

Proposed Referral List for Supra-regional Paediatric Liver Services

The aim of supra-regional paediatric liver services is to co-ordinate the optimum management of children with liver disease and to provide specialist management for rare conditions. Any paediatrician who has concerns about a child with liver disease should be able to refer that child to a supra-regional unit without funding implications. Because the level of hepatological experience in different paediatric centres is variable, paediatricians with particular expertise should collaborate closely with the supra-regional centres; performing audit, drawing up shared protocols, running joint clinics and clinical meetings. The following problems should be discussed with the supra-regional centres, to ensure prompt and appropriate referrals.

1. Neonatal Hepatitis Syndrome

Jaundiced infants who present with *acholic stools, hypoglycaemia, ascites (in utero or after birth) or severe failure to thrive* and those with *coagulopathy* not corrected by intravenous vitamin K.

Neonatal hepatitis of unknown cause, which has *not resolved completely with normal transaminases by 4 months of age*

Relevant diagnostic categories **may** include:

biliary atresia, Alagille's syndrome, alpha-1-antitrypsin deficiency, lipid storage disorders, parenteral nutrition associated liver disease, progressive familial intrahepatic cholestasis syndromes, hypopituitarism.

2. Chronic Liver Disease of Childhood

Children with clinical and/or biochemical evidence of cryptogenic chronic liver disease or when local facilities do not allow rapid diagnosis of treatable conditions like *autoimmune hepatitis or Wilson's disease* (at least within two weeks from presentation).

Children with problematic complications of chronic liver disease such as *cholangitis, intractable ascites, failure to thrive, malnutrition, pruritis, encephalopathy and recurrent gastrointestinal bleeding*.

Children with recognised causes of chronic liver disease who do not respond satisfactorily to treatment (*eg autoimmune hepatitis, Wilson's disease*)

Children with *chronic hepatitis B or C* to be considered for anti-viral treatment.

Children with *unexplained abnormality of liver function tests* to be referred:

- *immediately in the presence of coagulopathy not responding to vitamin K*
- *after no more than 3 month observation in the presence of normal synthetic function (PT, INR, albumin).*

Children with *unexplained hepatomegaly*

Children with *chronic liver disease for consideration of liver transplantation (eg biliary atresia after Kasai portoenterostomy)*

Relevant diagnostic categories **may** include:

Alagille's syndrome, alpha-1-antitrypsin deficiency, auto-immune liver disease, hepatitis B / C, sclerosing cholangitis, cystic fibrosis, drug-induced liver disease, hereditary fibrocystic disorders, haemochromatosis, progressive familial intrahepatic cholestasis, tyrosinaemia type 1, Wilson's disease, Budd-Chiari syndrome, non alcoholic steato-hepatitis.

3. Acute Liver Failure

All children with acute decompensation of chronic liver disease or with fulminant hepatic failure (ie coagulopathy not corrected by vitamin K associated with biochemical evidence of liver necrosis, with or without encephalopathy). These children may require transplantation and should be referred as soon as possible, without waiting for the onset of encephalopathy.

Relevant diagnostic categories **may** include:

viral hepatitis (A,B,C,D,E), non A /non E hepatitis, drug-induced liver disease (overdose, idiosyncratic), Wilson's disease, neonatal haemochromatosis, autoimmune hepatitis, Budd-Chiari syndrome, veno-occlusive disease, tyrosinaemia, mitochondrial electron chain disease.

4. a) Metabolic conditions requiring consideration for liver transplantation

(eg alpha-1 antitrypsin deficiency, Crigler Najjar syndrome type 1, glycogen storage disease, tyrosinaemia, propionic acidaemia, urea cycle defects etc)

b) Multi-system conditions requiring consideration for liver and kidney, or liver and bone marrow transplantation

(eg primary oxalosis, fibropolycystic disease, methylmalonic acidaemia, primary immunodeficiencies)

5. Surgical Liver Disease

Biliary atresia:

All suspected cases.

Choledochal cysts:

- a) diagnosed *antenatally* or *within 6 months of life*, as they may represent cystic biliary atresia.
- b) with features of *chronic liver disease* (e.g. *ascites, portal hypertension*) or evidence of *intrahepatic involvement*
- c) with recurrent *pancreatitis*

Primary Liver Tumours (benign / malignant):

- a) *central* (segments 1, IV, V, VIII)
- b) *multifocal* where an extended partial hepatectomy may be required.
- c) which may require evaluation for *total hepatectomy and transplantation* (typically hepatoblastoma)
- d) *rare tumours* such as liver/bile duct rhabdomyosarcoma.
- e) *vascular tumour* with complications (cardiac, mechanical, DIC)
- f) *undiagnosed liver masses*

Portal Hypertension

- a) *Variceal bleeding* (unless specialist paediatric therapeutic endoscopy is available locally)
- b) Children requiring consideration for *shunt surgery or transplantation*
- c) Children requiring consideration for *prophylactic treatment* (eg air travel, living in remote areas)
- d) Children with *ectopic variceal bleeding* (e.g. gastric varices)
- e) *Budd-Chiari syndrome*

Congenital Vascular Anomalies (e.g. congenital porto-caval shunts)

All cases will need specialist investigation (i.e. angiography) to determine relevant vascular anatomy. A proportion will require specialist surgical reconstruction.

Liver Trauma

Children requiring *urgent laparotomy and perihepatic packing* should be referred as soon as they have been stabilised.

Any child with *complications* of liver trauma (e.g. hemobilia, abscess, biloma).

- 6. High risk liver biopsies requiring interventional radiology and surgical back up**
[eg in the presence of coagulopathy (PT >3 seconds prolonged, thrombocytopenia <math><70 \times 10^9/l</math>), post liver transplant or previous biliary surgery, cystic disease, obesity, anatomical abnormalities)