SGH Care pathway for suspected Abusive Head Trauma (AHT) in children

Background Information/Overall plan

**Symptoms of suspected AHT**
- Poor feeding
- Lethargy
- Fits
- Enlarging head in an infant
- Sudden collapse
- Respiratory difficulty
- Sudden death
*Not all are acutely ill*

**Consequences of AHT**
- Bruising/abrasions or lacerations to head including scalp or face
- Skull fracture(s) usually with overlying haematoma
- Intracranial bleeding subdural, subarachnoid, intraventricular or parenchymal – extradural haemorrhage is rare
- Subdural collections are often bilateral and common sites are over convexity of the cerebral hemisphere, along the falx and in posterior fossa. In the acute stage they are typically small and do not cause mass effect
- Brain injury – include hypoxic ischaemic injury and direct traumatic injury of the brain substance
- Retinal haemorrhage in one or more usually both eyes

**Related or other injuries**
- Neck or cervical spinal cord injury
- Skeletal fractures – fracture of the ribs where child is grasped, long bone fractures when child is held, swung or limbs flail. Vertebral injury is rare
- Bruising to body or limbs

**Differential diagnosis of AHT**
- Retinal haemorrhages are common after birth. Most disappear rapidly within the first few days of life, occasionally larger subhyaloid and intraretinal haemorrhages last up to 6 weeks
- Subdural haemorrhage (SDH) may occur following birth trauma presenting with severe symptoms or may be discovered incidentally in asymptomatic infants. The latter resolve in 4 weeks
- Both retinal and subdural haemorrhages may uncommonly be associated with severe unintentional injuries [eg road traffic collision]
- Both retinal and subdural haemorrhage can occur in bleeding disorders [e.g. haemophilia, haemorrhagic disease of newborn]
- Rare causes of SDH – glutaric aciduria type 1 (early always accompanied by frontal lobe hypoplasia and there is often no accompanying skull fracture) open heart surgery, neurosurgery, hypernatremic dehydration.
- Retinal haemorrhages are very unlikely to follow resuscitation or epileptic fits

**Mechanism of AHT**
- Impact to head
- Severe repetitive rotational injury (with or without impact)
- Combination of mechanisms

**Clinical history:**
- Full paediatric history
- Full documentation of all possible explanations for injury

**Family history:** including siblings, half siblings, step siblings, their names and dates of birth

**Parental occupations and health history**

**Social and police history:**
- Identify any previous child protection concerns, relevant criminal record of carers

**Examination:**
- Thorough general examination
- Documentation and photographs of injuries
- Monitor head circumference
- Body map

**Investigations in suspected AHT**

**Laboratory:**
- FBC repeated after 24-48 hours to detect fall in haemoglobin
- Coagulation studies to rule out major bleeding disorder
- Septic screen to exclude infection – subdural collections can be associated with meningitis
- Urine toxicology and metabolic screen [lactate, acyl carnitine, plasma amino acids, urine amino acids, organic acids]
- If fractures present – Vitamin D PTH bone profile

**Ophthalmological examination** by an experienced ophthalmologist using indirect ophthalmoscope to exclude eye injury including retinal haemorrhage and photograph if possible, on day of admission or next day, including (if possible) weekend

**Skeletal survey** – to detect other fractures including rib, limb, vertebral

**NEUROIMAGING** Discuss neuroimaging with Neuroradiologist

Radiology guidelines [Jaspen et al 2003 RCPCH 2013]
1. Day of presentation – head CT as soon as child stabilised after admission
2. Day 1-2 skeletal survey including skull X-Rays.
3. Day 3-4 if initial CT is abnormal perform MRI of head. Include cervical spine (and preferably whole spine ) images.MRI is a more sensitive method of detecting small intracranial collections, cerebral oedema and ischaemic changes.
4. Follow up CT or MRI where an earlier abnormality was detected may be required at around 10 days and possibly later, 2-3 months after initial injury. Follow radiological advice.

**Note:** Head ultrasound is unreliable as a means of detecting SDH

Authors: Dr Pushpa Subramaniam, Dr Sarah Thurlbeck
References: RCPCH Child Protection Companion 2013-9.6, Local Practice guidelines University Hospitals Bristol NHS Foundation Trust
Reviewed Feb 2017
**Role of General Paediatrician**
- Detailed history and examination, Body mapping
- Check if child known to Children’s Social services CSS
- Inform parents hospital policy for suspected AHT and ensure a referral is made to CSS
- Admit child, Consultant to fill in the Safeguarding Issues Form
- Do baseline lab tests, refer to Ophthalmology
- Organise radiological investigations as per protocol
- Discuss the case with Named Doctor and Nurse for CS
- HV, GP to be informed of admission
- Follow up the referral to CSS with a phone call and insist on an initial strategy meeting within 48 hours of admission
- All conversations, discussions, meetings, results with mutiagency team members to be documented in notes
- Do iclip Discharge summary before child leaves ward
- Arrange Follow up if required
- Consultant to do a medical report ASAP and cc to relevant people [see end for further details]

**Role of Paediatric Neuroradiologist**
- Review CT /MRI scans and give formal reports at the earliest.
- Where possible comment on whether the appearance is suggestive of AHT as opposed to unintentional trauma or other cause.
- Give advice on any follow up CT /MRI scan if required

**Role of Neurosurgeon**
- Give opinion on abnormal CT scan; comment on possible mechanism of injury
- Review child and decide if any surgical intervention is required.
- If surgery needed, liaise with Anaesthetist, theatre and PICU and inform Nicholls ward staff
- Arrange follow up if needed
- Documentation in notes
- *For direct referrals from DGHs, seek advice of Named Doctor /Nurse for Child Safeguarding*

**Role of Orthopaedic surgeon**
- Only if part of poly trauma
- Review skeletal X-Rays and child and give opinion on possible mechanism of injury
- Consult or handover case to Paediatric Orthopaedic Consultants SGH
- Documentation in notes
- *For direct referrals from DGHs, seek advice of Named Doctor /Nurse for Child Safeguarding*

**Role of Local Hospital Consultant Paediatrician**
- For direct referrals from DGHs, Tertiary Lead Consultant
- Neurosurgeon or Orthopaedic Surgeon to liaise with Local Hospital Consultant Paediatrician prior to transfer to local hospital.
- Local Hospital Consultant Paediatrician to complete safeguarding investigations after transfer
- Send full information with patient

**Role of Named /Designated Doctor for Child Safeguarding**
- (Dr Thurlbeck/Dr Peter Green)
- Phone 07951587607
- Give advice and guidance after child has been discussed with either of them by the Paediatric Consultant who is responsible for the child

**Role of Paediatric Radiologist**
- Review previous X-Rays if any
- Organise skeletal survey including skull X-Ray and give formal report at the earliest time.
- Give advice about repeating X-Rays in approximately 10-14 days from skeletal survey.

**Multiagency team members**
- General Paediatrician collaborating with paediatrician with expertise in Child Safeguarding team
- Paediatric neurologist and or neurosurgeon
- Paediatric Radiologist
- Neuroradiologist
- Ophthalmologist
- Paediatric Orthopaedic Consultant [if AHT part of poly trauma]
- Social Worker
- Police

**Role of Ward Nurse**
- Allocate a named nurse each shift
- Closely monitor child and inform doctor of any change in his/her clinical status
- Observe and document interactions between carers and child
- Liaise with HV /School nurse
- Liaise with Social Worker who is allocated to the case
- Inform doctors of any new discussions with SW or police
- Document in notes all conversations and discussions with mutiagency team members
- Attend strategy meetings and discharge plan meetings
- Ensure follow up is arranged if required
- Ensure that child does not leave ward without a completed discharge summary

**Role of Named Nurse for Safeguarding**
- Give advice to junior paediatric staff
- Liaise with named Consultant
- Ensure that preliminary checks are made by doctors and nurses on the ward (HV, School Nurse, Community nurse etc]
- Organise strategy meeting after liaising with responsible Paediatric Consultant and CSS. police
- Take minutes of strategy meeting and enter in case notes
- Daily follow up of child until discharge

Authors: Dr Pushpa Subramaniam, Dr Sarah Thurlbeck
References: RCPCH Child Protection Companion 2013- 9.6, Local Practice guidelines University Hospitals
Bristol NHS Foundation Trust
Reviewed Feb 2017
## SGH Care pathway for suspected Abusive Head Trauma (AHT) in children

### Day 0  Responsibility of Paediatric Consultant

<table>
<thead>
<tr>
<th>Task</th>
<th>Details</th>
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<tbody>
<tr>
<td>Take full history (including birth history, family history)</td>
<td>- Birth History: Gestation: Mode of delivery, perinatal problems</td>
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<td>- Vit K given?</td>
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<td>- Umbilical stump bleeding?</td>
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<td>- Family history: including siblings, half siblings, step siblings, their names and dates of birth</td>
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<td>- Parental occupations and health history</td>
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<td>- FH of bleeding diathesis (e.g. post tooth extraction/tonsillectomy)</td>
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<td>- Any other significant medical history</td>
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<td></td>
<td>- Perform examination including fundi. Full documentation of all possible explanations for injury.</td>
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<td></td>
<td>- Body mapping</td>
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</tbody>
</table>

### Safeguarding Children

- Has the child or family got a social worker?
- Any increased health visitor input?
- Is this child subject to a Child Protection Plan? (contact duty social worker)
- Are there any pre-existing safeguarding concerns regarding this child? □□YES □□NO
- If YES – Action taken and names of any Healthcare professionals or others involved?

- Identify child’s borough of residence and inform duty social worker
- Identify responsible Paediatric Consultant who is usually the on call Consultant (contactable via SGH switchboard).
- Commence Safeguarding Issues Form in medical records
- Inform parents of hospital policy for suspected AHT and referral to Children’s Social services (CSS) at MASH
- Identify correct borough by putting child’s post code in this link: https://www.gov.uk/find-local-council
- Send Section 47 interagency referral form by secure email with all details to CSS/MASH and follow it up with a phone call. See contact details below Make sure that CSS fax back /email to us that they have received the referral
- Document physical injuries in notes, using body maps and photograph (contact medical photography Mo -- Fri 0900-1700 hrs ext 2600/2606 - will require consent/request form; ‘out-of-hours’ photography responsibility of police)
- Perform urgent CT brain scan after Registrar/Consultant has discussed with Consultant Radiologist on call and Anaesthetist on call
- CT head scan;
- Date and time
- Consult Neurosurgical team after CT scan and ask for advice re management and /or surgical intervention
- Liaise with bed manager and admit child to Paediatric ward
Day 0  Responsibility of Paediatric Consultant

**Ophthalmology review.**
- Contact the Ophthalmology Registrar on duty (through SGH switchboard).
- Fundoscopy + retinal photography (when camera available) will be performed. Use short acting mydriatic agent (0.5% tropicamide or 0.5% cyclopentolate) - caution, may mask clinical signs of raised ICP; check with hospital consultant if necessary.
- If there are abnormal findings, or if there is uncertainty, then the ophthalmology consultant will review the same or next day, including (if possible) on weekends.

**Routine tests**
- FBC + film, renal and liver function
- Standard clotting screen
- Blood, urine, CSF culture (if LP considered safe)
- CRP
- Plasma amino acids (approx 0.5 – 1.0 ml blood in heparin tube)
- Urine organic acids (5 ml in plain tube)
- Acyl carnitine profile (blood spot Guthrie card)
- Toxicology screen (blood and urine)
- If fractures present – Vit D, PTH, bone profile

**Extended clotting studies –**
- Discuss with Consultant Paediatric Haematologist and perform only if isolated subdural +/- retinal haemorrhages without explanation or other indicators of abuse (rib fractures etc); or if other evidence of bleeding disorder:
- Factors 8, 9, 11 and 13, platelet glycoproteins, alpha 2 antiplasmin, von Willebrand antigen and activity (at least 5 mls PERIPHERAL blood in a clotting bottle. Contact haematologist technician on duty and ask to spin down sample and store plasma). Recent transfusion can interfere with clotting studies for up to 24 hours – contact consultant paediatric haematologist for advice re timing of test.

**Telephone, Email and Fax numbers of CSS**

**Wandsworth Social Services:** Tel: 020 8871 6622, weekends and out of hours 020 8871 6000  
Email: mash.duty@wandsworth.cjsm.net

**Merton Social Services:** Tel: 020 8545 4226, out of hours 020 8770 5000  
Email: MASH@merton.gov.uk.cjsm.net

**Croydon Social Services:** Tel: 02087266464 out of hours 02087266400.  
Email: childreferrals@croydon.gcsx.gov.uk

**Lambeth Social Services:** Tel: 020 7926 5555, out of hours 020 7926 5555  
Email: duty.manager@lambeth.cjsm.net

**Sutton Social Services:** Tel: 02086490418 out of hours 020 87705000  
Email: mash@sutton.gov.uk.cjsm.net

**Kingston upon -Thames:** Tel: 020 85475008, out of hours 020 87705000  
Email: spa@rbk.kingston.gov.uk.cjsm.net
SGH Care pathway for suspected Abusive Head Trauma (AHT) in children

Day 1-2

Responsibility of Paediatric Consultant

- Discuss the case with Named Doctor and Nurse for CS, SGH
- HV, GP to be informed of admission
- Follow up the referral to CSS with a phone call and insist on initial strategy meeting within 48 hours of admission

- Review physical injuries, recording any bruises as they appear.
- Document using body maps and photographs. (Continue to look for evolving bruises/injuries during first week, and record on body maps)
- Repeat FBC after 24-48 hours to detect fall in haemoglobin

- Skeletal survey in x-ray department. This will not be done out of hours and may need to wait several days until patient is stable enough to be moved.
- In meantime CXR should be reviewed for fractures.
- Discuss with Consultant Paediatric Radiologist and arrange skeletal survey including skull X-Ray

- Obtain formal report of CT head scan from Consultant Neuroradiologist [Dr Philip Rich /Dr A MacKinnon]

- Documentation of all conversations, discussions, meetings, results with multiagency team members, police (including name, date, time, designation and bleep or pager number) in the patient’s notes

Other Tests - that may be indicated in specific clinical situations.

- Pre-existing developmental delay/neurological disease/large head → discuss with neurology team.
- Sickle cell, vasculitides, impaired venous return to heart → discuss with relevant specialist teams.
- Consider measuring anti-Ro antibodies if evidence of macrocephaly

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Day 3-5  Responsibility of Paediatric Consultant

- Discuss with Consultant Neuroradiologist: MRI head and spine to be done on day 3-4 and liaise with Paediatric anaesthetist for a morning or afternoon list
- MRI brain + T1/T2 sagittal views whole spine to look for spinal subdural haematoma (this will not be done out of hours). Prior neurosurgery may limit value of MRI in identifying timing of bleeds.

- Daily review of physical injuries, including recording any bruises as they appear. Document using body maps and photographs.

Consider further Metabolic Tests - only on basis of previous history, clinical findings, and abnormal investigations
- If fractures present – Vit D, PTH , bone profile
- Skin biopsy for glutaric aciduria type 1 → Consider if frontal atrophy on CT scan, urine organic acid profile is abnormal, and there are no other generalised signs of abuse e.g. bruising, fractures etc. Refer to Evelina Children’s Hospital for this
- Copper and caeruloplasmin levels → Consider in extreme prematurity or Menke’s kinky hair syndrome.
- Test for galactosaemia if retinal haemorrhages alone (0.5 mls in heparin tube – please label DO NOT CENTRIFUGE).
- Haemophagocytic conditions can cause severe irritability and bleeding diatheses. Consider if neutropaenia, thrombocytopenia, jaundice, and transaminitis, (confirmatory tests include high ferritin, high fasting triglyceride)

- Discuss with Paediatric Radiologist regarding repeating X-Rays as well as suspicious areas on initial survey or repeating complete or partial skeletal survey (especially if there is grave concern re shaking injury but original survey is normal).

Day 14+

- Repeat X-Rays as necessary /suggested
Responsibility of Paediatric Consultant

Conclusion:

What was the injury?

What was the mechanism of injury?

Have all child safeguarding issues been addressed?

What is the medical follow up?

Before transfer to local hospital or discharge

- Ensure all results have been checked, clearly documented on iclip and reviewed by relevant Hospital team. Ensure repeat and/or further tests are organized as appropriate
- Ensure that checklist of investigations has been completed and signed.
- Do iclip Discharge summary before child leaves ward
- Arrange Follow up if required
- Sign the Safeguarding Issues Form prior to discharges to confirm that all safeguarding issues have been dealt with and are in hand
- Consultant to do a medical report ASAP and cc to relevant people
- Medical report: In writing any report, comments attributed to specific individuals should be checked and approved by them before it is sent out. Approved, finalised reports (from EPR) can be quoted verbatim or pasted.
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Checklist and Flow chart for suspected AHT

<table>
<thead>
<tr>
<th>COMPULSORY</th>
<th>Date taken</th>
<th>Results</th>
<th>Doctor's signature /name</th>
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<tbody>
<tr>
<td>FBC</td>
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<tr>
<td>Blood Film</td>
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<td>Renal function</td>
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<td>Liver function</td>
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<tr>
<td>Standard Clotting screen</td>
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<tr>
<td>CRP</td>
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<tr>
<td>Vit D, PTH, bone profile</td>
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<tr>
<td>Blood culture</td>
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<tr>
<td>Plasma amino acids</td>
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<td>Urine organic acids</td>
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<tr>
<td>Acyl carnitine profile</td>
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<td>Skeletal survey</td>
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<td>CT scan</td>
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<td>MRI scan</td>
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| OPTIONAL                          |            |         |                          |
| Blood or urine toxicology         |            |         |                          |
| CSF                               |            |         |                          |
| Extended clotting studies         |            |         |                          |
| Galactosaemia                     |            |         |                          |
| Copper/ceruloplasmin              |            |         |                          |
| HLH tests                         |            |         |                          |
| Skin biopsy                       |            |         |                          |

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