What are the most common causes of paediatric lead poisoning in the UK?
Lead can be absorbed by ingestion of lead-containing particles or inhalation of lead dust or fume.

Ingestion of lead-containing paint remains the most common cause of paediatric lead exposure. Although lead has been banned completely (except for restricted use on listed buildings) from use in paints in the UK since 1989, lead was frequently used in domestic paints up until the mid 1960s (with a few minor uses continuing into the 1980s). Children may therefore be exposed by eating paint (pica) in older properties, such as peeling layers of paint from skirting boards, banisters etc. Renovation or redecoration is a further means of exposure if removal of old paint involves production of lead flakes or dust that may be ingested or dust or fumes that can be inhaled.

Lead ingestion may also occur from sucking or chewing painted objects such as toys that do not comply with the EU Toy Safety Directive (Council Directive 88/378/EEC) and may therefore contain lead-based paint. Cooking with lead-glazed earthenware has also caused lead poisoning by ingestion. Lead may also be a contaminant in ‘traditional’ remedies and cosmetics. Soil and water are other potential sources of lead ingestion, though significant lead-contamination of domestic water supplies is rare.

What symptoms and signs should prompt me to consider a diagnosis of lead poisoning in a child?
Lead poisoning in children is most likely to present with anorexia, abdominal pain, constipation and headache. Weight loss or failure to thrive have been reported. Children may also display increased irritability and reduced concentration. Anaemia may develop in more severe cases as a result of lead-induced inhibition of haem synthesis. Lead-induced anaemia may be normochromic or microchromic and normocytic or microcytic. Lead-induced encephalopathy is now rare but still seen occasionally in very severe cases of poisoning.
Paediatricians should have a particularly low threshold for screening for lead poisoning in children with learning disabilities or behavioural disorders as pica may be harder to identify in these cases.

At what blood lead concentrations do clinical effects occur?
Although the symptoms and signs described above are often not evident until blood lead concentrations are around 2.4 micromol/L (50 micrograms/dL), there is increasing evidence that lead has deleterious health effects at blood lead concentrations considerably lower than this. The developing nervous system is particularly susceptible with evidence that blood lead concentrations even below 0.48 micromol/L (10 micrograms/dL) may have deleterious effects on cognitive function in children.

What is the most appropriate investigation to confirm a diagnosis of lead poisoning?
A whole blood lead concentration should be undertaken in all cases of suspected lead poisoning.

What is a 'normal' blood lead concentration?
While there is no defined threshold for the harmful effects of lead, a blood lead concentration of < 0.48 micromol/L (<10 microgram/100 mL) is considered desirable.

Are blood lead concentration measurements widely available within the NHS?
Yes. Although many District General Hospitals will not carry out blood lead analyses themselves, they will have an arrangement with a hospital that does and is fully accredited by the Clinical Pathology Accreditation (CPA) scheme or equivalent body. It should be possible for a blood lead concentration requested from any NHS hospital to be available within one week.

If parents provide a blood lead concentration undertaken by an external laboratory, it is important to ensure that the laboratory is appropriately accredited.

What other clinical investigations may be appropriate?
Full blood count
Iron status (iron stores are normal or increased in lead poisoning) if anaemia is present
Abdominal X-ray if particulate lead ingestion is suspected

NB: Testing of hair, teeth or fingernails for lead, sodium calcium edetate lead-mobilisation tests or neurophysiological function tests are NOT recommended and radiographic imaging or X-ray fluorescence of long bones are NOT part of the routine clinical work-up for suspected lead poisoning in a child.
What are the options for treatment of lead poisoning in children?
The most important aspect of treatment is removal from exposure. Identification of the source of exposure may prove a challenge and requires a detailed history and often a degree of investigative imagination and persistence, acknowledging the principal sources of exposure outlined above. Remember that the source may be at school, a relative's or other frequently visited property. Appropriate investigations can be carried out by the Health Protection Agency, which will work with local authorities to enforce remediation of the source; contact details for your local unit can be found at www.hpa.org.uk.

It is reasonable to offer chelation therapy to children who are symptomatic or have a blood lead concentration > 2.4 micromol/L (50 micrograms/dL), although there is reliable evidence that chelation therapy does not improve cognitive function in children ≤ 3 years old with blood lead concentrations of ≤ 2.2 micromol/L (45 micrograms/dL). Management of cases where the blood lead concentration is greater than 0.48 micromol/L (10 micrograms/dL) but below 2.4 micromol/L (50 micrograms/dL) normally involves only removal from exposure but chelation therapy may be considered in some cases of chronic poisoning. Expert advice should be sought in these cases (see below).

Where chelation therapy is indicated, two drugs are available; oral DMSA (succimer) 30 mg/kg/day (DMSA is not licensed in the UK) or sodium calcium edetate 40 mg/kg twice daily (or 75 mg/kg/daily) by IV infusion for 5 days. Expert advice should be sought before institution of either agent (see below).

How often should I repeat blood lead concentration measurements in a child found to have an increased blood lead concentration?
This will depend on the initial value and the circumstances. Where the initial blood lead concentration is less than 2.4 micromol/L (50 micrograms/dL), removal from exposure and a repeat measurement of the blood lead concentration one month later is usually all that is required. If the initial blood lead concentration is > 2.4 micromol/L (50 micrograms/dL), chelation therapy should be considered. In these circumstances blood lead concentrations should be measured immediately before and after treatment and ideally during the chelation course. There is usually a rebound in the blood lead concentration following chelation (as lead moves from the bone to blood) so a repeat blood lead concentration measurement should be undertaken one week after the end of each chelation course.

Where can I obtain expert advice on diagnosis and management?
The National Poisons Information Service (NPIS) computerised database, TOXBASE® is available free of charge at www.toxbase.org to registered NHS users and contains detailed monographs on the diagnosis and management of lead poisoning.
The NPIS 24 hour telephone helpline (Tel: 0844 892 0111) is available to health professionals for discussion of more complex cases. When appropriate, senior medical staff can discuss their cases directly with an NPIS consultant clinical toxicologist.