbance – hypercalcaemia, hypokalaemia

The assessment of constipation is based upon the previous and current pattern of bowel habit, the underlying condition including any neurological problem, food and fluid intake, medication and previous laxative use.

Treatment
General measures

- Encourage fluid and fibre intake
- Encourage mobility
- Stop or reduce unnecessary drugs
- Predict and prevent

- Laxative treatment

Which laxative to use is based upon patient preference of formulation, drug availability and degree of constipation. As opioids reduce the propulsive movement of the bowel, transit delay occurs and treatment should be directed onto the large bowel to stimulate and soften the stool, therefore both a **stimulant** and **softener** should be employed.

If constipation is well established, suppositories or a small enema will be required to clear the lower bowel before a normal bowel pattern can be established. Larger volume enemas can lead to fluid and electrolyte disturbances particularly in the debilitated or dehydrated child. Once the constipation is relieved, prophylaxis should continue. During the terminal phase, significant discomfort related to constipation is uncommon. As fluid and oral intake are generally small, oral laxatives can be discontinued.

Laxative classification

- Lubricant and stool softener
  - docusate– softener and promotes secretion of fluid
- Stimulants/contact laxatives – promote secretion of fluid into bowel and stimulates peristalsis
  - senna
  - bisacodyl
- Osmotic – osmosis draws fluid into bowel - softens stool and stimulates peristalsis
  - lactulose
- Suppositories and enemas – rectally administered laxatives; often a combination of stool softener and stimulant
  - Glycerin suppository - softener

Diarrhoea

The cause of diarrhoea is usually evident from the history and the underlying condition. Simple measures such as discontinuing laxatives, high fibre foods and enteric supplements will often aid management. Medication is frequently required and loperamide is generally well tolerated and effective. Loperamide capsules can be dispersed in water to a 0.2-1mg/ml solution, thereby allowing easier administration to children who prefer liquid formulations. Morphine either orally or subcutaneously will also alleviate diarrhoea.

Anorexia and feeding issues

Anorexia is common in the later stage of the child's illness. Multiple causes are responsible including pain, nausea, oesophagitis and gastritis, constipation, drugs, anxiety, depression and the underlying disease. Treatment of reversible conditions and presentation of small simple meals may improve intake. With progressive disease, children can survive for significant periods of time with little oral intake, and have minimal complaints. Families, however, find this quite distressing and support and explanation is required to assist the family acknowledge that anorexia is a component of progressive disease.

Respiratory Symptoms

Dyspnoea
Dyspnoea frequently occurs with other symptoms and is always associated with anxiety, by both child and family

Causes of breathlessness

Pulmonary	Extra pulmonary
Airway obstruction - lower	Airway obstruction - upper
Infection	Mediastinal disease
Atelectasis	Cardiac failure
Pulmonary metastases	Elevated diaphragm: ascites, abdominal mass
Pleural effusion	Anaemia
Interstitial lung disease (radiation/chemo induced)	Anxiety
Pulmonary embolism	Pain

Treatment
Specific treatment
Some causes are reversible with relatively simple measures. For example, a short course of antibiotics may be appropriate for the management of infection, and analgesia will alleviate dyspnoea related to pain. Transfusion should be considered when the haemoglobin is less than 8 g/dL and where anaemia is contributing to dyspnoea. If pleural effusions are symptomatic, drainage can be considered if the patients' general condition allows. Re-accumulation will occur, and further drainage or interventions should be individually determined. .

Supportive measures
Simple measures such as positioning the child in a comfortable and upright position in bed or a chair; increasing air movement with a fan and improving ventilation in the room by opening windows and breathing exercises and relaxation techniques may be beneficial to the older child. As anxiety will contribute to the degree of dyspnoea the child and family should be managed in a calm and reassuring manner.

Drug therapy
Bronchodilators
If bronchospasm is present, or if there is a history of asthma, bronchodilators may be beneficial.

Corticosteroids
Corticosteroids are also effective and can be used in addition to bronchodilators in children who have reversible obstructive airway disease. They may also be helpful for bronchial compression and lymphangitis carcinomatosis. Prolonged therapy with steroids is not generally indicated as the effect is non-sustained and side effects can be significant.

Opioids
Opioids moderate the reflexive drive to breathe and decrease patient awareness of dyspnoea. They may also improve the efficiency of breathing and exercise endurance.

Anxiolytics
As breathlessness can be very frightening, low dose **diazepam** is often helpful in reducing associated anxiety. Optimising general symptom control, particularly pain, will also reduce the level of anxiety.

Oxygen therapy
In the terminal phase, many children may experience dyspnoea but will **not** find oxygen helpful and will be aggravated by the mask or nasal prongs. Oxygen therapy may be helpful in those with metastatic pulmonary or mediastinal disease. Headache, nausea, daytime drowsiness and confusion may indicate hypoxia and having oxygen available is often reassuring for child and family. The use of oxygen prior to walking to the toilet or bathing may be all that is required. Oxygen should be discontinued if there is no definite benefit noted.

Cough
Cough results from irritation to the receptors in the upper or lower respiratory tract, the pleura, pericardium or diaphragm. Avoidance of irritants; antihistamine or anticholinergic agents for post-nasal drip and antibiotics may give symptomatic relief. Simple linctus will also sooth the throat and reduce irritant dry cough. For children with persistent dry cough, suppression with opioids is indicated. If a child is already receiving morphine for pain relief, increasing the total dose may be effective.

Inhaled salbutamol may be helpful with associated bronchospasm .

Noisy breathing
Excessive secretions or difficulty clearing pharyngeal secretions will cause “rattly” or noisy breathing, particularly in the terminal stages or in children with brain stem lesions. Simple positioning will assist with postural drainage of secretions and may be all that is required. Anticholinergic drugs, such as **hyoscine hydrobromide** can be used to reduce the production of secretions

Bleeding and anaemia
Anaemia
As the most common site of metastatic disease in children with cancer is bone marrow, anaemia is frequently seen. Decisions regarding blood transfusion should be made on an individual basis and depend upon the stage, life expectancy and symptomatology of the child. If anaemia is interfering with the child’s activity level, transfusion is appropriate. As the disease progresses and the child’s activity reduces, anaemia will be less symptomatic and the benefit of transfusion should be questioned. Discussion with the

family regarding the value of ongoing transfusion should take place, as it will become evident that further transfusion would not be appropriate.

Bleeding
Thrombocytopaenia is also common with bone marrow infiltration and bleeding can consequently arise. Coagulopathy secondary to liver disease, nutritional deficiency, DIC or occasionally from drugs can also lead to bleeding. Active bleeding is very distressing for the child and family and prevention of major bleeding episodes with planned platelet transfusion weekly or twice weekly should be considered. With progressive disease, and if acquisition of platelets is difficult, transfusion could be reserved for episodes such as significant epistaxis, bleeding gums or GIT bleeding. The decision to transfuse with platelets at any time should, as for blood transfusion, be based on an individual patient basis, discussed with the family and reviewed periodically.

Bruising and petechiae are common, but not life threatening and do not necessarily require treatment. Oozing from mucosal surfaces can lead to bleeding gums, dark stools, haematuria and rectal bleeding. Bleeding from ulcerated areas on skin or peri-anally can be settled with topical 1:1000 adrenaline.

For major bleeding when death is imminent, treatment should be directed at calming the family and simple supportive measures. Application of gentle pressure to the bridge of the nose, for example, will stem most epistaxes. Bleeding lessens as the blood pressure and cardiac output drops. If the child is aware, appropriate analgesia and sedation should be administered to relieve distress.

Neurological symptoms
Anxiety
All families experience anxiety during treatment, and when cure is no longer possible this will be exacerbated. Fear of the unknown, of potential symptoms and suffering will cause agitation in the child and family. Communicating with the child and family will help allay some fears, but occasionally anxiolytics may be of benefit to the child. Antidepressants can be used if there is concomitant depression. Relaxation techniques, distraction, music and meditation for older children will reduce levels of anxiety.

Seizures
Knowledge of the patients' past history and an understanding of the natural history of the underlying disease will suggest which children may be at risk.

Causes of fitting

- Brain tumours – primary, metastatic or meningeal lesions
- Raised intracranial pressure
- Intracranial haemorrhage
- Metabolic disturbances eg;
    - hypoglycaemia
    - hyponatraemia
    - hypocalcaemia

    - hepatic encephalopathy
- Infection and fever
- Pre-existing epilepsy

Treatment
Children with epilepsy or previous seizures will usually be on an anticonvulsant and this should be continued. Control of seizures may be lost if the child is unable to tolerate oral medication. Phenytoin has a relatively long half-life and levels may not drop until several doses have been missed.

Treatment of seizures

Emergency treatment

Diazepam 0.2-0.4mg/kg IV or PR

Maintenance treatment

Phenytoin 2mg/kg q6-12h or
Phenobarbitone 2.5mg/kg q12h
Carbamazepine 2mg/kg q8h

Continuous treatment when oral route not possible

Diazepam PR (5mg 1-5yrs, 10mg >5yrs) as required

Muscle spasm and myoclonus
Muscle spasm can occur as a result of immobility, pain, neuropathic spasm or cramp. Appropriate analgesia will reduce the protective muscle spasm effect. Low dose diazepam can also be considered if muscle spasm itself is causing pain. Encouraging mobility or changing position regularly in children with little energy will also reduce spasm and the development of painful contractures.

Myoclonus is the involuntary twitching involving single muscles or groups of muscles and is a recognised toxic effect of opioids. It is seen less frequently in children than in adults and is more common in the terminal phase of illness.

Total Care
Palliative care does not merely involve symptom management. It must encompass total care of the child and family in terms of adequate symptom relief, spiritual care; psychosocial support and ongoing bereavement follow up after the child has died. Local resources and cultural background will guide the nature and extent of psychosocial support. Culturally sensitive palliative care requires the health professionals to develop an understanding of the family's cultural needs. Communication, therefore, with the family and child is vital to the delivery of optimal care. Honesty in discussion with the child, either by the health professional or family member should be emphasized. The child's understanding of death varies with age, developmental stage and life experience; however, children generally know when they are dying, even if this has not been discussed with them. Consequently, the health professional's role will be to assist the

child and family and to answer questions that will arise about death and dying, physical and emotional needs, treatment options and place of care.

Ethical issues may also arise throughout the palliative phase of treatment, such as extent of care, which should be directed at maximizing quality of life by providing good symptom control.

Of greater ethical concern is the lack of resources internationally to provide relief of pain and suffering. Health care resources, both financial and physical are finite and even in developed countries; most resources are directed towards curative therapy rather than palliative care. Whilst the focus and outcome measures differ, resources and availability of simple drugs to provide palliative care are required. The additional role of the health professionals caring for children with cancer, and their families is that of advocate to ensure access to optimal symptom management for those children whose cancer is not curable.

Appendix 1 Common drugs and doses used in symptom management *

Drug	Dose	Frequency & Indication
Amitriptyline	0.5mg/kg/dose (po) 1-5mg/kg/day (po)	Nocte - neuropathic pain Nocte - antidepressant
Carbamazepine	2-10mg/kg/dose (po)	q12h; gradually ↑ dose
Chlorpromazine (Largactil)	0.25-1mg/kg/dose (slow IV) 0.5-1mg/kg/dose (po) 1mg/kg/dose (PR) (100mg suppository)	q6-8h; agitation, antiemetic
Dexamethasone	0.125-0.5mg/kg/dose	q6-8-12h
Diazepam	0.1-0.3mg/kg/dose (IV) 5mg 1-5y; 10mg>5y (PR) (5mg rectal tubes) 0.04-0.2mg/kg/dose (po)	Status-repeat if req'd q8-12h; anxiolytic & antispasmodic
Docusate sodium (Coloxyl)	100mg >3y, 120-240mg >10y (po)	Nocte - laxative
Hyoscine hydrobromide	¼ tablet >2y, ½ tablet >7y, 1-2 tablet >12y (po) 30-60μg/kg/day (SC)	q6-24h; ↓ secretions Continuous infusion
Ibuprofen	2.5-10mg/kg/dose (po)	q6-8h
Lactulose	5ml <1y;10ml 1-5y; 15ml 6-12y; >12y 20ml	q12-24
Loperamide	0.05-0.1mg/kg/dose (po) (max 2mg)	q6-8h
Methadone	0.2mg/kg (po) <50kg 5-10mg (po) > 50kg	q4-8h
Metoclopromide (Maxalon)	0.12-0.5mg/kg/dose (IV/SC/po)	q6-8h Continuous infusion

Morphine sulphate	0.2-0.5mg/kg/dose (po)	q4h regularly Commencing dose, immediate release ↑ **dose as required**
	0.1-0.2mg/kg/dose (SC/IV)	Bolus q4h - infusion ↑ **dose as required**
Nozinane	(IV/SC/po) 250µg-1mg/kg/dose (po)	3-6 divided doses daily
	500µg-3mg/kg/24hr continuous infusion (subcut or IV)	
Ondansetron	0.15mg/kg (IV)	q6-12h
	2mg<3y; 4mg<10y; 8mg>10y (po)	q6-12h
Paracetamol	15mg/kg/dose (po/PR)	q4-6h
Phenobarbitone	20-30mg/kg/dose (IV)	Status – bolus
	2.5mg/kg/dose (po)	q12h – maintenance
Phenytoin	2mg/kg/dose (po) (usual max 100mg)	q6-12h
Prochlorperazine (Stemetil)	0.1-0.2mg/kg/dose (IV)	q6-8h
	0.1-0.4mg/kg/dose (PR/po) (5mg, 25mg suppositories)	q6-8h
Promethazine (Phenergan)	0.2-0.5mg/kg/dose (IV/SC/po)	q6-8h; antiemetic /antihistamine
Ranitidine	2mg/kg/dose (po)	q12h
Senna	½ tablet<2y;1-2tablets<10y; 2-4tablets>10y	Nocte
	½-1tsp granules <2y; 1-2tsp granules >3y	q12h-daily
Sodium valproate	5-15mg/kg/dose (po)	q8-12h

The drugs included are those commonly used for symptom management. Readers should also refer to larger texts on Palliative Care for further drugs, indications and side effects. Contact with an experienced pharmacist is also advisable. All care has been made to ensure that the doses are accurate, but the reader is advised to check these carefully and to consult the above references and the text of this guide for potential toxicities.

As written by Dr Helen Irving for SIOP in 2003 and modified by Dr Jane Skeen (with permission from Dr Irving) for the POSG Pacific Island Project- April 2007

Notes:
1) *<u>Based on:</u> "A formulary for Paediatric Oncology in Developing Countries" Barr et al, Pediatric Blood Cancer 2005;44:433-435.
For the POSG Pacific Island project drug availability varies from country to country, so that when training and implementation occurs the drug schedules for each country will be considered.

2) For the assessment of pain (page 3) other visual analogue tools may be more appropriate.
Below is the scale that ahs been adapted for use in Papua New Guinea.
Source:
Guidelines for the treatment of cancer in Papua New Guinea, Edited by David Watters and John Niblett ,3rd edition 2007.