## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page Nos:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leukaemias</td>
<td>2 - 9</td>
</tr>
<tr>
<td>Lymphoma and Reticulo-Endothelial Malignancy</td>
<td>10 - 18</td>
</tr>
<tr>
<td>Central Nervous System Tumours</td>
<td>19 – 34</td>
</tr>
<tr>
<td>Sympathetic Nervous System Tumours</td>
<td>35 - 43</td>
</tr>
<tr>
<td>Retinoblastomas</td>
<td>44</td>
</tr>
<tr>
<td>Renal Tumours</td>
<td>45 - 50</td>
</tr>
<tr>
<td>Hepatic Tumours</td>
<td>51 - 53</td>
</tr>
<tr>
<td>Malignant Bone Sarcoma and Soft Tissue Sarcoma</td>
<td>54 - 59</td>
</tr>
<tr>
<td>Rare Tumours</td>
<td>60 - 64</td>
</tr>
<tr>
<td>Long-Term Follow-Up (LTFU) of Survivors of Childhood Cancer</td>
<td>65 - 73</td>
</tr>
<tr>
<td>Psychosocial Assessment Guidelines</td>
<td>74 - 81</td>
</tr>
</tbody>
</table>
South Thames Children’s Cancer Network Group

Clinical Management Protocol – Children - Leukaemia
STCCNG Children’s Suspected Leukaemia Pathway


Leukaemia - 2
INTRODUCTION

Childhood leukaemia represents about 35% of all childhood malignancies. The commonest type is acute lymphoblastic leukaemia (ALL) which represents approx 80-85% of cases and acute myeloid leukaemia (AML) occurs in 15-20%. Adult type chronic myeloid leukaemia (CML) and juvenile chronic myelomonocytic leukaemia (JMML) along with other myelodysplastic disorders are uncommon in childhood and constitute 2-5% of childhood leukaemias.

DIAGNOSTIC & STAGING PROTOCOL

HISTORY AND EXAMINATION

Children may present with the following symptoms & signs:

Symptoms
- Fatigue
- Poor appetite
- Increasing Pallor
- Bruising
- Nose bleeds or gum bleeding
- Fever or history of Infection
- Swollen lymph glands
- Breathlessness
- Abdominal pain
- Bone pain
- Joint pain
- Headaches/visual disturbances
- Boys – swelling of testis
Examination
- Pallor
- Fever
- Bruising or petechiae
- Mucosal bleeding
- Lymphadenopathy
- Subcutaneous lumps
- Signs of respiratory distress (mediastinal mass – do NOT lie flat)
- Hepatosplenomegaly
- Bone or joint discomfort
- Signs of raised intracranial pressure (CNS disease)
- Boys – testicular swelling

INITIAL INVESTIGATIONS AT REFERRING HOSPITAL
- FBC and blood film
- Clotting screen including fibrinogen
- Electrolytes
- Liver Function Tests
- Bone Chemistry
- Urate
- Viral serology (CMV, VZV)
- Chest X-ray

REFERRAL TO RMH
All children aged ≥1yr with suspected leukaemia should be referred to RMH for further investigation. Children aged <1yr should be referred to Great Ormond Street Hospital. Children with a mediastinal mass should be transferred to St Georges Hospital (SGH) as they require high dependency care. See referral pathway for further details.

INVESTIGATIONS AT RMH
- FBC and Blood Film
- Clotting screen
- Blood Group and Save
- Electrolytes
- Liver Function Tests
- Bone Chemistry
- LDH
- Urate
- Viral serology (CMV, VZV, Hepatitis serology)
- Peripheral blood immunophenotyping – if blasts on peripheral blood
- Chest X-ray (if not done already)
- Bone marrow aspirate
  - Morphology
  - Immunophenotyping
  - Cytogenetics
- Molecular studies
- Minimal residual disease (MRD)

*If acute promyelocytic leukaemia (APL) suspected, send peripheral blood and bone marrow to Dr David Grinwade's lab at Guys Hospital (see APL protocol for details)

- Bone marrow Trephine
  - Histopathology
  - MRD – if dry tap (+send peripheral blood sample)

- Lumbar puncture – only if blasts on peripheral blood and hence give intrathecal chemo at the same time. Do NOT do if suspect APL or significant coagulapthy. Ensure platelets ≥ 50x10⁹/L.
- Baseline echocardiogram

If the patient has a mediastinal mass with anaesthetic risk factors:
- send peripheral blood film and immunophenotyping
- If the diagnosis cannot be made on peripheral blood commence dexamethasone 3mg/m² bd after hyperhydation. Proceed with BMA after 24hrs if able to tolerate anaesthetic
- If FBC normal then arrange mediastinal biopsy with surgical, anaesthetic and PICU team. If significant anaesthetic risk, commence steroids and proceed to mediastinal biopsy within 48hrs of commencing steroids.

Note it is important to liase with anesthetist, PICU and surgeon BEFORE starting steroids as the biopsy MUST be done within 48hrs
MANAGEMENT PROTOCOL

MANAGEMENT PRIOR TO TRANSFER

- Commence on iv fluids (no added potassium) at 3L/m².
- Allopurinol
- Broad spectrum iv antibiotics if febrile
- Transfuse packed cells (Hb<8g/dl) and platelets (<20x10⁹/l)
- If coagulopathy give FFP +/- cryoprecipitate and maintain platelet count ≥50x10⁹/l (see supportive care protocol for volume required)

Beware if mediastinal mass present, as may have pericardial +/- pleural effusion hence if electrolytes normal start with 2L/m². If need to increase fluids, use regular frusemide 0.5mg/kg bd if necessary.

SUPPORTIVE CARE AFTER TRANSFER

- iv fluids (no added KCL) at 3l/m² (caution if mediastinal mass)
- allopurinol or rasburicase (if WBC≥75x10⁹/l or bulky disease)
- iv tazocin and gentamicin – if febrile or clinically septic
- transfuse to maintain Hb>8g/dl and plat >50x10⁹/l prior to procedure
- correct coagulapathy
- monitor U&E, Ca, PO4 and urate q6h
- maintain urine output ≥2ml/kg/hr. Use regular frusemide 0.5mg/kg bd if necessary.
- If K+ falls below 2.5mmol/l give single bolus (max rate 0.5mmol/kg/hr with ECG monitor).
- If develops tumour lysis (TLS) refer to TLS policy for further management

TYPES OF LEUKAEMIA

- Acute Lymphoblastic Leukaemia (ALL)
- Acute Myeloid Leukaemia (AML)
- Adult-type Chronic Myeloid Leukaemia (CML)
- Juvenile Myelomonocytic Leukaemia (JMML)/ Myelodysplastic Syndrome (MDS)/ Myeloproliferative Disorder (MPD)
TREATMENT PROTOCOLS

All children should be commenced on standard treatment protocols as recommended by the national Childhood Leukaemia Working Party. All children should be offered entry to an open clinical trial wherever appropriate and this must be discussed with the parents/guardians before commencing treatment.

The current recommendation for treatment protocols are as follows:

- **Acute Lymphoblastic Leukaemia (Non-Ph+ ALL)**
  - 1st line: UKALL 2011 protocol (Phase III trial)
  - 2nd line: IntReALL 2010 (Phase III Trial) or Relapsed ALL Guidelines
  - 3rd line: FLAG
  - 4th line: Clofarabine ± cyclophosphamide/etoposide
  - 5th line: Phase I/II trial

  *Indications for stem cell transplant (SCT):* As per UKALL 2011 (CR1), R3 guidelines (CR2) and in CR3 if no prior SCT.

- **Acute Lymphoblastic Leukaemia (Ph+ ALL)**
  - 1st line: BMS CA180-372 protocol with dasatinib + standard chemotherapy (Phase II trial)
  - 2nd line: Imatinib ± R3 chemotherapy
  - 3rd line: Phase I/II trial

  *Indications for SCT:* As per BMS CA180-372 guidelines (CR1) and CR2 if no prior SCT. Consider donor lymphocyte infusions (DLI) if relapse post SCT

- **Acute Myeloid Leukaemia (AML)**
  - 1st line: Paediatric AML Guidelines
  - 2nd line: FLA ± Idarubicin/Daunoxome
  - 3rd line: Clofarabine, cyclophosphamide, etoposide
  - 4th line: FLAMZA RIC SCT
  - 5th line: Phase I/II trial

  *Indications for SCT:* High risk AML (CR1) or refractory disease as per Paediatric AML guidelines or following relapse after 2nd line treatment
- **Acute Promyelocytic Leukaemia (APL)**
  1st line: APL guidelines
  2nd line: Refractory/Relapse APL guidelines with arsenic ± mylotarg
  3rd line: FLA ± Idarubicin/Daunoxome
  4th line: Phase I/II trial

  **Indications for SCT:** As per APL guidelines ie Refractory/relapsed disease

- **Downs AML**
  1st line: Downs AML Guidelines
  2nd line: FLA
  3rd line: Mylotarg or Clofarabine, cyclophosphamide, etoposide
  4th line: FLAMZA RIC SCT
  5th line: Phase I/II trial

  **Indications for SCT:** Relapsed AML following 2nd line treatment

- **Ph+ CML**

  National CML guidelines

  **Chronic phase:**
  1st line: Imatinib
  2nd line: Dasatinib (Open Phase II study)
  3rd line: Phase I/II trial

  **Accelerated phase:**
  1st line: Imatinib
  2nd line: Phase I/II trial

  **Blast crisis:**
  - Myeloid: Imatinib or AML-type chemo
  - Lymphoid: ALL induction or FLAG

  **Indications for SCT:** As per national CML guidelines.

  Chronic phase: Sib allo SCT – Suboptimal response to imatinib or molecular relapse on imatinib.
  VUD SCT - Suboptimal response to dasatinib or molecular relapse on dasatinib
  Accelerated phase/Blast crisis: All proceed to sib or VUD SCT
Juvenile Myelomonocytic Leukaemia (JMML)

1st line Cytarabine/Etoposide or 6MP/retinoic acid
2nd line As per AML therapy
3rd line Phase I/II trial

Indications for SCT: All patients to proceed to SCT (nonTBI). Consider 2nd VUD SCT with TBI if relapse after prior sib allo SCT

FOLLOW UP

On treatment:

- Investigations
  - FBC weekly.
  - U&E - if clinically indicated
  - LFTs - if clinically jaundiced or hepatomegaly

- Follow up
  - Consultant review at the start of each cycle
  - Weekly review by daycare or local shared care or community team (if outpatient)

Off Treatment:

- Investigations
  - Echocardiogram - on completion of treatment.
    5 yearly thereafter or annually if reduced shortening or ejection fraction
  - FBC – only if clinically indicated

Follow up

- 1st year 6 weekly (alternating RMH & POSCU)
- 2nd year 3 monthly (alternating RMH & POSCU)
- 3rd year 4 monthly (alternating RMH & POSCU)
- 4th year 6 monthly
- 5th year+ Annually in Long term follow up clinic
INTRODUCTION

Lymphomas are the third most common malignancy in children. Of these 60-70% are non-Hodgkin and 30-40% are Hodgkin’s lymphomas. Non-Hodgkin’s Lymphomas are a heterogeneous group with Burkitt’s lymphoma forming 35-50%, lymphoblastic lymphoma 35-40%, diffuse large B cell 15-25%, Anaplastic large cell lymphoma (ALCL) 5-10% and lymphoproliferative disease and other rare lymphomas about 1% of reported case series.

PRESENTATION:

Enlargement of a single lymph node or lymph node group is the most common presentation and it is usually not possible to differentiate Hodgkin’s lymphoma from non-Hodgkin’s. However, in general Hodgkin’s lymphoma is slow growing and spreads in a stepwise fashion from one lymph node group to the next. Non-Hodgkin’s lymphomas grow rapidly and can present as a large mass in a short period of time.

Common presenting features for the two main subgroups are:

**Hodgkin’s Lymphoma:**

- Slow growing lymph node mass that may wax and wane in size
- Fever
- Night sweats
- Weight loss
- Lethargy
- Orthoponea or breathlessness on exertion due to mediastinal mass
- Rarely cord compression

* B symptoms: Fever > 38° x 3, night sweats, > 10% loss in body weight over last 6 months, need to be documented since these patients have to be treated more intensively.

**Non-Hodgkin’s lymphoma:**

- Rapidly enlarging lymph node, nasopharyngeal or tonsillar mass
- Large abdominal mass +/- ascites. Some patients can present with intussusception
- Orthoponea, breathlessness or swelling of the face, if there is a mediastinal mass. A pleural and/or pericardial effusion may also be present,
- If bone marrow involvement is present in either type (more common in lymphoblastic lymphomas, rare in Hodgkin’s Lymphoma) the patient may present with fatigue, poor appetite, increasing pallor, bruising, nose bleeds or bone and joint pain
- Testicular swelling
- Besides the standard presentation, ALCL and some peripheral T cell lymphomas can present as skin nodules or ulcers
• Rarely cord compression
• Patients with CNS lymphomas may present with headache, vomiting, visual disturbances or cranial nerve palsies.

REFERRAL:

When a diagnosis of lymphoma is suspected at a GP surgery or A&E, the patient should be urgently referred to the local paediatric service.

HISTORY AND EXAMINATION:

Symptoms as above.

Note: Always take a history of B symptoms.

* B symptoms: Fever > 38°C x 3, night sweats, > 10% loss in body weight over last 6 months

Examination-Hodgkin’s lymphoma:

• Lymphadenopathy
• Hepatosplenomegaly
• Signs of respiratory distress (mediastinal mass – Do NOT lie flat)

Examination- Non Hodgkin’s lymphoma:

• Lymphadenopathy
• Abdominal mass with or without ascites
• Signs of respiratory distress (mediastinal mass or pleural effusion – Do NOT lie flat)
• Facial oedema and prominent veins
• Hepatosplenomegaly
• Pallor, bruising, petechiae
• Fever
• Bone or joint pain
• Papilloedema
• Cranial nerve palsies
• Signs of cord compression
• Testicular swelling
INITIAL INVESTIGATIONS AT REFERRING HOSPITAL:

- FBC
- Blood film
- Serum LDH and ESR
- Urea and Creatinine
- Electrolytes including
- Liver function tests
- Bone chemistry
- Urate
- Chest X-ray (should always be done to rule out mediastinal mass)
- If mediastinal mass is not present a CT of neck, chest, abdomen and pelvis should be done

REFERRAL TO RMH:

- If there is no mediastinal mass and the patient is well the registrar/consultant on call at RMH should be called and the child transferred to the ward or sent to the out patient clinic for review.
- A patient with a significant mediastinal mass should be transferred by the South Thames retrieval team to St Georges Hospital after liaising with the on call team at RMH.
- Children less that a year old should be sent to Great Ormond Street Hospital.

MANAGEMENT PRIOR TO TRANSFER:

- Allopurinol or rasburicase
- Broad spectrum antibiotics if febrile
- If coagulopathy give FFP +/- cryoprecipitate
- If mediastinal mass or pleural effusion is present start fluids at 2 l/m². If need to increase fluids use regular furusemide 0.5 mg/kg if necessary
- In B-NHL the kidneys may be involved or there may be ureteric obstruction due to the mass. Keep close eye on renal function
- Do not give GA (for CT scan) or lie the child flat, if mediastinal mass is present

INVESTIGATIONS AT RMH:

- FBC + ESR and LDH
- Blood film
- Clotting screen
- Electrolytes
- Liver function tests
- Bone chemistry
- LDH
- Urates
- Viral Serology (CMV, VZV, Hepatitis serology)
- CXR (if not done already)
- CT scan of the neck, chest abdomen and pelvis (if no respiratory compromise)
- Biopsy of most accessible lymph node (RMH or SGH)
- Baseline echocardiogram
If patient has a mediastinal mass and anaesthetic risk factors, try and get a diagnosis without giving an anaesthetic (see algorithm for treatment of mediastinal masses below).

- Peripheral blood immunophenotyping – If blasts on peripheral smear
- If present, pleural or peritoneal tap for cytology
- If cervical, supraclavicular, axillary lymph nodes are also enlarged in an older child a biopsy should be done under a local anaesthetic.
- If general anaesthetic is required for a CT and biopsy give steroids (Prednisolone 60mg/m²/day) prior to the procedure.

* When steroids are given take precautions for tumour lysis syndrome (TLS) since a single dose can cause problems. Also assess the child every day and do the biopsy as soon as possible as the mass may disappear within 48-72 hours and there may be difficulty in making a diagnosis. Liaise with surgeon, anaesthetist and PICU consultant before starting steroids so the procedure is not delayed (see algorithm at end of document).

Once the diagnosis is made specific investigations for different tumour types are:

**Investigations for Hodgkin’s disease:**

- Bilateral bone marrow aspirate and trephine if stage higher than II A
- PET scan
- Bone scan if bony disease is suspected

**Investigations for Burkitts and Diffuse large B cell Lymphoma:**

- Lumbar puncture
- Bone marrow aspirate for morphology, immunophenotyping, cytogenetics and molecular studies
- Renal ultrasound if renal infiltration or hydronephrosis is suspected
- Consider CT scan/MRI of the head if CNS disease suspected
- GFR

**Investigations for lymphoblastic lymphomas:**

- Lumbar puncture
- Bone marrow aspirate for morphology, immunophenotyping, cytogenetics and molecular studies
- Consider CT scan/MRI of the head if CNS disease suspected

**Investigations for ALCL:**

- Molecular studies for t(2:5)
- Bilateral bone marrow aspirates and trephines
- Lumbar puncture
- Bone scan (X-ray if any suspicious area identified)
- Consider CT scan/MRI of the head if CNS disease suspected
- GFR
Investigations for lymphoproliferative disease:

- Lumbar puncture
- Bone marrow aspirate
- Molecular studies for clonality
- PET scan if disease not visible on CT

SUPPORTIVE CARE AFTER TRANSFER:

- IV fluids (no added KCL) at 2-3 l/m² (caution if mediastinal mass or pleural effusion)
- Allopurinol or rasburicase (if bulky disease)
- IV tazocin and gentamicin – if febrile or clinically septic
- Transfuse to maintain Hb > 8 gm/dl and platelets > 50 x 10⁹/l, prior to procedure
- Correct coagulopathy
- Monitor U&E’s, Ca, PO₄ and Urates every 6 hours
- Maintain urine output > 2ml/kg/hr. Use regular furusemide 0.5mg/kg bd if necessary
- If K⁺ falls below 2.5mmol/l give single bolus (max rate 0.5mg/kg/hr with ECG monitor).
- If patient develops tumour lysis syndrome (TLS), refer to TLS policy for further management

MAIN TYPES OF LYMPHOMAS:

- Hodgkin’s lymphoma
- Burkitt’s and diffuse large B cell lymphoma
- Primary Mediastinal large B cell Lymphoma
- B and T cell Lymphoblastic lymphoma
- Anaplastic large cell lymphoma
- Lymphoproliferative disease

LYMPHOMA TREATMENT PROTOCOLS

Non – Hodgkin’s Lymphoma:

1. **B-NHL:**
   - 1ˢᵗ line B-NHL guidelines
   - 2ⁿᵈ line CYVE or ICE + Rituximab followed by SCT
   - 3ʳᵈ line phase I/II studies

2. **Lymphoblastic Lymphomas:**
   - 1ˢᵗ Line: UKALL 2011 trial
   - 2ⁿᵈ Line R3 + SCT
   - 3ʳᵈ line FLAG +/- Idarubicin + SCT
   - 4ᵗʰ line phase I/II studies
3. **Primary Mediastinal Large Cell NHL:**

Rituximab plus B-NHL guidelines.

4. **Anaplastic large cell lymphoma (ALCL):**

   1\textsuperscript{st} line ALCL guidelines
   2\textsuperscript{nd} line ALCL relapse guidelines
   3\textsuperscript{rd} line weekly Vinblastine alone

5. **Lymphoproliferative disease**

   1\textsuperscript{st} line Reduction of immunosuppression +/- antivirals
   2\textsuperscript{nd} line rituximab or rituximab + COP/CP (LPD guidelines)
   3\textsuperscript{rd} line B-NHL like treatment modified according to organ damage (LPD guidelines)
   4\textsuperscript{th} line cytotoxic EBV sensitised T cells

**Hodgkin’s lymphoma**

   1\textsuperscript{st} line Hodgkin’s disease protocol
   2\textsuperscript{nd} line Relapse protocol or EPIC +/- Autologous transplant
   3\textsuperscript{rd} line Gemcitbine + Cisplatin +/- Allogenic transplant
   4\textsuperscript{th} line Lenalidomide
   5\textsuperscript{th} line Brentuximab
   6\textsuperscript{th} line Vinblastine alone

2. **Lymphocyte predominant Hodgkin’s disease**

   1\textsuperscript{st} line LPHD guidelines
   2\textsuperscript{nd} line Classical (as above).

**FOLLOW-UP**

**On treatment:**

- FBC weekly
- U&E’s and LFT’s if clinically indicated
- Assessments according to individual protocols

**Off treatment:**

**Investigations**

- Echocardiogram on completion of treatment. If normal 5 yearly thereafter. If shortening or ejection fraction outside normal limits, review by cardiologist and further follow-up and treatment as required
- Further investigations as required
Follow-up:

**B-NHL:**
- 1st year: 6 weekly with clinical examination for 18 months (X-ray or ultrasound if residual disease present)
- 2nd year: 3 monthly
- 3rd–5th year: 6 monthly

**Hodgkin’s:**
- 1st 2 years: 3 monthly clinical exam, CXR +/- U/S
- 3rd year: 4 monthly clinical exam, CXR +/- U/S
- 4th–5th year: 6 monthly clinical exam, CXR +/- U/S

**ALCL:**
- 1st year: 2 monthly clinical exam CXR, Abd U/S imaging of initially involved sites
- 2nd year: 4 monthly clinical exam
- 3rd year: 6 monthly clinical exam
- 4th year: yearly clinical exam
Algorithm for treatment of patients presenting with Anterior Mediastinal mass at diagnosis

**Differential Diagnosis**

1. T-NHL
2. Hodgkin’s Disease
3. Teratoma
4. Thymoma

Send blood for FBC, U&Es, CA, PO4, Uric Acid, LDH, AFP and BHCG

Tachypnoea, orthopnoea+O2 dependency and/or Signs of superior vena caval syndrome

YES

NO

Refer to St George’s PICU

CT scan

No airway compromise, discuss with anaesthetist

Consider diagnostic procedures under local at RMH
Steroid cover+hyperhydration+Rasburicase can be deferred if patient stable +/- history suggestive of Hodgkin’s disease/teratoma

CT scan for airway patency + start

Steroids (Pred 60mg/m2)+hyperhydration + Rasburicase

FBC show blasts in Peripheral smear


FBC

Cervical/supraclavicular/ Inguinal lymph nodes

Morphology/cytochemistry Flow, cytogenetics

To tap fluid under local

Cytology flow cytogenetics

Neutrophil<1 Platelet <150

Older child

BM under local

Older child

FNA+Biopsy under local
1. Airway compression/superior vena caval syndrome is a medical emergency and patient should be referred urgently to PICU.

2. Tissue for biopsy should be obtained as quickly as possible preferably within 24 hours, especially if the mass is responding rapidly. The mass may disappear in 48-72 hours preventing a tissue diagnosis.

3. If diagnostic tissue cannot be obtained under local, the patient should have a daily anaesthetic assessment at St George’s so that a biopsy can be obtained under GA or ketamine as soon as possible. A BMA and LP should be obtained at the same time.

4. If the mass is causing respiratory compromise and not responding rapidly to steroids, Cyclophosphamide 300mg/m² can be added.

5. **Remember to monitor for TLS in the patients on steroids +/- Cyclophosphamide**
CLINICAL PRESENTATION, DIAGNOSIS AND INITIAL CLINICAL MANAGEMENT

CLINICAL FEATURES

Brain and spinal cord tumours have been found to have the greatest diagnostic delay of all childhood cancers. This probably results from the often non-specific nature and variability of symptoms arising from CNS tumours and the need for neuro-imaging to confirm the diagnosis. The determinants of symptoms and signs include age, tumour type and of course anatomical site. The presentation may demonstrate features of raised intracranial pressure (ICP) or localising neurological deficits.

Increased ICP can be due to direct tumour infiltration or compression of normal structures or secondary to obstruction of the cerebrospinal fluid (CSF). In older children this can present initially as mood/behavioural changes and declining school performance prior to development of the more classical features of headache, nausea and vomiting. Typically headaches start generalised and intermittent, then increase in both intensity and frequency with time. The child may awake with headache at night with the pain generally being worse in the morning and improving during the day with an upright posture. Nausea and vomiting may occur alone or with headache, again this is often worse in the morning after being recumbent during sleep. School age children may also complain of visual disturbance with the development of cranial nerve palsies and papilloedema. False localising signs related to raised ICP include a deficit of lateral gaze (VI nerve palsy) or a head tilt related to a IV nerve palsy. In infants and younger children raised ICP is more insidious due to the plasticity of the developing skull and the inability to communicate symptoms easily. Infants may be irritable, with failure to thrive associated with anorexia and vomiting and possible regression of developmental milestones. Carers may notice increasing head circumference with widened sutures and a tense anterior fontanelle. In these late stages the “sun-setting” sign may be noted due to paralysis of upward gaze (Parinaud’s sign).

Focal neurological signs may help localise a CNS tumour prior to imaging but are not always present. Figure 2 demonstrates the typical distribution of anatomical sites in paediatric CNS tumours and the associated symptoms and signs associated with these sites. Specific tumours have characteristic presentations and will be discussed later. If the primary CNS tumour has spread, there maybe associated signs and symptoms related to the sites of metastases although these are often asymptomatic at presentation.
Diagnostic Workup and Initial management

In those patients who present with acute neurological deficit the most urgent need is to stabilise their condition. In most cases this can be done with appropriate conservative measures to control pain, raised ICP, seizures and electrolyte abnormalities allowing definitive surgery to be planned semi-electively. Occasionally, despite the use of high dose corticosteroids, surgical CSF diversion is required urgently and this may involve external ventricular drainage, a III ventriculostomy or insertion of a ventriculo-peritoneal shunt.

During this initial period the patient will obviously undergo full neurological examination (including ophthalmic assessment) and diagnostic investigations such as appropriate neuroimaging and baseline endocrine testing. If there was no sign of raised intracranial pressure CSF may have been obtained for testing for cytology (ependymoma, PNET, ATRT, CPC and germ cell tumours) and CSF tumour markers (AFP and Beta-HCG for possible germ cell tumours- should be paired sample with serum). CSF testing and tumour markers are usually repeated or performed for the first time at >15 days post-op via lumbar puncture (essential as part of staging for ependymoma, PNET, ATRT, CPC and germ cell tumours).

Neuroimaging is essential in making the diagnosis of a CNS tumour. Although computerised tomography (CT) is often used as the first imaging modality, magnetic resonance imaging (MRI) is in most cases a superior investigation and MRI with gadolinium contrast of both brain and spine will ideally take place prior to surgery allowing better delineation of both local
tumour extent and staging of any neuraxis metastases. Although paediatric CNS tumours have characteristic radiological appearances, in the majority of cases conventional CT/ MRI cannot replace a histological diagnosis. The exceptions to this are the typical diffuse intrinsic pontine glioma, an optic pathway glioma in a child with Neurofibromatosis type-1 and secreting intracranial germ cell tumour.

Neurosurgery is the principal modality in the management of the majority of CNS tumours and the extent varies from biopsy alone to attempting to completely remove the tumour. It is essential that children are referred to an experienced paediatric neurosurgical unit as per the referral pathway (Kings College or St. Georges Hospitals). Difficult to access tumours may undergo CT/MRI stereotactic guided biopsies or in the case of intraventricular tumours endoscopic biopsy. But in most cases an open procedure is preferred and the degree of resection will be dictated by neuroanatomy, tumour invasion, histology (available intra-operatively by fresh frozen section) and haemostasis. Accurate post-operative imaging is essential as it serves to confirm the degree of surgical resection and acts as a baseline for future imaging. Again MRI is preferable to and needs to be performed early after surgery (ideally within 24 hours post-surgery) to try and minimise the difficulties of distinguishing residual tumour from post surgical changes such as blood and oedema. The United Kingdom Children’s Cancer & Leukaemia Group (UK CCLG) guidance on neuro-imaging for CNS tumours is documented in the appendix. If spinal imaging was not obtained preoperatively then it is usually necessary to wait until >15 days post surgery to allow any surgical debris to clear.

**INDIVIDUAL CNS TUMOUR TYPES**

**ASTROCYTIC (GLIOMAS) TUMOURS**

Astrocytomas are the commonest childhood CNS tumour, representing approximately 40% of the total. They are divided into low grade (grade I and II of both the WHO and Kernohan systems) and high grade (grade III and IV) tumours.

Low grade astrocytomas/gliomas (LGG) include the pilocytic variant which is generally confined to children or young adults and is the most common low grade glioma. Grade II diffuse astrocytomas such as fibrillary, gemistocytic and protoplasmic astrocytomas with diffuse infiltration of neighbouring tissues but without mitoses, necrosis or vascular proliferation, they tend to occur at an older age. The pleomorphic xanthoastrocytoma is also more likely to occur at a younger age and although anaplasia is occasionally seen these are generally benign grade II tumours.

High grade astrocytomas/gliomas (HGG) are malignant tumours and consist of the grade III anaplastic astrocytoma and the grade IV glioblastoma and gliosarcoma.

The clinical behaviour of astrocytomas broadly corresponds to the histological grade, with low grade gliomas being less aggressive and more responsive to treatment than high grade gliomas which relentlessly progress and respond poorly to adjuvant therapy.

**Low Grade Glioma (newly diagnosed)**

Surgical resection is the primary and possibly only therapy for many patients (this will depend on the location of the tumour). Decisions on adjuvant therapy are based on the age of the patient, grade of tumour, NF-1 status, degree of resection and clinical status as illustrated in the diagram 2.1.
2.1. Flow diagram of the study

Adjuvant therapy options

- The UK CCLG/SIOP LGG 2004 03 study has closed. Patients will be treated as per the standard arm with Carboplatin and Vincristine without Etoposide as per the schema above.

Low Grade Glioma (progression, relapse or carboplatin allergy)

Carboplatin allergy

Patients with LGG treated with carboplatin may (~25%) develop an allergy to carboplatin (urticarial rash, mucosal swelling, wheeze & rarely anaphylaxis). If this occurs it is usually difficult to re-challenge with carboplatin and therefore an alternative regimen may be needed if further treatment is required.

- Patients on LGG study should follow guidance (alternating cyclophosphamide with vincristine). Cisplatin will be substituted by Cyclophosphamide as well to avoid ototoxicity.
- Patients off study or when concern over possible hearing or renal toxicity should be offered vinblastine monotherapy.
LGG progression or relapse

Use the following decision trees to assist choice of treatment for either progressed or relapsed LGG. Always discuss about possible surgical option & consider radiotherapy if non-NF-1 and not previously irradiated.

Decision tree for sporadic (NF-1 negative) progressive/relapsed LGG
Options for alternative chemotherapy regimens

- If patient on study follow guidance
- If patients previously had an objective response (i.e. >30% shrinkage) to vincristine & carboplatin plus are >12 months off chemotherapy- **re-challenge with VCR/Carbo**
- Consider Vinblastine monotherapy up to 12 months (low toxicity option)
- Consider TPCV (Thioguanine, procarbazine, CCNU, Vincristine) regimen up to 8 cycles (risk of late side effects but good response rate)
- Temozolomide monotherapy.
- Consider open relapse clinical trial such as Dabrafenib

Specific LGG

- **pilomyxoid astrocytoma** (WHO grade II)- more aggressive & likely to relapse/progress than pilocytic astrocytoma but current therapy is the same
- **subependymal giant cell astrocytoma** (WHO grade I)- associated with Tuberous sclerosis and usually requires surgery only (research interest in mTOR inhibitors)
- **pleomorphic xanthoastrocytoma** (WHO grade II)- surgical resection only may cure if complete but can transform to anaplastic variant (treat grade III same as HGG)
- **diffuse & fibrillary astrocytoma** (WHO grade II)- these are more typical of adult LGG and have a higher rate of malignant transformation

**High Grade Glioma (newly diagnosed glioblastoma & anaplastic astrocytoma)**

In children and young people maximal surgical resection (>90%) is a significant favourable prognostic factor and this should be attempted, if appropriate depending on tumour location. Tumour grade is also a prognostic factor (grade III tumours better than grade IV). Children under the age of 3 years appear to have a better outcome independent of other prognostic factors compared to older children thought to be related to increased chemo-sensitivity.

>3 years old

- Offer latest CCLG/ SIOP trial for HGG ( HERBY study evaluating the benefit of addition of Bevacizumab in standard treatment)
- If ineligible, no open study or declines- standard therapy is as per NICE and CCLG guidance following maximal surgery- chemoradiotherapy (temozolomide) plus adjuvant temozolomide (“Stupp regimen”)

<3 years old

- Offer latest SIOP Infant HGG study
- Best results are with German HIT-SKK protocol

**Specific HGG**

- **gliosarcoma**- treat as per glioblastoma
- **gliomatosis cerebri**- depends on extent of disease, age of patient & histology. If older and limited volume treat as per glioblastoma. If large volume may require whole brain radiotherapy. If oligodendroglial features consider PCV as an option.

**High Grade Glioma (progressive/ relapsed glioblastoma & anaplastic astrocytoma)**

If early progression following combined chemoradiotherapy consider possibility of pseudoprogression (i.e. increase in lesion as a result of tumour necrosis).

- Consider further surgery and if treated as an infant – radiotherapy & temozolomide
- If received “Stupp regimen as first line” consider further surgery and either
  - PCV (Procarbazine, Vincristine & CCNU)
  - Clinical trial

**Diffuse Intrinsic Pontine Glioma (newly diagnosed DIPG)**

Dismal prognosis associated with this tumour which primarily affects children. Lower grade tumours (focal, dorsally exophytic, midbrain and tectal) are treated as per LGG guidance. Biopsy is clinically required for atypical cases of DIPG and is increasingly being used for research purposes otherwise diagnosis can be based on characteristic MRI appearances. The only proven treatment for DIPG is focal radiotherapy but this standard only leads to a median survival between 9-12 months.

- Offer latest CCLG clinical trial
- Standard treatment is focal hypofractionated radiotherapy
Diffuse Intrinsic Pontine Glioma (progressive/ relapsed DIPG)

There is no proven effective therapy at progression/ relapse. Re-irradiation with or without concomitant carboplatin to be considered if feasible.

- Offer clinical trial or palliative care

Oligoastrocytic & Oligodendrogial tumours (newly diagnosed)

These rare tumours are more common in adults and older children/adolescents. They can be mixed tumours with an astrocytic component (oligoastrocytoma or anaplastic oligoastrocytoma) or pure oligodendroglioma (grade II) or anaplastic oligodendroglioma (grade III).

- Grade II tumours are initially treated by maximal surgical resection & may be observed if stable- if progression depending on age, location consider adjuvant radiotherapy in older patients or chemotherapy (PCV or temozolomide)
- Grade III tumours are often eligible for latest CCLG/SIOP HGG trial or standard treatment would be radiotherapy plus minus chemotherapy with either PCV or temozolomide

Oligoastrocytic & Oligodendrogial tumours (progression/ relapse)

Further surgical debulking should be considered both therapeutically and also to exclude malignant transformation.

- Consider further chemotherapy with either PCV or temozolomide depending on prior first line treatment
- Consider clinical trial

EPENDYMOMAS

Ependymomas usually arise in paraventricular locations, they constitute 8% of all paediatric brain tumours and 25% of all spinal cord tumours. The maximum incidence of intracranial ependymomas is in the first decade of life, whereas spinal ependymomas tend to present a little later. Two-thirds of intracranial ependymomas occur in the posterior fossa. Ependymomas present as space occupying lesions with clinical features appropriate for their site of origin with obstructive hydrocephalus being common at presentation. Ependymal tumours are graded according to the WHO criteria into grade I myxopapillary and subependymoma, grade II ependymoma and the malignant grade III anaplastic ependymoma. Extent of surgical resection is the most important prognostic factor but age and tumour location have a major impact on treatment decisions. Full staging includes; pre and post operate whole neuroaxis MRI plus CSF cytology. Second look surgery should be considered to try and achieve a complete macroscopic resection at all time points!

<18 months old

- Consider open CCLG/SIOP clinical trial
- Supratentorial or metastatic- UKCCSG Baby brain protocol
- If completely resected posterior fossa tumour consider focal radiotherapy if >18 months
>18 months old

Consider open CCLG/SIOP clinical trial or proton radiation therapy

- If complete resection- standard adjuvant is focal radiotherapy
- If metastatic- standard adjuvant is craniospinal radiotherapy

Ependymoma (progressed/ relapsed)

Further surgery should always be considered for ependymoma at relapse or progression and re-staging with whole neuroaxis MRI and if appropriate CSF cytology. If patient has not previously received radiotherapy this should be considered depending on age and tumour location.

- Consider further surgery and possibility of stereotactic repeat radiotherapy
- Consider open clinical trials (example 5-FU institutional pilot)
- Consider low dose “metronomic” etoposide based regimen (options include single agent, alternating with oral cyclophosphamide +/- thalidomide)

CHOROID PLEXUS TUMOURS

These usually occur in infants and represent between 1-4% of paediatric CNS tumours. The choroid plexus papilloma (WHO grade I) is more common than carcinomas and classically is a frond-like mass arising in the ventricles and secreting CSF. The infant usually presents with hydrocephalus and following diagnosis, complete excision is curative. Choroid plexus carcinomas (WHO grade II) represent a considerable surgical challenge due to their high vascularity, but with the majority of tumours can be fully excised but this may be in a two staged process after adjuvant chemotherapy has reduced the vascularity of the malignant tumour. Depending on age and location adjuvant radiotherapy should be considered as it appears irradiation does offer a survival advantage. Chemotherapy has been shown to be affective both in producing a response and allowing second look surgery. The most important positive prognostic factors are the absence of metastases and completeness of surgical resection.

- Consider open CCLG/SIOP clinical trial
- If no open study- “ICE” (Ifosfamide, carboplatin, etoposide) chemotherapy
- Depending on age and location- adjuvant radiotherapy

Choroid plexus tumours (relapse/ refractory)

If localised consider further surgical resection and if no previous radiotherapy consider irradiation.

- Consider open CCLG/SIOP clinical trial
- Temozolomide monotherapy (high cost drug need approval from DTC & EC funding)
EMBRYONAL TUMOURS

Medulloblastoma and CNS primitive neuroectodermal tumour (PNET)

Medulloblastoma is the most common malignant CNS tumour and accounts for 20% of all childhood brain and spinal cord tumours and 40% of those in the cerebellum. This is an embryonal tumour and considered a primitive neuroectodermal tumour (PNET) of the CNS. The term medulloblastoma is reserved for those PNET’s arising in the posterior fossa, those found in the pineal region are pineoblastomas and those in the cerebrum are called supratentorial primitive neuroectodermal tumours (SPNET). The classical paediatric cerebellar medulloblastoma is a midline vermis tumour, which has its peak incidence in 5 year olds; 85% of cases have presented by 15 years of age. There is a slight male predominance. In young adults the tumour more often appears to arise in the cerebellar hemispheres and is histologically the desmoplastic type with prominent stroma. PNET’s tend to invade locally, metastasize into the subarachnoid space and disseminate by CSF to other areas of the neuraxis. The incidence of CSF seeding at diagnosis ranges from 10-40% in different reports but the risk is always substantial and full MRI imaging of brain and spine is mandatory.

Staging consists of ideally pre-operative MRI of brain and spine, so avoiding the difficulties of interpreting post surgical changes in the spine. If pre-operative spinal imaging is not available at least 14 days should elapse before imaging the spine to allow clearance of blood products. The Chang staging system is used, and measures the extent of primary tumour and metastases (M). However, only the M stage is of prognostic importance; M0 – represents localised disease with no evidence of metastasis. Metastatic stages (M+) include; M1- microscopic tumour cells found in CSF; M2- nodular seeding intracranially, M3- nodular seeding on spinal cord, M4- extraneuraxial metastasis. The sampling of CSF is therefore of prognostic importance & the standard site of sampling from lumbar puncture rather than ventricular CSF and is usually performed at least 14 days post-surgery. Surgical resection is aimed to be maximal but avoiding significant morbidity as studies have confirmed that in non-disseminated PNET a >90% resection improves prognosis but this does not have to be complete (a residual of less than 1.5cm$^2$ did not impart a significantly worse prognosis but a larger residuum did in M0 patients). This means to complete staging a post-operative MRI/CT is required ideally within 72 hours of the operation.

Standard Risk (SR) Medulloblastoma

Patients with desmoplastic or classical medulloblastoma who have no metastatic disease (MRI and CSF cytology negative) and a residual of <1.5cm$^2$ are treated according to age due to the concerns over the long term side effects of craniospinal radiotherapy in young children (<3 years).

<3 years SR Medulloblastoma

- Head Start II

>3 years SR Medulloblastoma

Enroll in the PNET study or if ineligible or decline CSRT (24 Gy) maintenance chemotherapy with Cisplatin CCNU and VCR( A) and Cyclophosphamide and Vincristine (B) for 9 cycles (AAB AAB AAB AAB) as per the current ACNS0331( COG).
High Risk (HR) PNET (Medulloblastoma)

Patients with metastatic medulloblastoma (Chang M1-4), large cell variant histology or with a large residual (>1.5cm^2) NB. attempts to down stage by second look surgery should be made) are regarded as high risk. In addition PNETs at other locations e.g. Supratentorial PNET or pineoblastoma (irrespective of stage) are also considered high risk (the rare variant embryonal tumours medulloepithelioma and ependymoblastoma will also usually be treated as HIGH Risk PNET). Again treatment is allocated according to age due to the concerns over the long term side effects of craniospinal radiotherapy in young children (<3 years).

<3 years HR PNET (Medulloblastoma)

- Open Head Start IV study (or if ineligible as per Head Start II)
- Modified "HeadStart II protocol"

>3 years HR PNET (Medulloblastoma)

- Open CCLG/SIOP study or
- "as per CCG 99701 : CSRT + Carboplatin and Vincristine followed by 6 cycles of Cyclophosphamide and Vincristine"
Decision tree for medulloblastoma/PNET

Newly diagnosed & fully staged MB/PNET

Standard Risk Medulloblastoma (Chang M0 & residual <1.5cm²)

<3 years CCLG open study or Head Start II

High Risk PNET/MB (Chang M⁺, Large cell variant, Supratentorial PNET, pineoblastoma)

>3 years CCLG open study (PNET 5 or guidelines (standard arm of PNET IV “Packer”

<3 years CCLG open study or HeadStart II protocol

>3 years CSRT+ carboplatin followed by 6 cycles of Cylophosphamide and Vincristine
Medulloblastoma and CNS primitive neuroectodermal tumour (relapse/ refractory)

The majority of patients who relapse with a medulloblastoma or CNS PNET cannot be cured. The small number of patients in who aggressive second line therapy should/could be considered include: 1) infant patients who have not been previously irradiated and are now old enough to consider radiotherapy as an option 2) patients relapsing with an isolated local recurrence amenable to local control i.e. surgical resection and/or repeat stereotactic radiotherapy. 3) Patients who have demonstrated both chemosensitivity and a significant tumour response resulting in minimal residual disease. In these patients following any local disease control and induction chemotherapy consolidation with high dose chemotherapy with peripheral stem cell rescue has resulted in a small number of patients (5-10%) having a durable and prolonged second remission.

For relapsing or refractory patients outside of these groups benefit maybe derived from additional chemotherapy but has not been shown to result in long term survival. The type of chemotherapy will depend on previous exposure and side effects.

- Possible intensive second line therapy (e.g. non-irradiated infants, local recurrence or very chemosensitive tumours): consider local control options (i.e. surgery/radiotherapy) and induction chemotherapy regimen (such as Milan protocol) followed by Thiotepa based high dose chemotherapy with peripheral stem cell rescue.
- Other patients: offer open CCLG/SIOP Clinical trials
- Oral monotherapy/ sequential “metronomic” chemotherapy (e.g. etoposide/cyclophosphamide).
- PCT application should be considered for Bevacizumab with Temozolomide Irinotecan or intrathecal Depocyte + Bevacizumab +metronomic chemotherapy as per recently published early encouraging data.

Atypical teratoid / rhabdoid tumour (ATRT)

A malignant embryonal CNS tumour (WHO grade IV), histologically and genetically similar to the malignant rhabdoid tumour of the kidney (MRTK) and metachronous tumours of the CNS and kidney have been reported. The vast majority of tumours arise before the age of 5 years but older cases have been confirmed, with peak incidence in the first two years of life. Over 60% of tumours arise in the posterior fossa can occur anywhere in the CNS. A third of patients present with disseminated disease from CSF spread. Presentation and neuroimaging are very similar to that for medulloblastoma and PNET. The majority (90%) demonstrate monosomy deletion of chromosome 22. The gene involved is hSNF5/INI1 located at 22q11.2, germline mutations have been detected in patients with both CNS and renal lesions and cancer genetic referral should be offered in all cases. The histological classification can be difficult but immunohistochemistry using the INI-1 antibody helps to identify ATRT (INI-1 negative). Prognosis is poor compared to a similar stage PNET with few long term survivors, although with aggressive therapy, recent survival in children > 3 years of age has improved.

- Following attempt at complete surgical resection (consider 2nd look surgery) patients are treated according to age:
  - Open CCLG/SIOP study or
  - <3 years- Modified HeadStart II protocol
  - >3 years- consider treatment as per High Risk PNET protocol or High Risk sarcoma protocol
• **Relapse**: if local consider further surgery and if not irradiated option of radiotherapy.

• **Relapse**: consider open CCLG trials of investigational agents

### NEURONAL AND MIXED NEURONAL-GLIAL TUMOURS

#### Dysembryoplastic Neuroepithelial Tumours (DNET)

This is a mixed neuronal and neuronoglial benign tumour (WHO grade I) which is slow growing and often presents with a chronic history of refractory seizures. The most common location is the temporal lobe and a cortical lesion is classical possibly extending subcortically. Surgical excision is curative and may improve seizures.

#### Ganglioglioma

These represent up to 4% of paediatric CNS tumours and are more frequent in children than adults. This is a benign slow growing tumour composed of mature well differentiated ganglion cells. The glial component demonstrated Rosenthal fibres and calcification. Anaplastic variants have been described but are very rare (WHO grade III). A specific tumour that occurs in infancy as a large supratentorial cystic mass with a desmoplastic matrix, is known as a ‘desmoplastic infantile ganglioglioma (WHO grade I). The clinical presentation is dependent on site, with half of patients developing seizures, usually associated with a supratentorial location such as the temporal lobe or another cortical site. Symptom history is usually long and may include headache, visual disturbance or spinal symptoms if a midline or spinal lesion is present. Treatment is surgery and gross total resection is attempted. Radiotherapy has been used in non-operable lesions or at recurrence, the place of chemotherapy is debateable. Patients who relapse should be considered for BRAF inhibitors if a study is open.

#### Neurocytoma

Predominately a tumour of young adults central neurocytomas (WHO grade II) are usually found located in the septum pellucidum or the lateral ventricle wall but have been reported in a variety of other intra-, extra- and paraventricular sites. Most commonly the tumour presents with symptoms and signs of raised ICP. Imaging usually shows a tumour in the lateral ventricles but can occur extraventricularly. Pathology demonstrates a typical honeycomb pattern resembling oligodendroglioma with uniform nuclei. The treatment of choice is gross total excision but the central location can limit resection. Prognosis is generally good but recurrence and dissemination have been reported. Radiotherapy has been suggested to be useful in those with a subtotal resection.

#### Dysplastic gangliocytoma of cerebellum - (Lhermitte-Duclos disease)

Lhermitte-Duclos disease, or dysplastic cerebellar gangliocytoma, is a hamartoma associated with Cowden disease that can cause symptoms and signs of mass effect in the posterior fossa and lead to hydrocephalus, brain herniation, and death, if not treated. The prognosis for patients with LDD has improved markedly with advances in neuroimaging, allowing early surgical intervention which is the treatment of choice. Patients with Cowden Disease (hamartoma/cancer syndrome), have a high risk of systemic cancers and therefore have to undergo appropriate screening measures. Approximately 90% of patients in whom
Cowden disease develops manifest its clinical findings by 20 years of age and 80% of patients with Cowden disease have a germline mutation of the \textit{PTEN} gene, and another 10% harbor mutations in its promoter region. Approximately one half of the cases of Cowden disease are familial and one half are spontaneous. Other \textit{PTEN}-related hamartomatous tumor syndromes in addition to Cowden disease include Bannayan-Riley-Ruvalcaba, Proteus, and Proteus-like syndromes.

**OTHER CNS TUMOUR TYPES**

**PINEAL TUMOURS**

Tumours of different histology can arise in the pineal gland and account for 1-2% of all CNS tumours. The estimated incidence of the various pineal tumour types is; germinomas 45%, astrocytomas 17%, non-germinomatous germ cell tumours (NGGCT’s) including teratomas 16%, pineal parenchymal tumours (pineoblastoma and pineocytoma) 15% and other 7%. As the prognosis and treatment vary considerably between this tumour types it is essential that accurate tumour classification and staging is conducted with the minimum risk to the patient. This includes for all patients full neuroaxis imaging, tumour markers from serum and CSF (\(\alpha\)-FP & \(\beta\)-HCG plus cytology). As the pineal gland is potentially hazardous with regard potential bleeding during surgery the requirement and method of tissue biopsy should be carefully considered by the neuro-oncology team (e.g. endoscopic, stereotactic or open). Pineoblastomas are treated as per High Risk PNET section. Endocrine work up should be considered if there is any concern over potential deficits.

\textbf{Pineocytoma (WHO grade I / II)}

These tumours are of lower grade and far less likely to disseminate than pineoblastoma and depending on grade and surgical resectability maybe observed following surgery or if higher grade considered for focal radiotherapy.

\textbf{Germ cell tumours}

Germ cell tumours (GCT) arise in the pineal gland and other midline structures of the brain, including the third ventricle and suprasellar regions as well as the basal ganglia. Germinomas represent about two thirds of all intracranial GCT’s, the rest are Non-Germinoma Germ Cell Tumours (NGGCTs) and can be divided into secreting GCT’s (embryonal carcinoma, yolk sac tumours and choriocarcinoma) and teratomas (mature and immature). There are also mixed GCT’s. The germinoma is the most common pineal tumour, has a high incidence in young adult males and is fast growing. They do not secrete AFP but low levels of B-HCG can be detected if the tumour contains a few syncytiotrophoblasts and does not preclude the diagnosis. Germinomas have a tendency to disseminate in the CSF in approximately 10-15% of cases. NGGCT’s are more likely to arise in the pineal region than the suprasellar area and their histological appearance is identical to extracranial tumours of the same type. A raised serum or CSF B-HCG is consistent with choriocarcinoma whereas embryonal cell carcinomas, immature teratomas and yolk sac tumours secrete AFP.

- Open CCLG/SIOP study or guidelines
- \textbf{Relapse}- due to rarity and individual considerations needs personalised decision.
CRANIOPHARYNGIOMA

Craniopharyngiomas account for about 8% of all paediatric, median age of 8 years at presentation. Usually occurring in the midline suprasellar region, approximately 55% of the tumours are entirely cystic, 15% almost entirely solid and the rest mixed. The capsule of the tumour adheres tightly to the adjacent brain tissue, making complete resection difficult and sometimes hazardous. Clinical presentation varies but raised ICP, visual changes, pituitary dysfunction and mental abnormalities are common. Very young children tend to present with signs of hydrocephalus and older children with endocrinopathies, failure to thrive and diabetes insipidus. Adolescents and young adults more commonly have visual field deficits. Neuro-imaging will generally distinguish these tumours from other parasellar tumours. A rigorous preoperative neuroendocrine and ophthalmic work up is essential. Surgery is the most important initial therapy. The debate as to whether radical resection or subtotal resection with adjuvant radiotherapy should be attempted is still controversial but UK guidelines guide decision making. Whenever possible and indicated proton radiation therapy should be prioritized.

- CCLG guidelines

MENINGIOMA

The incidence of meningeal tumours is much lower in childhood than adults representing only 0.5-2% of tumours. Histologically they are indistinguishable from the adult tumours and are classified into several variants including anaplastic meningiomas (WHO grade III). The main aetiological factors are the presence of neurofibromatosis type 1&2, with some series suggesting 25% having these predisposing conditions and previous irradiation. Treatment options include surgery which may be preceded by embolisation. Radiotherapy can produce stabilisation of disease and sometimes reduction in size, chemotherapy has no established role. Prognosis is good but local recurrences do occur.

- CCLG guidelines

FOLLOW UP GUIDELINES

CNS tumours are the leading cause of morbidity in survivors of childhood tumours/ cancers and require dedicated and multi-disciplinary long term follow up. This is provided by dedicated teams in the Long Term Brain Tumour Follow up clinic at the Royal Marsden & the Adult Transition Long Term Follow up clinic at St Georges Hospital.

Lower grade Benign Tumour that have only surgery as the treatment modality may be followed up a in the Benign Brain Tumour clinics at Kings College Hospital and St Georges Hospital.
1 Clinical Presentation
Neuroblastoma is the commonest extra-cranial solid tumour in children. It accounts for 8%-10% of childhood cancers. The tumours arise from the sympathetic nervous tissue along the sympathetic chain or in other sympathetic ganglia. The neuroblastic tumours include neuroblastoma, ganglioneuroblastoma and ganglioneuroma.

2 Therapeutic Classification
Table 1 shows the International Neuroblastoma Risk Group Staging System. Based on image defined risk factors (table 2), age and presence or absence of metastasis, patients are now staged as L1, L2, M and MS

Table 1. INRGSS – The International Neuroblastoma Risk Group Staging System (1)

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>Localised tumour not involving vital structures as defined by the list of Image Defined Risk Factors and confined to one body compartment.</td>
</tr>
<tr>
<td>L2</td>
<td>Locoregional tumour with presence of one or more Image Defined Risk Factors.</td>
</tr>
<tr>
<td>M</td>
<td>Distant metastatic disease (except Stage MS).</td>
</tr>
<tr>
<td>MS</td>
<td>Metastatic disease in children younger than 18 months with metastases confined to skin, liver and/or bone marrow.</td>
</tr>
</tbody>
</table>

Patients with multifocal primary tumours should be staged according to the greatest extent of disease as defined in the table.
Table 2 Image Defined Risk Factors in neuroblastic tumours (1)

<table>
<thead>
<tr>
<th>Ipsilateral tumour extension within two body compartments:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neck-chest, chest-abdomen, abdomen-pelvis</td>
</tr>
<tr>
<td>Neck:</td>
</tr>
<tr>
<td>Tumour encasing carotid and/or vertebral artery and/or internal jugular vein</td>
</tr>
<tr>
<td>Tumour extending to base of skull</td>
</tr>
<tr>
<td>Tumour compressing the trachea</td>
</tr>
<tr>
<td>Cervico-thoracic junction:</td>
</tr>
<tr>
<td>Tumour encasing brachial plexus roots</td>
</tr>
<tr>
<td>Tumour encasing subclavian vessels and/or vertebral and/or carotid artery</td>
</tr>
<tr>
<td>Tumour compressing the trachea</td>
</tr>
<tr>
<td>Thorax:</td>
</tr>
<tr>
<td>Tumour encasing the aorta and/or major branches</td>
</tr>
<tr>
<td>Tumour compressing the trachea and/or principal bronchi</td>
</tr>
<tr>
<td>Lower mediastinal tumour, infiltrating the costo-vertebral junction between T9 and T12</td>
</tr>
<tr>
<td>Thoraco-abdominal:</td>
</tr>
<tr>
<td>Tumour encasing the aorta and/or vena cava</td>
</tr>
<tr>
<td>Abdomen/pelvis:</td>
</tr>
<tr>
<td>Tumour infiltrating the porta hepatis and/or the hepatoduodenal ligament</td>
</tr>
<tr>
<td>Tumour encasing branches of the superior mesenteric artery at the mesenteric root</td>
</tr>
<tr>
<td>Tumour encasing the origin of the coeliac axis, and/or of the superior mesenteric artery</td>
</tr>
<tr>
<td>Tumour invading one or both renal pedicles</td>
</tr>
<tr>
<td>Tumour encasing the aorta and/or vena cava</td>
</tr>
<tr>
<td>Tumour encasing the iliac vessels</td>
</tr>
<tr>
<td>Pelvic tumour crossing the sciatic notch</td>
</tr>
<tr>
<td>Infiltration of adjacent organs/structures:</td>
</tr>
<tr>
<td>Pericardium, diaphragm, kidney, liver, duodeno-pancreatic block and mesentery</td>
</tr>
</tbody>
</table>

Multifocal primary tumours, Intraspinal tumours (with or without symptoms of spinal cord compression, pleural effusion (with or without malignant cells) and ascites (with or without malignant cells) to be recorded, but not considered IDRFs:
Table 3: The International Neuroblastoma Risk Group classification (2)

<table>
<thead>
<tr>
<th>INRG Stage</th>
<th>Age months</th>
<th>Histological Category/Grade of Tumour Differentiation</th>
<th>MYCN</th>
<th>11q aberration</th>
<th>Ploidy</th>
<th>Pre-treatment Risk Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1/L2</td>
<td></td>
<td>GN maturing</td>
<td></td>
<td></td>
<td></td>
<td>A Very Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GNB intermixed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L1</td>
<td></td>
<td>Any, except GN maturing or GNB intermixed</td>
<td>NA</td>
<td></td>
<td></td>
<td>B Very Low</td>
</tr>
<tr>
<td>L2</td>
<td>&lt;18m</td>
<td>Any, except GN maturing or GNB intermixed</td>
<td>NA</td>
<td>No</td>
<td></td>
<td>D Low</td>
</tr>
<tr>
<td></td>
<td>≥18m</td>
<td>GNB nodular, differentiating NB, differentiating</td>
<td>NA</td>
<td>No</td>
<td></td>
<td>E Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GNB nodular, poorly differentiated or undifferentiated NB, poorly differentiated or undifferentiated</td>
<td>NA</td>
<td></td>
<td></td>
<td>H Intermediate*</td>
</tr>
<tr>
<td></td>
<td>×18m</td>
<td>Amp</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>&lt;18m</td>
<td></td>
<td>NA</td>
<td>Hyperdiploid</td>
<td></td>
<td>F Low</td>
</tr>
<tr>
<td>&lt;12m</td>
<td></td>
<td></td>
<td>NA</td>
<td>Diploid</td>
<td></td>
<td>I Intermediate</td>
</tr>
<tr>
<td>12m-&lt;18m</td>
<td></td>
<td></td>
<td>NA</td>
<td>Diploid</td>
<td></td>
<td>J Intermediate</td>
</tr>
<tr>
<td>&lt;18m</td>
<td></td>
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</table>
Footnote for Table 3:
Abbreviations: GN = Ganglioneuroma; GNB = Ganglioneuroblastoma; NB = Neuroblastoma; Amp = Amplified; NA = Not amplified;
*Pre-treatment risk group H has two entries

Tumour Stages:
L1: Localised tumour confined to one body compartment and with absence of image defined risk factors (IDRF)
L2: Locoregional tumour with presence of one or more IDRFs
M: Distant metastatic disease (except Stage MS)
MS: Metastatic disease confined to skin, liver and/or bone marrow in children <18 months of age

Definitions: 12m = 365 days; 18m = 547 days
Blank field = “any”
Diploid (DNA index <1.0); Hyperdiploid (DNA index >1.0 and includes near-triploid and near-tetraploid tumours).
Very Low-risk (5-year EFS >85%); Low-risk (5-year EFS >75 %-< 85%); Intermediate-risk (5-year EFS > 50 %-< 75%); High-risk (5-year EFS <50%)

3 Investigations
For a patient referred with suspected diagnosis of neuroblastic tumours, the following specific investigations should be done.
• Ultrasound of the primary site
• CT scan/ MRI of the primary site
• Haematological and Biochemical investigation
• Urine for catecholamines: a single sample of urine, to be sent to the reference laboratory.

The Patient should then be referred to the PTC, he / she will then be discussed at the Solid Tumour MDT.

If a suspected diagnosis of a neuroblastic tumour is agreed then:-
• For L2, M or MS Biopsy (Usually of the of the primary tumour by ultrasound guided needle biopsies with a Consultant Radiologist present) of will be carried by the designated Paediatric Oncology Surgeons;
• For L2, M or MS At the same time as the biopsy bilateral bone marrow aspirates and trephine examination will be carried out and a central venous catheter will be inserted
• For L1 Attempted surgical resection should be undertaken
• For L1 Bilateral bone marrow aspirates and trephine examination will be carried out at the time of attempted surgical resection
• MIBG scan arranged
If histological diagnosis of a neuroblastoma tumour is confirmed

- MIBG scan will be carried out and then
- Bone scan for tumours negative on MIBG

Tumour biology:
MYCN gene copy number
Tissue to be sent to Newcastle for Multiplex ligation-dependent probe amplification (MLPA)

I) Low and Intermediate risk neuroblastoma - Therapy: As per CCLG guidelines 2011 (as below)

NCA profile: Numerical Chromosomal Abnormalities
SCA profile: Segmental chromosomal abnormalities see appendix 3
LTS: Life threatening symptoms

1) L2, ≤ 18 months, MYCN non amplified
a) NCA profile, no LTS.
   Rx 2-6 courses of chemo (CO x 2-4, VP/Carbo x 2) Surgery when image defined risk factors negative (see Appendix 2).
   NOTE: In the LINES study this group will be randomised between this chemotherapy and observation
b) NCA profile + LTS
   Rx 2-4 courses of chemotherapy (VP/Carbo x 2 +/- CADO2) ± Surgery. Surgery if image defined risk factors negative (see Appendix 2).
c) SCA profile ± LTS
   Rx 4 courses of chemotherapy (VP/Carbo x 2-4 ± CADO x 2) ± Surgery

2) Ms, ≤ 12 months, MYCN non amplified
a) NCA profile, No LTS
   Rx Observation only
b) NCA profile + LTS
   Rx 2-4 courses of chemotherapy (VP/Carbo x2 ± CADO x 2)
c) SCA profile, ± LTS
   Rx 4 courses of chemotherapy (VP/Carbo x 2-4 ± CADO x 2) ± Surgery

NB: If a genomic profile cannot be obtained at diagnosis patients should be treated as follows:
L2, ≤ 18 months, MYCN non amplified No LTS = 2 CO, 2 VP/Carbo, With LTS = Rx as 1b,
Ms, ≤ 12 months, MYCN non amplified, No LTS = Rx as 2a. With LTS = Rx as 2b
Guidelines for Low and Intermediate Risk Neuroblastoma patients, Final August 2011 Page 4
Intermediate risk (using the International Neuroblastoma Pathology Classification INPC)

1) L2, non-MYCN amplified, age 18 months - ≤ 10 years
   a) Histology- INPC differentiating
      Rx 4 courses of chemotherapy (VP/Carbo x 2 + CADO x 2 or VP/Carbo x 2) ± Surgery
   b) Histology- INPC undifferentiated or poorly differentiated
      Rx 6 courses of chemotherapy (VP/Carbo x 2, CADO x 2, VP/Carbo x 1 + CADO x 1 or CADO x 2), ± Surgery + Radiotherapy + 6 courses of 13 cis retinoic acid (doses of underlined as for High risk neuroblastoma study).
   Note: It is recommended that patients in this group are always discussed with the national leads.

2) L1, MYCN amplified age ≤ 10 years
   Rx 6 courses of chemotherapy (VP/Carbo x 2, CADO x 2, VP/Carbo x 1 + CADO x 1 or CADO x 2), ± Surgery + Radiotherapy + 6 courses of 13 cis retinoic acid (doses of underlined as for High risk neuroblastoma study)

3) M, MYCN non-amplified, age < 12 months
   Rx 4-8 courses of chemotherapy (VP/Carbo x 2-4 ± CADO x 2-4) ± surgery.

II) High risk neuroblastoma
   Stage 4 neuroblastoma in children over 1 year of age or MYCN amplified tumours (stage 2, 3) and infants with MYCN amplification— SIOP-HR NBL trial.

III) Treatment of relapsed neuroblastoma (previous HR NBL) (CCLG guidelines- May 2013) as below:

SCENARIOS
Relapse after Myeloablative Treatment (MAT)
Induction phase
   • The phase II randomized study BEACON-Neuroblastoma is an option for patients who experience relapse after MAT if the patient is eligible.
   • If BEACON-Neuroblastoma is not available or parents decline
     ▪ Patients could receive topotecan, vincristine and doxorubicin (TVD) if this has not previously been administered. The patient should be evaluated after 2 courses. If any response consider TVD for up to 4-6 courses provided toxicity is well tolerated. If the patient’s family wishes to reduce hospitalisation or intensity of treatment, or the patient has poor bone marrow reserve alternative chemotherapy such as temozolomide alone or irinotecan and temozolomide could be considered. There is no evidence to indicate that the addition of irinotecan improves the efficacy of temozolomide.
     ▪ Patients, who have already received TVD or other topotecan-based regime, could be offered temozolomide alone or irinotecan and temozolomide. The patient should be evaluated after 2 courses. If any response consider continuing for up to 6 courses. Treatment beyond 6 courses could be given if toxicity is well tolerated. Treatment beyond 12 courses is currently not recommended because of risk of second malignancy.
     ▪ After 2 courses of chemotherapy-based regime, the possibility of participating in phase I studies could be explored should the family wish. However, not all phase I studies allow patients with stable disease or responding disease, so potential eligibility should always be checked with the phase I sites before a formal referral.

Consolidation phase
After completing the induction phase, (i.e. after completion of BEACON Neuroblastoma or 4-6 courses of TVD or 6-12 courses of irinotecan and temozolomide or temozolomide alone or other alternative chemotherapy regime), if there is a response or stabilization of disease, 68Gallium octreotate avidity should be assessed for eligibility for the LuDo trial and if positive the patient could be offered 177Lu-DOTATATE treatment in the LuDo trial (see Appendix).
If the neuroblastoma is 68Gallium octreotate negative or parents decline participation to the study, 131I-mIBG therapy could be administered, provided that the tumour is mIBG avid (positive on mIBG scan).

### 3.1.3 Maintenance phase

Children who obtain a response or have stable disease after induction and consolidation therapy should be considered for an immunotherapy clinical trial.

- If the child has not previously received an anti GD2 antibody, then **Infusional anti GD2 antibody study with IL2** (continuous infusion of ch14.18/CHO combined with subcutaneous Aldesleukin (IL-2) should be offered;

**Further relapse/progression**

In case of further relapse/progression a phase I study could be offered or alternatively oral etoposide or symptom care only.

### Relapse before Myeloablative Therapy (MAT)

#### Induction phase

Children with neuroblastoma who experience relapse/progression before MAT or patients, who experience relapse after high risk neuroblastoma treatment which has not included MAT for any reasons, could receive an induction type chemotherapy treatment described above. We suggest that **BEACON-Neuroblastoma trial** should be considered first. Other treatment such as TVD, other topotecan based regime available, temozolomide alone or irinotecan-temozolomide can be considered if BEACON-Neuroblastoma trial is not available or patient is not eligible.

#### 3.2.2 Consolidation phase

Consolidation of any response should be pursued by using **targeted radiotherapy** (177Lu-DOTATATE or 131I-mIBG).

**MAT**

This could be followed by MAT, i.e. high dose chemotherapy (Busulfan-melphalan) with peripheral blood stem cell rescue (PBSCR) provided stem cells are available. Other options involving MAT should be discussed on a single case basis.

**Maintenance phase**

Children who obtain a response after MAT should be offered an immunotherapy clinical trial; currently in the UK **antibody anti-GD2 - Infusion anti GD2 Study. with IL2**

**Further relapse/progression**

In case of further relapse/progression a phase I study could be offered or alternatively oral etoposide or symptom care only.

### Patients with Central Nervous System (CNS) relapse

**CNS Control**

Children with CNS relapse could receive an aggressive local approach aiming for a good local control. This group of patients should undergo **neurosurgical resection** of a solitary CNS lesion, should that be possible, followed by **cranio-spinal irradiation**. If the patient has not received MAT already at this stage, peripheral blood stem cell harvest should be attempted.
Induction phase
Patients should then receive induction type chemotherapy, as described above in details and according to previous treatment and eligibility criteria. Patients with actively bleeding CNS lesions are not eligible for BEACON-Neuroblastoma trial. This is because patients receiving bevacizumab have a higher risk of bleeding. Also, progression must be demonstrated at least on one of the lesions before entering BEACON. Patients with stable disease (after for example irradiation of all target lesions) must show progressive disease before being enrolled in BEACON-Neuroblastoma.

Consolidation phase
Response after local control and induction therapy should be consolidated with targeted radiotherapy. MAT should be considered if patient did not receive it previously and stem cells are available.

Maintenance phase
Immunotherapy (currently Infusional anti GD2 Study with IL2) should be given.

Further relapse/progression
In case of further relapse/progression a phase I study could be offered or alternatively oral etoposide or symptom care only.

Relapsed neuroblastoma (Patients with previous localised disease)
a) Patients who have previously been treated for localised disease and have metastatic relapse

2nd line chemotherapy regime with drugs not received previously (consider HR-NBL protocol) - high dose chemotherapy with Bu-melph conditioning. Consider MIBG therapy for slow responders.

b) Local Relapse L1 tumours: If remains L1 – further resection

c) Local Relapse L2 tumours
Treat according to High Risk Protocol HR-NBL-1

Reference List


cooperation of the Societe Francaise d'Oncologie Pediatrique (SFOP) and the United


Topotecan, cyclophosphamide, and etoposide (TCE) in the treatment of high-risk

6. Simon T, Langler A, Berthold F, Klingebiel T, Hero B. Topotecan and etoposide in the
treatment of relapsed high-risk neuroblastoma: results of a phase 2 trial. J Pediatr

study of topotecan with vincristine and doxorubicin in children with recurrent/refractory

Phase II study of temozolomide in relapsed or refractory high-risk neuroblastoma: a
joint Societe Francaise des Cancers de l'Enfant and United Kingdom Children Cancer

plus temozolomide for relapsed or refractory neuroblastoma. Journal of Clinical
Oncology 2006; 24:5271-6.

Phase I trial of temozolomide and protracted irinotecan in pediatric patients with

al. Randomized phase II window study of two schedules of irinotecan (CPT-11) and
vincristine (VCR) in rhabdomyosarcoma (RMS) at first relapse/disease progression.

Phase II study of 21 day schedule oral etoposide in children. New Agents Group of
the United Kingdom Children's Cancer Study Group (UKCCSG). Eur J Cancer. 1997;
33:1816-22

South Thames Children’s Cancer Network Group

Clinical Management Protocol – Children – Retinoblastoma

REFERRAL

Children with a suspected diagnosis of retinoblastoma, should in the first instance be seen by their local paediatric ophthalmologist to exclude some of the conditions simulating retinoblastoma. Then if retinoblastoma is strongly suspected, they should be referred on to one of the two NCG funded

Retinoblastoma centres (children living in the South of England should be referred to the London retinoblastoma service based at the Royal London Hospital in Whitechapel. Referrals should be made to either Mr Mandeep Sagoo, Consultant Ophthalmic Surgeon or Mr M Ashwin Reddy Consultant Paediatric Ophthalmologist at the following address:

Address:

The Retinoblastoma Service
Barts and The London NHS Trust
The Royal London Hospital
Whitechapel Road
Whitechapel
London E1 1BB
Cancers presenting abdominal masses are rare in children. Renal tumours are one of the common cause of abdominal tumours in childhood. Wilms tumour is the most common primary malignant renal tumour of childhood and second most common abdominal tumour in children. Other causes of abdominal masses like lymphomas, appendicular masses etc need to be ruled out. Wilms tumour usually presents in the under 10 age group. In children above age of 10 years, renal tumour is more likely to be renal cell carcinoma or adrenal cortical carcinoma infiltrating kidneys. Children under 6 months are more likely to have mesoblastic nephroma or cystic partially differentiated nephroblastoma.

**Presentation**

Renal tumours usually come to medical attention because of abdominal swelling or abdominal mass. Often a parent notices a mass while bathing or dressing the child. They can also present with abdominal pain, haematuria or fever. On examinations the child is found to have an abdominal mass and an ultrasound reveals the presence of renal tumour.

**Referral**

When a diagnosis of renal tumour is suspected at a GP surgery or A&E, the patient should be urgently referred to the local paediatric service and from where they are referred to Royal Marsden Hospital.

**History**

- Abdominal swelling or mass
- Abdominal pain
- Haematuria
- Fever

Specifically ask for history of prematurity, neonatal hypoglycaemia, abdominal wall defects nephropathy, family history of renal abnormalities or early onset cancers.

**Examination**

- General examination: Look for hypertension, aniridia, dysmorphic features, hemihypertrophy, genitourinary abnormalities – hypospadias, cryptorchidism, ambiguous genitalia
- Varicocele on the side of tumour
- Location and size of abdominal mass

Look for features of Beckwith-Wiedemann syndrome- prematurity, macrosomia, macroglossia,
Management prior to transfer
Start on antihypertensives if BP is persistently more than 95th centile for age.

Investigations
Full blood count
Urea, creatinine and electrolytes
Liver function tests
Serum calcium
Clotting screen including von Willebrand factor
Urine analysis to look for proteinuria

Staging investigations
Ultrasound abdomen
CT scan/ MRI of abdomen
Chest X ray
CT scan of chest
Bone scan and skeletal survey, (only if clear cell sarcoma of kidney or renal cell carcinoma)
MRI of brain (only if rhabdoid tumour or renal cell carcinoma)
Biopsy of renal mass.
Echocardiography before receiving Doxorubicin

Treatment
All renal tumours including nephroblastomatosis can be registered on the IMPORT (Improving Population Outcomes for Renal Tumours of Childhood) clinical trial and treated as per the SIOP Nephroblastoma guidelines (previous SIOP WT 2001 clinical trial) except renal rhabdoids which are treated according to EpSSG NSRSTS protocol.

Treatment of Wilms tumour consists of initial pre-operative chemotherapy (except in children < 6 months who have primary nephrectomy unless extension into IVC or metastatic) followed by nephrectomy and post operative chemotherapy based on the histopathology result.

Preoperative chemotherapy consists of weekly chemotherapy for 4 weeks with Vincristine (V) and Actinomycin (A) in localised disease and chemotherapy for 6 weeks with Vincristine, Actinomycin and Doxorubicin (D) for 6 weeks. Then they have surgery – nephrectomy. Based on the pathology they are classified in low risk, intermediate and high risk histology. Depending on histology and stage postoperative treatment is decided. They may have no further treatment.
Chemotherapy with AV1 (2 drugs for 4 weeks),
AV2 (2 drugs for 27 weeks),
AVD (3 drugs for 27 weeks),
High risk treatment (4 drugs- Etoposide, Carboplatin, Cyclophosphamide, Doxorubicin for 34 weeks).
They would receive radiotherapy to lungs, flank or abdomen depending on stage, response to pre operative chemotherapy and histology.
Strategy for Management of Pulmonary Micrometastases visible only on CT

Bilateral tumours
Refer to previous SIOP- WT 2001 protocol

Follow up off treatment
Chest X ray 3 monthly until 3 years from end of treatment
Abdominal ultrasound 3 monthly for 2 years from end of treatment
Abdominal ultrasound 3 monthly to age of 7 years if age <12 months at diagnosis and nephrogenic rests in nephrectomy, bilateral tumours, partial nephrectomy, genetic predisposition syndromes.
Schema for investigation of Abdominal Mass

Abdominal mass noted by parent or GP - Suspected Cancer.

Local Acute Paediatric Provider
Check Blood Pressure, Urine for protein
FBC, Biochemistry for urea, creatinine, electrolytes, Calcium, Clotting screen
Arrange abdominal Ultrasound, Chest X ray
Consider urinary Catecholamines if upper pole renal tumour or neuroblastoma suspected

If clinical signs of rupture, will need CT scan of abdomen and transfer for PTC decision regarding need for emergency surgery. Usually not indicated. No biopsy to be done before discussion with PTC.

Depending on clinical condition
PTC - Clinic at RMH or PTC - admission at SGH

Early discussion with PTC, to decide whether to be seen in clinic or transferred as inpatient depending on clinical condition and results of investigations. Also discuss where CT scan of abdomen and chest should be done.

CT scan of chest, abdomen and pelvis

If bilateral Wilms’ tumour - Get MRI or diffusion weighted MRI or referral to Great Ormond Street Hospital for pre chemo imaging. (Can be post biopsy). Consider PET scan. Early discussion with surgical centre who is going to operate.
SUMMARY

Less than 6 months age or Totally cystic –
- Primary Nephrectomy, No central line
- Post operative management as per staging and histology

Typical clinical and imaging features of Wilms tumour
- Biopsy, Central line insertion
- Alert Radiotherapy department of likely dates if needed.
- Preop chemotherapy within 2-7 days of biopsy (Depending on need for immunohistochemistry)
- Pre OP CT scan at RMH
- Surgery at SGH
- Post op chemotherapy depending on staging and histology.
- Radiotherapy if indicated.

Atypical age or clinical imaging

Stage V
Refer to SIOP WT 2001

Relapse
Relapsed Wilms tumours are treated as per UKW-R Relapsed Wilms guidelines or after discussing with National study coordinator.

I. Strategy for Standard Risk and High Risk Relapsed Wilms Tumour and CCSK

TREATMENT GROUPS

Standard Risk
Patients with initial FH Stage 1 and 2 tumours treated with VCR + AMD only (ie Regimens AV1 & AV2)
If possible histology should be reconfirmed by review of initial pathology and biopsy/excision of relapse.
EXCEPT
Any relapse occurring less than 6 months from diagnosis.

High Risk
All other first relapses, including all patients with CCSK or diffuse anaplasia.
AND
Patients progressing on first line therapy
AND
Second and subsequent relapses previously treated as ‘Standard Risk’
EXCEPT Any patients relapsing after treatment on High Risk strategy in SIOP WT 2001
Very high risk
Any patients relapsing after treatment on High Risk strategy in SIOP WT 2001

TREATMENT STRATEGY

Standard Risk
Chemotherapy with alternating courses (Cyclophosphamide and Etoposide) and
Cyclophosphamide and Doxorubicine )for total of 8 courses:

High Risk
Chemotherapy with alternating courses (Carboplatin and Etoposide) and
(Cyclophosphamide and etoposide ) for total of 6 courses followed by high dose
chemotherapy with Melphalan conditioning.

II Treatment Strategy for Very High Risk patients

Suggested regimens
Paclitaxel
Cisplatin

Suggested Regimen 2
Ifosfamide, Carboplatin, Etoposide with Topotecan
Also consider available phase I/II studies.
South Thames Children’s Cancer Network Group

Clinical Management Protocol – Children – Hepatic tumours

INTRODUCTION

This brief document will focus on staging investigations and management pathways for paediatric malignant liver tumours - hepatoblastoma and hepatocellular carcinoma.

Hepatoblastoma

Specific investigations
• Clinical evaluation
• AFP
• bHCG
• Hepatitis B and C serology

Biopsy

Staging

Doppler Liver Ultrasound
CT chest abdomen pelvis and/or MRI
PRETEXT as described in SIOPEL 6

Treatment

Standard risk patients are eligible for entry to the SIOPEL 6 study however, we recommend the following treatment strategy for patients not entered into a clinical trial.

Standard Risk Tumours

These are localised tumours (Pretext 1, 2 or 3) with no additional adverse features (e.g. low AFP, vascular involvement (V3 or P2), extrahepatic spread, tumour rupture, metastatic disease). The recommendation is to follow the cisplatin monotherapy arm of the SIOPEL 3 study (Perilongo et al 2009 NEJM 361:1662). The standard treatment is 4 cycles of preoperative chemotherapy followed by surgical resection and 2 post operative cycles of therapy.

High risk tumours

These tumours are defined as any tumour not meeting the standard risk or very high risk criteria. The recommendation is to receive the dose intensive “superPLADO” arm of the SIOPEL 3 study (Zsiros et al 2010 J Clin Oncol 28:2584). Patients in this group are likely to have challenging surgical disease and we would recommend consultation at the time of diagnosis with a specialist liver surgery/transplant service.

Very high risk tumours

These tumours are defined by the presence of metastatic disease (usually lung) or very low AFP (<100 ng/ml). Pulmonary lesions documented on the chest X-ray and/or lung CT scan
will be considered to be unequivocal metastatic tumour deposits if there is one nodule larger than 10 mm or several nodules with at least one larger than 5 mm. In the other cases, the metastases will be considered as doubtful and a surgical biopsy of one of the nodules should be discussed if the general condition of the child permits it. Patients should be treated with the approach utilised in the SIOPEL4 protocol with dose-intensive weekly cisplatin/doxorubicin induction therapy.
**Hepatocellular Carcinoma**

*Specific investigations*
- Clinical evaluation
- AFP
- bHCG
- Hepatitis B and C serology

*Biopsy*

**Treatment**

Children with Hepatocellular carcinoma will be treated as per SIOPEL-5 (HCC-1) TRIAL.

**Treatment at relapse of Hepatoblastoma and Hepatocellular Carcinoma**

Children with relapsed malignant liver tumour will be enrolled in available Phase I/II studies.

**Summary of Therapy**

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INTRODUCTION

*This standard operating procedure outlines the clinical management protocols for malignant bone and soft tissue sarcoma.*

Abbreviations & Definitions *(delete if not applicable)*

If appropriate a definitions section should be included.

- PTC: Principal Treatment Centre
- MDT: multi-disciplinary team
- OS: osteosarcoma
- ES: Ewings sarcoma
- STS: soft tissue sarcoma
- RMS: rhabdomyosarcoma
- P: cisplatin
- M: methotrexate
- V: vincristine
- I: ifosfamide
- Bu/mel: busulphan/melphalan
- RMS: rhabdomyosarcoma
- A: actinomycin
- Do: doxorubicin
- GOSH: Great Ormond Street Hospital
- UCLH: University College Hospital
- RMH: Royal Marsden Hospital

Scope

There are separate policies in effect for the management of chemotherapy/radiotherapy anti-emesis, febrile neutropenia, usage of growth factors and blood product support.

These policies will not be covered in this document

Stakeholders/Responsibilities

- Prescribing should only be undertaken by medical practitioners currently registered by the general medical council and holding an appropriate North or South Thames PTC contract.

- Administration of drugs will be by nursing staff registered with the nursing and midwifery council and holding an appropriate North or South Thames PTC contract.

- Clinical screening of prescriptions should be by a registered pharmacist and the dispensing of any prescriptions by themselves or an approved delegated individual.
Limitations / planned deviations

- All patients will be discussed at an appropriate MDT for recommendation of an appropriate treatment plan. For bone sarcomas, this is always at the sarcoma MDT irrespective of patient age. Extremity soft tissue sarcomas irrespective of age should be discussed at the sarcoma MDT (and a paediatric tumour MDT if appropriate. In South Thames, discussion will be at the sarcoma MDT if >16 years but may be at a paediatric tumour MDT as well or instead for patients <16 yrs.

- Emergency treatments prior to an MDT discussion may occur at physician discretion but must be discussed at the earliest possible subsequent MDT

- Additional treatments may be utilised within the context of a clinical trial, but must be ratified within the appropriate MDT.

- Access to studies will depend on trial availability.

Related Documents

*London and South East Managed Sarcoma Network Referral guidelines*
*British Sarcoma Group guidelines for bone sarcomas*

Clinical management protocols

Patients with suspected soft tissue sarcoma should be referred to RMH, GOSH or UCLH according to agreed geographical and age-related referral patterns for paediatric tumours. All children <1yr should be referred to GOSH. All patients with suspected bone sarcoma should be referred to the regional bone sarcoma service at UCLH/Stanmore.

Osteosarcoma

Chemotherapy
s per North London Cancer Network connective tissue board guidelines.

Surgery
Trucut biopsy at presentation by oncologic orthopaedic surgeon at presentation – via sarcoma referral pathway
Primary tumour control – MDT decision
Recurrent disease – MDT decision
Metastatectomy – thoracic sarcoma MDT decision
Radiotherapy

Exceptionally for primary tumour control – MDT decision
Palliation – MDT decision

Ewings sarcoma

Chemotherapy

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<td>High dose Ifosfamide</td>
<td>Cyclophosphamide and Topotecan</td>
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<td>VDC/IE 2 weekly</td>
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</table>

Surgery

Trucut biopsy at presentation by oncologic orthopaedic surgeon via sarcoma referral pathway or paediatric oncology or sarcoma surgeon for soft tissue presentations.

Primary tumour control – MDT decision
Recurrent disease – MDT decision
Metastatectomy – thoracic sarcoma MDT decision

Radiotherapy

Primary tumour control – MDT decision
Recurrent disease – MDT decision
Palliation – MDT decision
## Rhabdomyosarcoma

### Chemotherapy

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<td>EpSSG RMS 2005</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Metastatic</td>
<td>Observational metastatic arm&lt;br&gt;EpSSG RMS 2005 study&lt;br&gt;Or&lt;br&gt;IVADO x 4, IVA x 5 maintenance therapy with 12 months Vinorelbine / Cyclophosphamide (European guideline)</td>
<td>VIT study&lt;br&gt;Or&lt;br&gt;EpSSG guidelines for relapsed disease&lt;br&gt;Or&lt;br&gt;Oral Etoposide&lt;br&gt;Or&lt;br&gt;Palliative care.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;21 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No age specified</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Surgery

Trucut biopsy at presentation by oncologic surgeon—via sarcoma referral pathway or paediatric oncology surgeon or by interventional radiologist (GOSH)
Primary tumour control – EpSSG RMS guidelines - MDT decision
Recurrent disease – MDT decision

### Radiotherapy

Primary tumour control – EpSSG RMS guidelines - MDT decision
Recurrent disease – MDT decision
Palliation – MDT decision
“Non-rhabdomyosarcoma” soft tissue sarcoma (NRSTS)

Chemotherapy

<table>
<thead>
<tr>
<th>Disease</th>
<th>1st line</th>
<th>2nd line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Localised NRSTS</td>
<td>EpSSG 2005 NRSTS</td>
<td>Local connective tissue board guidelines</td>
</tr>
<tr>
<td></td>
<td>Or</td>
<td>Or</td>
</tr>
<tr>
<td></td>
<td>Local connective tissue board guidelines</td>
<td>Individualised</td>
</tr>
<tr>
<td>Metastatic NRSTS</td>
<td>Local connective tissue board guidelines</td>
<td>Local connective tissue board guidelines if appropriate or experimental therapy or palliative care.</td>
</tr>
<tr>
<td>Metastatic extrarenal malignant rhabdoid tumour</td>
<td>If decision to treat, follow EpSSG 2005 NRSTS</td>
<td>Experimental therapy or palliative care</td>
</tr>
<tr>
<td></td>
<td>guidelines for malignant rhabdoid tumour</td>
<td></td>
</tr>
</tbody>
</table>
**Surgery**

Trucut biopsy at presentation by oncologic surgeon– via sarcoma referral pathway or paediatric oncology surgeon or by interventional radiologist (GOSH)  
Primary tumour control – EpSSG NRSTS guidelines - MDT decision  
Recurrent disease – MDT decision

**Radiotherapy**

Primary tumour control – EpSSG RMS guidelines - MDT decision  
Recurrent disease – MDT decision  
Palliation – MDT decision  
All children < 16yrs with synovial sarcoma and adult-type soft tissue sarcomas should be discussed in the sarcoma MDT and management agreed with the sarcoma team.
Introduction

This brief document will focus on staging investigations and management pathways for rare tumours. As these tumours are rare, in many situations at initial diagnosis or at relapse it would be important to consult with colleagues with specific expertise. This could be MDTs specialising in adult tumour types or world-wide colleagues.

Nasopharyngeal carcinoma

Specific investigations

- Clinical evaluation of the size and location of cervical lymph nodes
- Indirect nasopharyngoscopy to assess primary tumour
- Neurological examination of cranial nerves
- EBV viral capsid antigen

Staging investigations

- Chest radiotherapy (AP and lateral)
- CT/MRI scan of head and neck - to below clavicles, assess base of skull erosion.
- CT chest.
- Bone scan

Treatment

CCLG guidelines or as per adult H&N team.

Extracranial germ cell tumours:

Specific examinations and investigations

- Alfa Feto protein
- B-Human chorionic gonadotropin

Staging investigations

- Chest X-ray
- CT scan: chest and abdomen
- Bone scan
- Bone marrow aspirates and trephines: if stage 4 at any other site
- MRI brain: for symptoms or HCG >10,000 IU
Treatment

CCLG guidelines. For adolescent patients – refer to Urology unit guidelines/ gynaecology unit guidelines on the RMH intranet

Pleuropulmonary blastoma

Staging investigations

CT chest and abdomen
Bone scan
MRI brain

Treatment

Guidelines from PPB registry with IVADO and IVA
Genetics referral (DICER-1)

Adrenocortical carcinoma

These are rare and urgent input from endocrinologist is very important.

Specific investigations:

24 hour urinary collection to measure steroid profile:- free cortisol, 17-hydroxycorticosteroids (17-OH) and androgens.
24 hour urinary catecholamines to exclude phaeochromocytoma.
Plasma samples for: - electrolytes, glucose, calcium, cortisol, dehydroepiandrosterone sulfate (DHEA-S), testosterone, androstenedione, 11-deoxycortisol, oestradiol, renin and 17—hydroxyprogesterone.
Thyroid function
Dexamethasone suppression test if diagnosis remains in doubt.
ACTH at 08.00 and 24.00 hrs.

Staging investigations

CT scan chest and abdomen
Bone scan for patients with pulmonary metastasis

Treatment

CCLG guidelines
Genetics referral

Pancreatic tumours

Specific investigations

CA19-9

Staging investigations

CT chest, abdomen, pelvis
PET scan
Treatment

As per RMH GI unit guidelines
Discussion in hepatobiliary MDT.

Langerhans Cell Histiocytosis

Staging investigations

Chest X-ray
Skeletal survey
Urinary and plasma osmolarity
MRI head for cranio-facial bony lesions
MRI spine for suspected vertebral lesions
CT chest: if the chest X-ray is abnormal or signs and symptoms of abnormal lung function
MRI primary area

Treatment

CCLG TREATMENT GUIDELINES

Malignant melanoma

Staging investigations

Chest X-ray
Ultrasound abdomen
CT Chest
CT nodal drainage area
CT brain

Treatment

CCLG guidelines and adult MDT decision

Thyroid tumours

Specific investigations:

Neck ultrasound
Thyroid function test including TSH and Thyroglobulin
Thyroid antoantibodies
Serum calcitonin
Serum calcium, Vitamin D

Treatment:

CCLG guidelines. Tumour specific MDT
Colorectal carcinoma

Specific investigations
Serum Carcino-embryonic antigen

Staging investigations
CT chest and abdomen

Treatment
As per RMH GI unit guidelines

Carcinoid tumour

Specific investigations
Chromogranin A
24 hours urine for 5 hydroxy indole acetic acid

Staging investigations
CT chest and abdomen
Treatment
As per RMH GI unit guidelines

Ovarian tumours

Specific investigations
Serum AFP, B-HCG, CEA, CA-125

Staging investigations
Chest X-ray
CT chest and abdomen and pelvis
# Treatment

As per Gynaecology Unit handbook

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Treatment</th>
<th>Treatment at relapse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nasopharyngeal carcinoma</td>
<td>CCLG guidelines (Cisplatin, 5FU)</td>
<td>Phase 2 study</td>
</tr>
<tr>
<td>Pleuropulmonary blastoma</td>
<td>PPB registry guidelines with IVADO and IVA</td>
<td>Phase 1/2 study</td>
</tr>
<tr>
<td>Germ cell tumours</td>
<td>CCLG guidelines. For adolescent patient refer to urology unit guidelines/ gynaecology unit guidelines (intranet)</td>
<td></td>
</tr>
<tr>
<td>Adrenocortical carcinoma</td>
<td>CCLG guidelines</td>
<td></td>
</tr>
<tr>
<td>Pancreatic carcinoma</td>
<td>CCLG guidelines. GI unit handbook (intranet)</td>
<td></td>
</tr>
<tr>
<td>Langerhans Cell histiocytosis</td>
<td>LCH3 guidelines.</td>
<td>Cd2a containing regimen</td>
</tr>
<tr>
<td>Fibromatosis</td>
<td>Surgery and radiation. EpSSG RMS guidelines if chemotherapy needed.</td>
<td>Vinblastin + Methotrexate</td>
</tr>
<tr>
<td>Malignant melanoma</td>
<td>CCLG guidelines + Melanoma guidelines (intranet)</td>
<td></td>
</tr>
<tr>
<td>Thyroid</td>
<td>Radioiodine ablation. Thyroid guidelines (intranet)</td>
<td></td>
</tr>
<tr>
<td>Colorectal carcinoma</td>
<td>GI unit handbook (intranet)</td>
<td></td>
</tr>
<tr>
<td>Carcinoid tumour</td>
<td>Hemicolectomy as per published guidelines. Discuss with adult MDT</td>
<td></td>
</tr>
<tr>
<td>Ovarian carcinoma</td>
<td>Gynaecological unit guidelines (intranet)</td>
<td></td>
</tr>
<tr>
<td>Other adult tumours</td>
<td>Refer to adult guidelines</td>
<td></td>
</tr>
</tbody>
</table>
INTRODUCTION:

Following end of treatment, childhood survivors of cancer are followed up by their named consultant, until they have been off treatment for 5 years. During this time they undergo clinical examinations and surveillance investigations depending on the type and site of cancer and the risk of relapse. These have been described in the individual cancer guidelines. The main emphasis is on early detection and treatment of relapse.

Once they have been off treatment for 5 years the risk of relapse is very small and the main reason for continuing follow-up is for early diagnosis and management of long term side effects of treatment. At this point survivors are transferred to the long term follow-up clinic.

Prior to transfer all patients are provided with a treatment summary, a copy of which is also sent to the late effects clinic, GP and all doctors involved in patient care. This treatment summary is used to produce a care plan which is discussed with the patient at the time of their first appointment in the late effects clinic by the late effects clinical nurse specialist. The treatment summary and care plan template is shown in Fig I and II.

Brain tumour patients are referred to the paediatric endocrinologist in the LTFU 1 year from end of treatment and are jointly followed up with the paediatric oncologists. Post BMT patients are transferred to the LTFU clinic at 18 months from end of treatment. These patients also continue to be seen in the BMT follow-up clinic until they are at least 5 years from end of treatment.

Patients are also assigned a level of care (Table I) in the late effects clinic which determines their further follow-up. We are working towards implementation of the national cancer survivorship initiative risk stratification model of care (Table II). In the paediatric long term follow-up clinic input is available from paediatric oncologists, paediatric endocrinologists, neurologists and neurosurgeons depending on the site and type of cancer and the primary treatment given. Patients are also referred to other specialists including cardiologists, nephrologists, fertility experts, orthopaedic surgeons, plastic surgeons and respiratory physicians as required.

At 16 - 18 years of age patients are transferred to the Teen Age and Young Adult long term follow-up (TYA LTFU) clinic where they are looked after by an adult physician and endocrinologist, clinical nurse specialist and oncologist. Over the coming months a pathway is being developed so that level I and II patients and level III patients with minimal follow-up requirements will be discharged into primary care with open access to the TYA or adult LTFU clinics. Level III patients are currently followed up in the adult clinic at St Georges Hospital.

Children from the Brighton area are followed up in the joint paediatric LTFU clinic run by the consultant paediatrician and paediatric oncologist from the Marsden, at Brighton Children’s Hospital. The clinic is held twice a year. Follow-up is similar to follow-up at the Marsden. At 18 years of age the patients are transferred to the adult long term follow-up clinic at Brighton. The clinic is run by an adult endocrinologist and medical oncologist with input from the paediatrician from the children’s long term follow-up clinic.

All patients transferred to the paediatric or adult clinics are discussed at the late effects MDT held at the Marsden once a month. Each patient is assigned a key worker who helps coordinate services between the Marsden, community and shared care centres.
Please see Table III for list of surveillance investigations carried out. There is a database in the department which helps in the management of long term follow up patients and is currently being reviewed and redesigned to meet the needs of the developing service.

Fig I: Treatment summary – A record of diagnosis, treatment and complications

<table>
<thead>
<tr>
<th>Name:</th>
<th>NHS No:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of birth:</td>
<td>Sex:</td>
</tr>
<tr>
<td>Address:</td>
<td>Hospital No:</td>
</tr>
<tr>
<td>Diagnosis:</td>
<td>Diagnosis Date:</td>
</tr>
<tr>
<td>Stage/Group:</td>
<td>Treatment End Date:</td>
</tr>
<tr>
<td>Treatment:</td>
<td></td>
</tr>
<tr>
<td>Trial/Protocol:</td>
<td></td>
</tr>
</tbody>
</table>

Recurrence of Disease

<table>
<thead>
<tr>
<th>Date</th>
<th>Site/s</th>
<th>Management Summary</th>
</tr>
</thead>
</table>

Chemotherapy

<table>
<thead>
<tr>
<th>Drugs [include cumulative dose for anthracyclines and alkylating agents]</th>
</tr>
</thead>
</table>

Other relevant medication

<table>
<thead>
<tr>
<th>Drugs [Include dose if relevant]</th>
</tr>
</thead>
</table>

Surgery [including biopsies and central lines]

<table>
<thead>
<tr>
<th>Date</th>
<th>Details</th>
</tr>
</thead>
</table>

Radiotherapy [append RT summary and dose volume histograms if available]

<table>
<thead>
<tr>
<th>Date</th>
<th>Site/s</th>
<th>Total Dose (Gy)</th>
<th>Fractions</th>
<th>Normal Tissues within Field</th>
<th>Notes</th>
</tr>
</thead>
</table>
# Bone-marrow transplantation/PBSC

<table>
<thead>
<tr>
<th>Type</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditioning Regimen</td>
<td></td>
</tr>
<tr>
<td>Total Body Irradiation</td>
<td>YES/NO</td>
</tr>
<tr>
<td><strong>Dose (Gy)</strong></td>
<td>Fractions</td>
</tr>
<tr>
<td><strong>GvHD</strong></td>
<td>Yes/No</td>
</tr>
</tbody>
</table>

**Events during treatment, residual problems and management required**

**Heart:**

<table>
<thead>
<tr>
<th>Pre-treatment Echocardiogram</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-treatment Echocardiogram</td>
<td>Date</td>
</tr>
</tbody>
</table>

**Lung:**

<table>
<thead>
<tr>
<th>Pre treatment Result</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post treatment Result</td>
<td>Date</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pre treatment GFR Result</th>
<th>mL/min</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post treatment GFR Result</td>
<td>mL/min</td>
<td>Date</td>
</tr>
</tbody>
</table>

**Events during treatment, residual problems and management required**

**Other Studies/trials** Yes/No

<table>
<thead>
<tr>
<th>Familial factors and syndromes</th>
<th>Yes/No</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Current issues</th>
<th>Yes/No</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Holistic Needs Assessment performed – Yes/No</th>
<th>Date:</th>
</tr>
</thead>
</table>

| Treatment summary completed by: |
|-------------------------------|----------|
| Signature                     | Date:    |
| Print Name                    | Print Title |
| Treatment summary discussed with patient / family | Yes/No | Date: |

---

**Fig 2: Individualised care plan**

**Systems at Risk and Care Plan**

**Growth Problems:**

<table>
<thead>
<tr>
<th>Growth hormone started</th>
<th>Start Date</th>
<th>Finish date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final height (cm)</td>
<td></td>
<td>Date</td>
</tr>
<tr>
<td>Onset of Puberty</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other growth problems</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Fertility Problems:**

<table>
<thead>
<tr>
<th>Menarche Date</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular Periods?</td>
<td>Date</td>
</tr>
<tr>
<td>Semen analysis Result</td>
<td>Date</td>
</tr>
</tbody>
</table>

**Hormone Problems:**

<table>
<thead>
<tr>
<th>Pre-treatment Result</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-treatment Result</td>
<td>Date</td>
</tr>
<tr>
<td>Follow-up Result</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>---</td>
</tr>
<tr>
<td>Blood Pressure Result (mmHg)</td>
<td></td>
</tr>
<tr>
<td>Other abnormalities</td>
<td></td>
</tr>
</tbody>
</table>

**Lung Problems:**

<table>
<thead>
<tr>
<th>Pre treatment Result</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post treatment Result</td>
<td>Date</td>
</tr>
</tbody>
</table>

**Kidney Problems:**

<table>
<thead>
<tr>
<th>Pre treatment GFR Result</th>
<th>mL/min</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post treatment GFR Result</td>
<td>mL/min</td>
<td>Date</td>
</tr>
<tr>
<td>Follow Up GFR Result</td>
<td>mL/min</td>
<td>Date</td>
</tr>
<tr>
<td>Renal tubular dysfunction</td>
<td>mL/min</td>
<td>Date</td>
</tr>
</tbody>
</table>

**Problems with Brain/Nerves:**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>

**Problems with other Organs/Tissues:**

<table>
<thead>
<tr>
<th>Organ/Tissue</th>
<th>Details</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Psychosocial/school/occupation issues**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>

**Offspring (live births and miscarriages)**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>

**Information given to Patient/Family**

<table>
<thead>
<tr>
<th>Information</th>
<th>Date given</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Follow-Up Plan**

☐ Disease Related Follow Up at
Disease Related Follow Up at shared care hospital
Long Term Follow Up at
Long Term Follow Up at shared care hospital
Return to Primary Oncology Centre
Long Term Follow Up with GP

Long Term Follow Up due:
Frequency of Long Term Follow Up, every .......................
Review of follow-up plan:
Name of shared care Consultant:

<table>
<thead>
<tr>
<th>Investigation</th>
<th>Start Date</th>
<th>Frequency</th>
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</thead>
<tbody>
<tr>
<td><strong>GENERAL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height and weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pubertal status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urinalysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BLOOD TESTS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full Blood Count</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urea &amp; Electrolytes (Kidney Function)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liver Function Test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lipid profile (Cholesterol etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glucose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anterior Pituitary function tests</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gonadotrophins (Sex Hormones)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thyroid Function</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GFR (Kidney Function)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OTHER</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test Type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chest X Ray</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEXA Bone Scan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interval MRI scan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CT Scan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Echocardiogram (Heart Function)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECG (Heart Function)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lung Function Tests</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audiometry (Hearing Test)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Long Term Follow Up Care Plan completed by:**

*Signature* ____________________________  *Date* ________

Print Name
Print Title
### Table I: Level of care depends on tumour type, stage and treatment given.

<table>
<thead>
<tr>
<th>Level of care</th>
<th>Treatment</th>
<th>Tumour Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Surgery alone, low risk chemotherapy.</td>
<td>Wilm’s tumour stage I and II, Single system LCH, Germ cell and neuroblastoma (surgery alone)</td>
</tr>
<tr>
<td>2</td>
<td>Chemotherapy, &lt; 24 Gy cranial irradiation</td>
<td>Most patients e.g. All in first remission</td>
</tr>
<tr>
<td>3</td>
<td>Radiotherapy (except low dose cranial), Megatherapy</td>
<td>BMT, Brain tumours, all stage 4 and most multiply relapsed patients</td>
</tr>
</tbody>
</table>

### Table II: NCSI risk stratification
Table III: Summary of clinical history, examination and surveillance investigations

<table>
<thead>
<tr>
<th>Surveillance in clinic</th>
<th>Late Effects to consider</th>
<th>Tests</th>
<th>Advice/Referral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height, Weight, BMI</td>
<td>Obesity</td>
<td>Fasting glucose, lipids, LFT Assess insulin resistance/glucose tolerance if severe</td>
<td>Dietary advice (low GI diet) graded exercise</td>
</tr>
<tr>
<td>Height velocity, sitting height, pubertal stage</td>
<td>Early or late puberty, growth hormone deficiency</td>
<td>Gonadotrophins, sex hormones, thyroid function, bone age</td>
<td>Refer to Late Effects-endocrinology service</td>
</tr>
<tr>
<td>Menstrual history, erectile dysfunction, Tanner stage</td>
<td>Gonadal /germ cell failure or Leydig cell dysfunction</td>
<td>Gonadotrophins, sex hormones, thyroid function. Semen analysis when appropriate</td>
<td>Refer to Late Effects-endocrinology Assisted reproduction service</td>
</tr>
<tr>
<td>Joint pain (hip, knee) gait, fractures</td>
<td>Osteopenia/osteoporosis/Avascular necrosis</td>
<td>Bone profile, DEXA scan/MRI</td>
<td>Encourage a calcium-rich diet, exercise. Refer to Late Effects-endocrinology service</td>
</tr>
<tr>
<td>Hearing and speech development</td>
<td>Sensori-neural hearing loss</td>
<td>Audiological tests</td>
<td>Refer to Audiology/speech and language therapist</td>
</tr>
<tr>
<td>Vision</td>
<td>Cataracts, dry eyes</td>
<td>Opthalmoscopy</td>
<td>Refer to Ophthalmology</td>
</tr>
<tr>
<td>Dental Health</td>
<td>Caries, short dental roots, microdontia</td>
<td>Dental and oral mucosa examination</td>
<td>Advice on dental hygiene and refer to dentist/specialist orthodontist</td>
</tr>
<tr>
<td>Skin</td>
<td>Naevi, basal cell carcinoma in irradiation field</td>
<td>Measure number, change in size, pigmentation, surface</td>
<td>Refer to Dermatology</td>
</tr>
<tr>
<td>Exercise tolerance, shortness of breath</td>
<td>Cardiac dysfunction or obstructive/restrictive pulmonary defect</td>
<td>ECHO/ECG and/or pulmonary function tests</td>
<td>Refer to Late Effects-cardiology service</td>
</tr>
<tr>
<td>Renal</td>
<td>Isolated hypertension, glomerular/tubular dysfunction</td>
<td>Blood pressure, U&amp;E, urinalysis for proteinuria and haematuria. Estimate GFR if appropriate</td>
<td>Refer to Late effects-renal service</td>
</tr>
<tr>
<td>New masses, regular breast examination, neck masses, brain tumours</td>
<td>Second malignant neoplasms</td>
<td>Imaging</td>
<td>Refer to Late Effects-biopsy and further management</td>
</tr>
</tbody>
</table>

NB This not an exhaustive list but an illustration of common problems
South Thames Children’s Cancer Network Group

Clinical Management Protocol – Children –

Agreed guidelines for psychosocial assessment

INTRODUCTORY STATEMENT

The statements in this policy document are aimed specifically at children and young people less than 18 years of age and their families. In general children and young people with cancer and their families want to live their lives as “normally” as possible whilst coping with the impact of serious illness. As a unit we believe that they have the right to achieve their optimum potential during the treatment process and in helping them to do this we are thus enabling them to lay the foundations to live full and active lives in the future. For this to happen effectively children, young people and their families require support at key stages of the treatment pathway to minimise the impact of the illness and treatment on them and those who are close to them. This document has been written to help everyone involved in a child and young person’s treatment understand the standards that we expect in terms of the psycho-social support team and the ways that we measure how well we are doing, and everyone’s role within that.

The operational context:

The operation of the psychosocial team on Children’s and Young People Unit is governed by a number of different pieces of legislation, regulations and guidance documents. One of the major influences to improve service outcomes for all children and young people but especially the most disadvantaged and vulnerable is The Children’s Act 2004 which gave legal force to the Every Child Matters five outcomes namely:

- Be healthy
- Stay Safe
- Enjoy and achieve
- Make a positive contribution
- Achieve economic well-being

In 2005 Nice published guidance: Improving Outcomes Guidance for Children and Young People with Cancer (CYPIOG) on how the NHS in England should deliver services to children and young people with cancer. The aim of this guidance is to improve not just clinical outcomes but the holistic experience of care for children and their carers. As a consequence of this guidance a review was set up and led by CLIC Sargent with the aim of developing a model of care which would best meet needs both in hospital and in the community. The key messages from this review “More Than My Illness” are the foundation to the approach offered by our psychosocial team which centre on the importance of:

- Ensuring children and young people have access to information and are empowered to make informed choices
- The Key worker role as care co-ordinator
- Assessment and care planning processes at key stages of the treatment pathway
- Tailoring packages of care that are unique to a child and their family and take account of clinical, educational, social emotional practical and financial needs.

In 2012 The Teenage Cancer Trust (TCT) and Teenagers and Young people with cancer national group (TYAC) jointly produced a guidance document which covers primarily 16-24 year olds, but is also directly relevant to 13-15 year olds. The focus of this Blueprint of Care is to complement the key recommendations of the CYPIOG by defining the complex
elements and characteristics of age-appropriate care. By exploring the specific issues that arise in teenage and young adult (TYA) cancer care and addressing a number of key themes, it offers recommendations regarding TYA practice principles, models of care, practice guidance, and practical tips for those caring for this group of patients throughout the UK and beyond. This document is intended for use by healthcare professionals as a guide to good practice and does not replace recommendations made in the CYPIOG.

In 2014 there will also be change to the special educational needs (SEN) guidance as described in The Children and Families Bill which will come into force across England and Wales in September 2014. This will place legal responsibility to identify and support children and young people with SEN with Local Education Authorities (LEA)s early education providers, schools, colleges. This will include the implementation of the new Education, Health and Care Plan which will replace the current Statementing process for special educational needs.

Key messages about what we are trying to achieve within the psychosocial team:

- The psychosocial team has a unique contribution to make in improving key outcomes for children, young people and their families throughout the treatment process.
- Children and young people have the right to be fully informed and participate in decisions about their care and how this is delivered wherever possible.
- The child/young person’s welfare is our paramount concern. In situations where child abuse is suspected or alleged this information should be shared appropriately according to trust policy and pan London procedures.
- Working in partnership with parents is vital to meeting children and young people’s needs successfully and effectively. We strive to be open and honest in our dealings with all parents and care givers.
- The children and young people that we treat represent a diversity of different cultures, ethnicity and religious beliefs. In all our work with children we must protect and respect their cultural inheritance, religion and racial identity. As part of this process racism and discrimination will be challenged in accordance with trust policy.

What you can expect from members of the psychosocial support team:

- Knowledge of the legislative framework and associated regulations and guidance.
- Knowledge of safeguarding thus ensuring risk is minimised and managed appropriately.
- Workers have an ability to process and analyse information and use this to make appropriate plans with the child/ young person and their family.
- Practitioners will develop their practice skills and knowledge base and accept this shared responsibility throughout their time with the trust.
- Practitioners are responsible for keeping up to date with national and local policy development and research which relates to children and young people’s cancer services. Understanding the context within which we work helps make sense of the jobs we do and the priorities we establish.
- Accurate record keeping – completed in a timely manner.
- Practitioners will take account of appropriate line management and abide by Trust and professional directives.
- The team will be focused creative and determined to make a positive difference to the treatment experience for patients and their families.
- Psycho-social support will be offered to any member of the family, throughout the disease trajectory.
- Regular psych-social assessments will be carried out at strategic points (diagnosis, end of treatment, relapse and palliative care) throughout the disease trajectory to
ensure patients and members of their families who are vulnerable will be identified and offered or referred for support as necessary.

- Consistent advice about what to do if there is a psychiatric emergency (in either the patient or relative) both in and out of hours.
- Regular consultation, teaching sessions and multi-disciplinary discussions about psychosocial issues are held to ensure the knowledge base of all members of the multi-disciplinary team is updated and they are made aware of psycho-social issues, and what to do if there is a concern.

What we expect from our medical and nursing colleagues:

- It is the responsibility of the nominated key worker to ensure that appropriate AHP’s are informed that a patient is embarking on treatment and psychosocial assessment is required.
- When a new patient is admitted, a clinical and social history should be completed to include family composition (who is in the family, names and ages of siblings, occupations of parents).
- That members of medical and nursing team understand what constitutes a “high risk” family and any issues pertinent to psychosocial risk, detailed in assessment section.
- Families should be informed if medical or nursing staff feel specialist assessment is required – i.e. by psychiatry or psychology.
- Appropriate and timely sharing of information about new patients.
- Keeping the psychosocial support team updated about changes to a patients treatment plan – so that plans for support and service provision can be adapted accordingly at all stages of the treatment pathway.
- Attendance and active participation at the weekly psycho-social ward round is a priority.
- Any safeguarding issues are highlighted in a manner that is consistent with Trust policy and Pan London Guidance.
- That medical and nursing staff know about the referral process to the psychosocial team. The referral process is attached in appendix 1.

Referrals to the team:

- In order to activate the referral for psychosocial assessment the medical diagnosis must have been shared with the patient or his or her family for referrals to the CLIC Sargent team; the clinical psychology team can see patients who have not yet had a diagnosis.
- All new patients will be discussed in the appropriate MDT meeting and this will be the trigger for a psychosocial assessment of a child and their family to commence.
- A referral can be made at any other time during the treatment pathway from a member of the oncology MDT, the patient, his or her family, any other professional working with the family. Patients and their families need to agree and consent to being seen by a member of the psychosocial team, if this is not done, the acceptance of support is usually not successful.
- Referral pathway is documented in detail in appendix 1.

Key trigger points for reassessment of a child or family’s needs following initial medical diagnosis need might be:

- Any mental health risk issues such as increase in self harming thoughts or behaviours, extreme or suicidal ideation or intent.
- Any changes of concern in the child’s health and general development, behaviour or mood
- Any major changes or deterioration in patient’s cognitive functioning, schooling or academic performance
- Any changes of concern in a parent or care giver (as above)
- Any changes in a parent or care giver’s personal circumstances
- Impact of environmental factors such as housing finance, employment schooling etc
- Transitions – i.e. end of treatment, referral to long term effects clinic, transfer to adult care
- Relapse
- Palliative care
- Bereavement

Assessment process:

Once a diagnosis of cancer is confirmed an initial contact will be made by a member of the CLIC Sargent team and an offer of service and support will be made. The roles of the whole psycho-social team are introduced by the CLIC Sargent Social worker and explanations given about how referrals can be made.

If the family choose to accept this offer of service CLIC Sargent Registration will take place and they will be advised about the CLIC Sargent initial support grant.

The needs of the patient, their family and their environment will be assessed to a consistent standard and a Care plan for ongoing support drawn up in agreement with them. This will include as standard:

- Information needs
- Coping skills
- Practical support issues
- Social and cultural circumstances
- Education related issues
- Employment related issues

Assessments are undertaken in a format that is consistent with the national Common Assessment Framework to ensure that any resources needed from other agencies can be applied for without duplication or repeat questioning. The Unit will be gradually introducing the holistic needs assessment thermometers to screen for psychological distress in the patient’s throughout the treatment pathway, and are also considering introducing the PAT 2.0 risk assessment tool to identify families in need of more intense psych-social support at diagnosis.

In normal circumstances children and families will be seen face to face however if this is not possible for any reason contact will be made by letter, enclosing information about the service and offering a planned meeting.

Assessments conducted will be signed off by the team leader and will be subject to audit and peer review to ensure that assessments are of a sufficiently high quality.

Assessment process for families at high risk of psychological or psychiatric problems.

This initial assessment will normally act as a feeder to other specialist support services within the Psycho social team – unless there are urgent concerns such as a psychiatric...
emergency requiring immediate assessment in which case referrals can be made directly to Psychological Medicine.

High risk families needing a referral to psychological medicine/psychiatry include:

- Families where there is: involvement with mental health teams either patient or family member, and any potential mental health issues, depressed or suicidal patients or parents/carers, identification of lone or unsupported parents, any child protection issues. Any concern about odd, aggressive or inappropriate/out of character behaviour.

- Patient groups which are known to have significant psychological risk factors include patients with brain tumours and patients undergoing bone marrow transplantation. These patient groups will therefore be met by members of the clinical psychology team as well as members of the CLIC Sargent team. If the clinical psychology team is unable to meet in person, an introduction leaflet is sent out to the patient and their family.

Sharing information without consent:

It is acknowledged that it is good professional practice to be open and transparent with families about how and when information that they give us will be shared or communicated to other professionals either internally or externally. However during the course of an assessment the worker may gather information that they believe they need to share without consent (because consent has been refused or because it would be inappropriate to seek consent) In this case, the worker will need to consider whether the information is confidential. If the information is not confidential, and the practitioner judges the sharing to be necessary for them to fulfil a legitimate purpose, they may share the information. This should not be done routinely as a substitute for consent.

There are however specific circumstances where sharing confidential information without consent will normally be justified:

- Where there is evidence that the child or young person is suffering, or is at risk of suffering, significant harm
- Where there is reasonable cause to believe that a child or young person may be suffering, or is at risk of suffering, significant harm
- To prevent significant harm arising to children and young people, or serious harm to adults, including through the prevention, detection and prosecution of serious crime

Education Plans

- Every child of school age who is having treatment for cancer should be supported to maintain their education by an Individual Education Plan drawn up with their mainstream school
- A key worker system is devised to liaise about education issues, both from the hospital and one at the school.
- The hospital education service in partnership with the key worker and other involved AHP’s will ensure that the need for an education plan has been identified and is in place
- The appropriate member of the psychosocial team will support children and young people facing difficulties in school, will advise the family and MDT colleagues of ways to address these and will advocate on behalf of the young person with their agreement.
- Members of the clinical psychology team and hospital education service are available for consultation about the application of the special educational needs code of practice, if statementing is needed and need for specialist psychometric testing.

**Safeguarding**

- All staff will follow Trust policy on safeguarding and protection of children and vulnerable adults
- The Designated Safeguarding professionals (see Trust policy) will advise and support colleagues in the MDT who may be concerned about safeguarding issues.
- All staff members have an individual responsibility to report concerns to their line manager and to act upon them in accordance with the policy.

**Appendix 1**

The Royal Marsden Paediatric Psycho-social support team, Referral pathway for staff

We are a multi-disciplinary team consisting of CLIC Sargent Social Workers, Paediatric Clinical Psychologists, Child and Adolescent Psychiatrist, Play Specialists and Ward Teachers. We work in close collaboration with the larger multi-disciplinary team. Our purpose is to offer support, therapy and advice to families and staff where there is a diagnosis of cancer in a child or young person.

**Referral Pathway to the Psycho-social support team:**

<table>
<thead>
<tr>
<th>High Risk* (psycho-social) patients or families</th>
<th>Issues arising on ward or outpatients</th>
<th>Children undergoing Bone marrow transplants</th>
<th>Children with brain tumours</th>
<th>Issues to do with schooling/ statementing, special educational needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refer immediately to a psychologist, or families with past psychiatric history (parents or children) to Consultant Psychiatrist</td>
<td>Safe guarding issues refer to named safe guarding Doctor and Nurse (see CP policy)</td>
<td>All children and their families to be assessed by a psychologist.</td>
<td>All children and their families to be referred to a psychologist for assessment and advice</td>
<td>Children to be referred to ward teachers for advice and liaison</td>
</tr>
<tr>
<td>All children undergoing radiotherapy to be referred to and prepared by play specialist</td>
<td>All children undergoing radiotherapy to be referred to and prepared by play specialist</td>
<td>\</td>
<td>\</td>
<td>All children with brain tumours referred to hospital school for school liaison</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All children also to be prepared by a play specialist</td>
<td>\</td>
<td>For extra advice on statementing and psychometric assessment refer to Psychology</td>
</tr>
</tbody>
</table>
*High Risk: families with significant psychiatric/mental health history, in parent, family member or child, suicidal ideation or intent, extreme or out of control behaviour. Any extreme changes in behaviour or mood in any family member

Psychology: Ext 3676       CLIC Sargent Social Work Team: Ext 3880

Our roles:

CLIC Sargent Social Work Team (020 8661 3880)
Will meet and assess every NHS patient with a diagnosis of cancer up to the age of 24 years, regarding their psychological, practical and social needs. If private patients present with a need for psychological or social support, they will also be offered support as appropriate. We will work with families therapeutically on an individual (patient, parent or sibling) basis or with the whole family, or with couples from the point of diagnosis, through to remission or bereavement. Any psycho-social issues should be directed to the CLIC Sargent Team in the first instance as they will have knowledge of most families.

We will give information and advice about practical help and resources that may be available. Where necessary, from our assessment we will refer to and work with clinical psychologists and/or child psychiatrists. If any member of the family is thought to be psychologically high risk, the clinical psychologist or child psychiatrist can be contacted directly.

Any situation where a child is at risk from significant harm must be brought to the immediate attention of the named safeguarding Professionals within the Trust must be notified (see Trust policy for details).

Child and Adolescent Clinical Psychologist (020 8661 3676)
Will accept referrals from any member of the psycho-social support team, members of the multi-disciplinary team and from patients or family members directly. Patients are usually referred where there is a perception of a complex, or long standing psychological problem(s), which requires more in depth work, and where there is immediate concern.

Psychologists specialise in child and adolescent development, assessment and treatment and will work with any member of the family to offer psychological therapy, support and advice. We offer help with behavioural problems such as feeding, sleeping, tantrums and anticipatory or non compliant behaviour or changes in behaviour. We will also offer help with psychological problems such as acute anxiety and depression, aggression and anger control issues, relationship problems, or changes in mood or personality and complex issues to do with identity and body image.

We will also offer advice about problems with school, memory and concentration, and will advise about the need for psychometric assessments and statementing for special educational needs.

All patients coming up for bone marrow transplant, or who have a brain tumour should automatically be seen by the child psychologist.
Child and Adolescent Psychiatrist (020 8661 3329)
The Child and Adolescent psychiatrist should be involved in cases where:
- There is knowledge or concern that the child may have a psychiatric disorder, e.g. depression or anxiety disorder, or where a parent has a history of psychiatric disorder, or where the staff are concerned about a parent’s mental state
- The child has an organic brain syndrome that is difficult to manage.
- In cases where there are complicated consent issues which may require a formal mental state examination and psychiatric report.

It may be useful to involve the psychiatrist in cases where there is a psychosomatic representation, with an unclear overlap of medical and psychological symptomatology.

Ward Teachers (020 8661 3614)
The teachers who provide education in the unit endeavour to support and assist families in all dealings with a child/adolescent’s school or college, right from the start of treatment. The ward teacher will make contact, with the family’s permission. Advice and guidance will be given about statementing should it be required.

If a pupil is issued with a statement of special educational need, it means they will get additional support from either a classroom assistant or a designated teacher should they have learning difficulties. A statement may also provide extra support when a child exhibits emotional or behavioural difficulties.

In the future, SEN statements and learning difficulty assessments will be replaced by a single assessment, the ‘Education, Health and Care Plan’ (EHC plan), to improve the quality and rapidity of support for young people with SEN and their parents (Department for Education, 2013a). The development of the EHC plan is tailored to the needs of children and young people who may require support as a result of long-term medical illnesses, such as cancer (EHCplans, 2013a) and may be utilised to cover care up until the age of 25 when necessary, with annual review.

The teacher is also able to arrange home tuition with the local education authorities if required. The teacher will also liaise with external examination boards to arrange special consideration or special arrangements for examinations.

Play Specialists (0208 642 6011 ext 1425/4031)
The role of the play specialist is to provide normal play and activities to aid the children’s development. The role includes preparing children from point of diagnosis for invasive procedures, for example radiotherapy and bone marrow transplantation using adapted toys, photo books or visits. To also provide distraction techniques or help give coping strategies during procedures, for example bubbles, music books or guided imagery. A new initiative is the 3-d machine which can be used for distraction, preparation and relaxation. The play team also has introduced the beads of courage programme which helps patients and their families see their medical journey in a different and often very positive way.

Being a consistent member of staff means we can build up a relationship with the family, and provide a link with other families. We can encourage the child to explore and express feelings through play, for example syringe painting. We have several books and games to give the child appropriate information about the type of cancer they have, and the treatment they will receive. If the child will be here long term, then we can link up with the school and provide a developmental play programme. Most importantly the play specialist can provide fun during a stressful time.