

There has recently been intense media interest and public concern on the problem of lead contamination in drinking water in certain public housing estates. As young children are the at-risk population, paediatricians may be consulted by their patients and the public.

College has closely liaised with the Hospital Authority and other disciplines through a Task Force initiated by Hong Kong Medical Association. College Council would like to provide the attached information update on this hot topic for our members' reference, so that we can all give objective scientific opinion to our patients and the public to relieve their concern and alleviate their undue anxiety.

Hong Kong College of Paediatricians

Information update on "lead contamination in drinking water and environment"

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Endorsed by College Council on 24 July 2015

Background

Lead is a known environmental toxicant. However there are no signs and symptoms specific to lead poisoning making identification based solely on patient history and physical examination difficult. Symptoms that occur are vague and commonly encountered in our daily practice: gastrointestinal complaints such as abdominal pain, constipation, nausea and vomiting; decreased growth, delayed sexual maturation, increased dental caries, neurologic symptoms such as behavioural changes, mental impairment, seizures and encephalopathy. These symptoms may have many other causes. Thus testing for blood lead level (BLL) may be included as one of the investigations for these symptoms, among other tests.

On a population level, raised BLL was found to be associated with negative outcomes including impaired cognitive, motor, behavioural and physical abilities in children.

Elevated BLL is a ubiquitous environmental issue in the modern world, affecting developing and developed countries alike. Using a cut off value of 5 microgram/dL (based on 97.5 percentile of the NHANES-generated BLL distribution in children 1-5 years old) would include 450,000 children in the US alone.

Lead exposure in the general population comes from many sources other than the water supply, some contaminated traditional herbal remedies commonly given to young babies & children for health benefits e.g. Bo Ying compound 保嬰丹; pottery and ceramic containers are some of the often overlooked sources of lead and should be taken into consideration and controlled. Hence, a concerted effort to reduce all possible contaminating sources, in addition to our water supply is desirable to tackle this important public health issue.

The Centers for Disease Control and Prevention (CDC) of USA previously recommended screening of at risk group of children by BLL. A BLL of 10 microgram/dL (or 0.47 micromol/L) was previously designated as elevated, and these children required follow-up and monitoring. With increasing evidence suggesting a lack of a level of lead exposure below which is health protective, in its revised recommendation in 2012, the CDC removed this “level of concern” to stress that there is no safe BLL. It has therefore recommended primary prevention by removing all possible sources of lead exposure to minimize intoxication, rather than a response to exposure after it has taken place.

For BLL below 44 mcg/dL, there is no evidence that chelation therapy will improve outcome, and it is not recommended. Moreover there is a risk of adverse effects such as hypersensitivity or depleting other trace elements essential for our body functions. Thus, for BLL between 5-44 microgram/dL, the emphasis should be on monitoring BLL and neurodevelopment, ensuring good nutrition, especially adequate iron, calcium, vitamin C intake, and eliminating further exposure to any lead source. Although in adults studies BLL decrease gradually with a half-life of 30 days by excretion in the urine and faeces, paediatric data show that levels of decline are much more prolonged, ranging from months to years for children with BLL above 20 mcg/dL to drop below 10 mcg/dL. The CDC recommends that chelation therapy should only be considered at BLL > 44 microgram/dL.

What will the Government do for the affected children?

The updated care plan of the Government for residents of public estates with elevated lead level in drinking water is attached for members' reference. A few points deserve mention:

1. A BLL of >5microgram/dL was used to decide on further follow up action, because this was the 97.5th percentile of childhood population in USA and roughly 95th percentile in a smaller study of schoolchildren in Hong Kong.

2. For children with level >5microgram/dL, exposure assessment and advice, developmental assessment and health evaluation will be conducted.
3. For children with level >20microgram/dL, in addition to above measures, medical assessment will be arranged within 2 weeks.
4. For children with level >44microgram/dL, in addition to above measures, treatment in toxicology clinic in PWH or UCH will be arranged within 1-2 weeks.
5. BLL levels will be monitored until they fall below 5microgram/dL.

What can we tell the parents and the public?

1. This is a good opportunity to appeal to the Government and all stakeholders to promote primary prevention to remove all sources of environmental lead contamination, through legislations and their proper enforcement.
2. At an individual level, public education can be conducted to avoid lead exposure whether from the drinking water, lead-containing paints in the house, furniture, toys, herbal medicines, and batteries.
3. We can advise against testing the urine and hair for lead content.
4. We can confirm that the above health measures taken by Government are in accordance with available evidence and international guidelines so as to reduce public anxiety.
5. We can take this opportunity to promote health education and emphasize on the benefit of good nutrition, e.g. prevent iron deficiency and adequate dietary intake of calcium and vitamin C etc.
6. We should emphasize that neurodevelopmental or behavioural problems usually have multifactorial aetiologies. For instance, a nurturing and stimulating family environment can promote optimal and healthy neurodevelopment of children.
7. For the lactating mothers, World Health Organisation and US Experts recommended that a mother with BLL <40 microgram/dL can continue breastfeeding. Assuming a breast milk lead to blood lead ratio of 1-3%, the benefit of breast feeding outweighs the slight risk of lead exposure. However both mother and infant BLL should be monitored to ensure a falling trend.

Useful references:

1. www.who.int/ceh/publications/leadguidance.pdf
2. Warniment C, Tsang K, Galazka SS. Lead Poisoning in Children. *Am Fam Physician.* 2010;81(6):751-757, 759-760

3. Centers for Disease Control and Prevention (CDC) Advisory Committee on Childhood Lead Poisoning Prevention. Interpreting and managing blood lead levels < 10 microg/dL in children and reducing childhood exposures to lead: recommendations of CDC's Advisory Committee on Childhood Lead Poisoning Prevention. MMWR Recomm Rep. 2007 Nov 2;56(RR-8):1-16
4. www.cdc.gov/nceh/lead/ACCLPP/Final_Document_010412.pdf

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