LEAD alert

A guide for health professionals

Commonwealth Environment Protection Agency

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Commonwealth Environment
Protection Agency

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Contents

There is new evidence that lead is harmful to people at blood lead levels previously thought safe. Even low levels of lead in blood can have detrimental effects on the intellectual development of young children.

This guide briefly explains why the National Health and Medical Research Council recently emphasised its continuing concern over human exposure to lead.

It also provides guidance for medical practitioners and health workers about recognising people at risk, the symptoms of lead poisoning and a protocol for management of children with elevated blood lead levels.

A nation-wide blood lead level survey to identify the severity of the problem will be undertaken in 1994. A national public education campaign, informing people about the need to reduce the amount of lead entering the environment, will begin in February 1994. These two initiatives inevitably will generate some concern about blood lead levels and will result in health professionals receiving inquiries from their patients.

Ros Kelly

Commonwealth Minister for the Environment

All Australian parents will be concerned about the possible effects of lead on their children. They are likely to seek advice from their medical practitioners and health carers,

I hope the information in this guide will assist you to recognise people at risk, particularly young children, and to advise on risk reduction and treatment.

This booklet represents an excellent guide to us in caring for families seeking advice and answers to their questions.

Consistent with the profession's concern for the impact of the environment on the health of our patients, I am pleased on behalf of the AMA to work with the Federal Government on this substantial initiative to improve our understanding of lead-related illnesses, their detection and management.

Irrespective of our geographic location, we must be vigilant to the possibility of this problem within our own communities and show a preparedness to address it on the basis of this publication, which I commend to you.

Brendan Nelson

President

Australian Medical Association

AMA

Why is lead a health issue now?

Humans have been aware of the dangers of lead since the time of Hippocrates who observed and described the symptoms of lead poisoning amongst lead miners.

Levels of lead in the blood that were thought to be safe a few years ago are now considered to hold some risks for young children.

Whilst blood lead concentrations above 3.38 (µmol/L (70.4 µg/dL) * in children have long been known to produce the classical symptoms of lead poisoning -fits, encephalopathy, brain damage - it is only in the last five years that epidemiological studies in Australia, the US and Europe have indicated that lead crossing the placenta during pregnancy or absorbed after birth can have detrimental effects on intellectual development and children's behaviour at blood lead levels as low as 0.48 µmol/L (10 µg/dL).

The best estimate is that, after one takes into account the effects of all the other factors which may relate to lead exposure and intellectual development (so-called 'confounders'}, the effect of each 10 µg/dL increase in average lifetime blood lead level is a 2-3 point decrement in IQ scores in children between the ages of 4 and 10 years.[1,2,3]

While these effects are clinically undetectable in individual children, the effects on the distribution of IQ scores in populations of children exposed to higher blood lead levels is considerable, with the proportion of very bright children diminished and the numbers of children requiring special educational assistance because of lower IQs increased perhaps two to threefold.

* µg/dL = micrograms per decilitre of blood.
Most laboratories these days report blood lead levels in terms of micromoles per litre (µmol/L), but public health agencies still tend to refer to the old units ((µg/dL). To convert a test result from) µmol/L to µg/dL, multiply the µmol/L figure by 20.7.

NHMRC Recommendations

After taking into account the accumulating evidence from Australia and overseas about the adverse health effects of low-level lead exposure on young children, the National Health and Medical Research Council (NHMRC) at its meeting on 2 June 1993, set a national goal for all Australians to have a blood lead level of less than 0.48 µmol/L (10 µg/dL)-*.

The development of a national goal, and accompanying action guidelines, is a new approach by the NHMRC to deal with the complex issue of lead exposure. Previously there had been a 'level of concern', last amended in 1987 to 1.2 µmol/L (25 µg/dL). The Council recommended that there should be a range of responses to different blood lead levels.

In the case of communities where representative surveys show more than 5% of children aged 1-4 years have blood lead levels above 0.72 µmol/L (15 (µg/dL), lead sources in the community should be investigated, and environmental management plans developed and implemented in consultation with the community.

In individual children with a blood lead level greater than 0.72 µmol/L (15 µg/dL), personal sources of lead exposure should be evaluated-and point sources should be remediated and exposures controlled, with personal education and counselling on exposure control provided to the child and family. Repeat testing of blood lead may be indicated to assess the effectiveness of any actions taken.

Above 1.2 µmol/L (25 (µg/dL) similar measures should be followed, together with a detailed medical history and general examination including particular attention to nutritional and developmental status! Retesting in about three months is recommended to assess the effectiveness of actions taken.

Children with blood lead levels above 2.65 (µmol/L (55 µg/dL) should be referred for urgent specialist paediatric assessment and advice regarding the need for chelation.

For more detail about recommended responses, please see Appendix One, the NHMRG Summary Statement 'Lead in Australians.'

At its meeting on 3 November 1993, NHMRC set target dates for the reduction of lead in all Australians to less than 15 μg/dL (0.72 |4 μmol/L) by the end of 1998, with the exception of occupational exposures. Strategies in place to achieve this first target should be such as to result in blood lead levels in 90% of children between 1-4 years below 10 μg/dL (0.48 μmol/L) by the end of 1998.

Why are pregnant women and children at special risk?

Lead crosses the placenta and at low concentrations has been shown to be harmful to the fetus, affecting performance on standardised developmental tests in the first few years of life. In older children, .these prenatal effects may not be detectable - often because they are surpassed by the effects of the usually higher post-natal exposure.

There is also some evidence of an adverse effect on pregnancy outcome, with slightly higher risks of preterm delivery.

Children under five years of age are at special risk for three reasons:

- the developing brain in young children appears more vulnerable to a range of biological and environmental insults, including lead;

- the normal exploratory hand-to-mouth activity in young children (the most extreme variant of which is pica - the habitual eating of nonfood substances) exposes them to higher risks of ingesting lead from a contaminated environment. Pica is more common in children with intellectual impairment.

- children absorb a much higher proportion of ingested lead than adults - up to 50% compared to 10%.

Which children and women are at special risk of having raised blood lead levels?

Placental transfer

Lead readily crosses the placenta to accumulate in the developing fetus and therefore the mother's exposure to lead from occupational or household sources (e.g. renovation of old houses or accumulation of dust with residues of airborne lead) may affect the fetus.

Age

Population studies in urban environments show that blood lead levels in children rise from around six months, reaching a peak around two years of age, from where they steadily decline to adult levels.

Exposure to environmental sources

The children at greatest risk of high blood lead levels in Australia include those living near major lead industries such as at Port Pirie (SA), Broken Hill (NSW) and Boolaroo (NSW), and children living in older homes previously painted **with** lead-based paint which are being renovated.

Paint. Up until 1970, lead-based paint was used on many Australian houses. Peeling and flaking of lead-based paint causes dangerous residues of lead to build up in household dust. Children may deliberately swallow paint flakes because of their sweetish taste, or suck on fingers or toys coated with deteriorated lead-paint powder. Older cots and toys may have been painted with lead-based paints.

Renovation of older (pre-1970) houses poses special risks, as children may ingest paint flakes or be exposed to lead-contaminated household dust. Removal of old paint by sand-blasting, burning, scraping and power tool cleaning potentially create even greater dangers than when the paint is peeling and flaking off, because the particle sizes are small enough to be deposited into furnishings and carpets, making removal difficult. The residual dust may be ingested or inhaled by young children.

Nearly all cases of acute lead poisoning in children admitted to children's hospitals in recent years have been attributed to home renovation activities.

Before older homes undergo any renovation that may generate dust, they should be tested for the presence of lead-based paint. If such paint is discovered, special precautions should be taken to seal off areas being renovated to prevent young children being exposed to dust or fumes. Pregnant women and children should not be present in a house when renovations involving the disturbance of lead-based paint are taking place.

Petrol. Lead emissions from motor vehicles contribute about 90% of the lead in air in Australia's urban areas. Children (and women of child-bearing age) living near main urban thoroughfares are at increased risk of exposure,

Ingestion of dust containing lead fallout is a more important pathway of exposure for children than inhalation of lead from the atmosphere.

Point sources of lead include lead mining and smelting, and other lead industry operations, such as breaking down old car batteries.

Lead in the workplace. Workers in lead industries may bring lead dust home on their clothes. Parents may be occupationally exposed to lead in various industries as well as primary and secondary lead metal processing. These include:

- inorganic pigments manufacturing;
- lead mining, ore concentration and handling;
- primary and secondary lead metal processing;
- brass, bronze and copper foundries;
- the manufacturing of batteries, machinery, electronic capacitors,
- auto repair services and garages;
- bridge, tunnel and elevated highway repairs;
- stone, glass and clay products manufacturing;
- munitions manufacturing;
- firing ranges.

Other sources

- Lead is a naturally occurring element. Loading of soils and sediments can occur from natural sources, from emissions from vehicles using leaded fuel, dust deposited from leaded paint or from industrial sources.
- Lead in water is thought to be an uncommon source in Australia. Lead may enter water in run-off from contaminated surfaces (soil or roof) or delivered through lead or lead-soldered pipes. Further research into this type of contamination is underway.
- Food manufactured and purchased in Australia generally has low lead levels. However, root vegetables grown in contaminated soil, leaf vegetables exposed to lead-containing dusts, fish obtained from contaminated waters (particularly shellfish), unrefined brown rice, cereals or eggs obtained from poultry feeding in lead-contaminated soil may contain higher lead levels.

Storage of food in cans with lead-solder side seams has been an uncommon source of contamination for the past 15 years. Imported cans may still pose problems.

- Cooking with lead-glazed ceramic ware and the use of lead-based medicinal products and cosmetics is frequent in some Latin American and Asian cultures.'
- Hobbies involving the use of lead, such as making stained glass or lead-glazed pottery pose risks when children are in the vicinity or when lead particles are retained on "clothing.
- Lead bullets and sinkers may be ingested causing acute elevation of blood lead.

Nutritional factors

Iron deficiency. Children with insufficient iron in their diets, or deficient in iron stores, absorb lead more readily. Lead, through interfering with iron uptake, is likely to potentiate iron deficiency. Thus anaemia is more likely in children who have iron deficiency and elevated blood lead.

Calcium. Deficiency of dietary calcium increases absorption of lead.

Zinc and protein. Diets deficient in zinc and protein may also predispose children to increased lead absorption.

Fat. A very high fat diet promotes lead absorption. However, there is no evidence that a low fat diet minimises absorption.

Frequency of eating. The presence of food in the stomach decreases the absorption of lead from non-food sources.

What are the symptoms of excess lead

Once absorbed, lead is distributed amongst blood (3%), soft tissue (up to 5%) and mineralising tissue - bone or teeth (90-95%). In children, the proportion in bones may be as low as 75%. Of lead in the blood, most (99%) is associated with red blood cells, with the remaining 1 % in plasma available for transport to the tissues.

Whilst the half-life for lead in blood is around 28-35 days, the half-life in soft tissues and in the non-labile compartment of bone may be more than 25 years. Thus blood lead levels are a reflection of a dynamic equilibrium between ongoing exposure, tissue {especially bone) stores and turnover, and losses through excretion.,

Children with mild to moderate lead exposure {<2.17 µmol/L or < 45 µg/dL) are usually asymptomatic. When symptoms do appear they are usually nonspecific. Symptoms of moderate to severe exposure may range from lethargy, intermittent abdominal pain or constipation, irritability, headache, paresis or paralysis, and encephalopathy - which may lead abruptly to seizures, coma and death. Anaemia may occur, but it is rarely severe. Subclinical effects on haemoglobin synthesis may occur in children experiencing mild to moderate exposure.

Symptomatic lead intoxication in children generally does not occur until levels are at least 2.17 to 2.42 µmol/L {45-50 µg/dL). Lead encephalopathy can occur with levels in excess of 3.38 (µmol/L {70 (µg/dL) and such levels represent a medical emergency.

Lead poisoning may also present insidiously in children with developmental delay, learning difficulties, hyperactivity or other behaviour problems, but undue lead exposure is a relatively uncommon cause of clinically recognisable developmental or behavioural problems.

Adults with high levels of lead (e.g. from occupational exposure) are at increased risk of peripheral neuropathy (diminished nerve conduction velocity), and reproductive sequelae (reduced fertility in women and affected sperm morphology and function in men).

The following is a guide only: /

<u><2.17 µmoI/I, (45 µg/dL) in children, <2.90 µmol/L (60 µg/dL) in adults</u>

- Usually asymptomatic

<u>2.17- 3.38 µmol/L (45-70 µg/dL) in children, 2.90-3.86 µmol/L (60-80 (µg/dL) in adults</u>

- May be asymptomatic. If symptoms do occur, they include general fatigue, irritability, concentration difficulties, tremors, headaches, abdominal pain, vomiting, weight loss or constipation. These symptoms may be mistaken for other disorders.

<u>Over 3.38 µmol/L (70 µg/dL) in children, over 3.86 µmol/L (80 (µg/dL) in adults</u>

- Asymptomatic or symptoms similar to those mentioned above. At very high levels (>3.38 µmol/L in children, >4.83 (µmol/L in adults) symptoms can include convulsions, paralysis, coma or-death

Which children should be tested?

Because most lead poisoning is not apparent clinically, a blood test is more sensitive than clinical assessment. Blood lead levels generally provide an indication of recent exposure (e.g. over previous six weeks).

Estimating lead in hair, urine and teeth is not recommended to guide clinical management.

The following groups of children may be at risk of having elevated lead levels:

- children aged 9-48 months who live in, or arc frequent visitors to, older dilapidated housing with peeling paint;*
- children aged 9-48 months who have been present during 'unsafe' renovations of older housing (painted before 1970);
- children whose siblings have elevated blood lead levels;
- children with pica particularly if living in lead-contaminated environments, e.g. older houses with peeling paint;
- children aged 9-48 months whose parents may be occupationally exposed or who are living near lead smelters, battery breaking yards, lead ore bodies, or on highways or main roads with heavy traffic;
- children exposed to the less common exposure pathways e.g. lead hobbies, folk medicines containing lead, etc.

Clinicians might also consider ruling out elevated lead as a contributing factor in children presenting with intellectual disability or behaviour problems. High blood lead levels may also need to be excluded in children with iron deficiency.

Until better epidemiological information about blood lead levels in the community is available[5], universal screening of all children in Australia is not thought necessary.

Because the risk of contamination of capillary (finger-prick) blood samples is high, blood lead level test should be done on venous blood using lead-free equipment. For the analysis, clinicians should use laboratories participating in external quality control schemes.

At present there is some inconsistency in the reporting format used by different laboratories in terms' of the correct reference ranges for blood lead levels, so that routine interpretative comments may not be applicable to children.

Blood lead levels may fall rapidly in children with a single episode of exposure, or fall very slowly over months or years in a child with previous heavy or repeated exposure. In children with elevated levels, it is usually necessary to repeat tests over a period of time to assess progress.

Where definite risk factors (such as those fisted above) are present, or where there are clinical grounds for testing, a Medicare rebate is applicable. Medicare does not, however, cover routine screening of children in whom no risk factors or symptoms possibly attributable to lead are present.

What advice should you give parents if a child's blood lead is >15 µg/dL (O.72 µmol/L)?

Explanation and advice to parents arc important aspects of management. The aim should be to maintain a balance between appropriate concern and undue anxiety.

Many people have difficulty understanding the difference between risks to populations and risks to individuals.

The scientific evidence shows that mean IQ levels are reduced in childhood populations exposed to high blood lead levels. An identifiable specific effect of lead on an individual child's IQ, however, cannot be proven conclusively.

An analogy with the effects of cigarette smoking on the birth weight of a baby may be helpful. Accumulated scientific evidence shows there is a strong correlation between maternal smoking and low birth weight. However, there are many other factors, known and unknown, that contribute to low birth weight. Thus, when a clinician is confronted with an individual low birth weight baby whose mother smokes, it is not possible to determine the extent to which the mother's cigarette smoking might have contributed to that outcome.

Similarly, in a child with an elevated blood lead level who also has learning or behavioural problems, it is not possible to determine the extent to which lead might have contributed to an outcome which is influenced by a range of other factors, including genetic factors, the quality of parenting, socio-economic factors, nutrition and physical health.

In the hierarchy of such influences on children's cognitive growth and development, lead would normally be a minor factor {except in cases with severe poisoning and encephalopathy).

In most situations, quality parenting will count for a lot more in terms of a child's development than obsessive attention to reducing lead exposure to zero. As a clinician however, one would want to minimise exposure to any known risk factors, such as lead, which is amenable to intervention.

Parents may need assistance to keep their child's lead exposure in perspective. Many young parents are likely to have had significantly higher lead levels themselves as children than their babies and younger children will have now.

Steps to minimise exposure and absorption

Parents can be given helpful advice about a number of steps that they can take to minimise their children's exposure to lead absorption. They can be advised to:

- Ensure children's hands and faces are washed before they cat or have a nap.
- Discourage children from putting dirty fingers or toys in their mouths.
- Encourage children to play in grassy areas instead of places where dirt sticks to their fingers and toys. Plant grass or ground cover on exposed areas of soil in the yard.
- Wash fruit and vegetables before eating.
- Ensure the child's diet is adequate in calcium and iron, which help to minimise lead absorption. Sources of iron include poultry, red meat, liver, fish, fortified cereal, cooked legumes (e.g. beans, peas, lentils), dark green leafy vegetables. Vegetable sources of iron are better absorbed when taken with Vitamin C containing foods such as fruit and fruit juices. Sources of calcium include milk, cheese, yoghurt. Avoid high fat diets as they encourage lead absorption.
- Ensure young children have regular, frequent meals and snacks - up to six per day because more lead is absorbed on an empty stomach.

- Don't store food in lead crystal glassware or pottery with a lead-based glaze. Beware of imported foods in cans with lead soldering.
- Seal cracks in the ceilings of older homes, especially if near a point source of lead, as they may allow dust to fall into the house.
- \Vet dust floors, ledges, window sills and other flat surfaces at least weekly, or more often if the house is near a point source of lead. A phosphate containing cleaning solution is most effective.
- Vacuum carpets and rugs regularly using a vacuum cleaner with an effective filter and agitator.
- Ensure that the child does not have access to peeling paint or chewable surfaces painted with lead-based paint. Particular attention should be paid to cots, window sills and windows.
- Wash children's toys (especially those used outside) and dummies frequently.
- Wash family pets frequently - particularly if furry. Discourage pets from sleeping on children's beds.

Special care needs to be taken with home renovations. Seek advice about controlling leaded paint flakes and dust if renovating older houses (built before 1970). Pregnant women and children under five should not be present in a house while renovation involving lead-based paint is taking place.

A leaflet containing these tips has been produced for parents and is available from the Commonwealth Environment Protection Agency. If you would like additional copies of the leaflet for patients, please phone 008 803 772.

Clinical and environmental assessment

Clinical assessment

A standardised protocol has been developed for the guidance of clinicians (see page 21). This outlines recommended management for children who are found to have elevated blood lead levels.

Whilst the NHMRC has recommended that a response is required for any individual child with a blood lead above 0.72 µmol/L (15 µg/dL), retesting of children aged less than three years whose blood lead is between 0.48 and 0.72 µmol/L (10-15 µg/dL) in a year's time may be warranted if there are any continuing concerns about behaviour or development.

Clinical assessment by a pediatrician should be carried out for any child with a level greater than 1.20 µmol/L (25 µg/dL), to check particularly for developmental delay, hearing deficits, speech problems or neurological abnormalities.

Treatment of iron deficiency, and other nutritional measures to combat deficiencies in calcium, zinc or ascorbate will help. to reduce uptake of lead.

Parents should be given information about the recommended course of action for their child.'

Environmental assessment

As there is no particularly successful treatment for reducing moderately raised blood lead levels (< 2.65 µmol/L or 55 µg/dL), preventing exposure is of paramount importance. In most cases, management of the child with an elevated blood lead level will involve discussing possible sources of lead in the child's environment with the parents (see above). Removal of the source of

exposure is the most important aspect of treatment.

Where lead levels are significantly elevated, environmental inspection and sampling may be warranted. In some circumstances, environmental abatement activities may be indicated.

State health departments may be able to assist with advice about identification of sources of exposure and their removal. (A contact list is provided at the back of this booklet).

Protocol for managing children found to have elevated blood lead levels

As a modification of the US Center for Disease Control's recommendations[6], and in keeping with the current NHMRG recommendations, the following guidelines arc recommended for follow-up of blood lead concentrations.

Children 9-36 months

No or low risk children Lead level < 0 .72 µmol/L (< 15 µg/dL)	No further action unless any concerns about developmental or behavioural factors - check level in one year
At risk children Lead level < 0.48 µmol/L (< 10 µg/dL)	Consider retest in one year if still at risk.
Lead level 0.48-0.67 µmol/L (10-14 µg/dL)	Retest in 3-4 months. If two consecutive tests 3-4 months apart show no increase, retest in one year.
Lead level 0.72 - 1.16 µmol/L (15-24 µg/dL)	Retest in 3-4 months. Assess iron status. Environmental evaluation and remediation if , /appropriate. Education re minimising exposure and absorption.

If significant risk factors are present (e.g. continuing exposure to old paint, renovations, or proximity to primary or secondary lead industry) retest sooner than three months.

If level > 15 µg/dL on two consecutive occasions consider an environmental evaluation.

If level drops on retesting, professional judgement to be used in deciding on frequency of further retesting, using above guidelines.

Lead level
2.0-2.61 µmol/L (25-54 µg/dL)

Refer for paediatric assessment which should include a neurodevelopmental, and behavioural assessment.

Retest in 0.5-3 months (depending on age of child and level).

Environmental assessment and sampling if
source of lead is not obvious, and remediation where appropriate.

Education re minimising exposure and absorption.

Lead level
2.66-3.33 µmol/L (55-69 µg/dL)

Refer for urgent paediatric assessment for evaluation of need for chelation therapy.

If overtly symptomatic admit for chelation immediately.

Environmental assessment and abatement if appropriate before return home.

Education re minimising exposure and absorption.

Lead level
>3.38 µmol/L (>70 µg/dL)

Refer to tertiary paediatric unit (where possible) for immediate chelation.

Environmental assessment and abatement if appropriate before return home.

Education re minimising exposure and
absorption.

Children > 36 months

No or low risk children

Lead level	
<0.72 µmol/L (<15 µg/dL)	No need to retest.
Lead level	
>0.72 µmol/L (>15 µg/dL)	Manage as for younger children.

High risk children

Lead level	
< 0.72 µmol/L (< 15 µg/dL)	Retest annually to fifth birthday.
Lead level	
>0.72 µmol/L (>15 µg/dL)	Manage as for younger children.

Note

Where it is known or suspected that children have ingested paint flakes or have swallowed lead objects, an X-ray of the abdomen should be obtained. If there is evidence of significant lead paint in the intestine, a cathartic and possibly activated charcoal should he considered (although its value has not been proven). Other lead objects should be dealt with according to the individual case.

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Further reading

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Lead Toxicity: Current Concerns by Robert A. Goyer in *Environmental Health Perspectives* v. 100, April 1993, pp 177-187.

Community prevalence survey of children's blood lead levels and environmental lead contamination in inner Sydney, Michael J. Fett, Michael Mira, Jason Smith, Garth Alperstein, Jane Causer, Tim Brokenshire, Brian Gulson and Santo Cannata in *Medical Journal of Australia* v. 157 (7), October 1992, pp 441-445.

Information for Paediatricians

A paper entitled *Reducing Blood Lead Levels in Australian Children* has been prepared by authors, Dr Garth Alperstein and Professor Graham Vimpani. This will be distributed to all members of the Australian College of Paediatrics. Further copies are available from the Australian College of Paediatrics, PO Box 30, Parkville, Victoria, 3052.

Appendix one

Lead in Australians

Summary statement of the 115th session of the National Health and Medical Research Council, 2 June 1993, regarding revision of the 1987 (103rd session) guidelines for Lead in Australians.

The National Health and Medical Research Council (NHMRC) emphasises its continuing concern over human exposure to lead, especially exposure in young children. It re-iterates its 1987 position that there are no benefits of human exposure to lead and that all demonstrated effects of such exposure are adverse,

Council strongly endorses the coordinated national approach to timely reduction and accelerated elimination of lead in petrol, as proposed by the Australian and New Zealand Environment Council and other relevant Commonwealth, State and Territory agencies. This approach will ensure timely reduction in the lead exposures of the community to achieve the NHMRC goal recommended below.

Recommendations

Goal

That a specific goal be set:

- **to achieve for all Australians a blood lead level of below ten micrograms per decilitre (0.48 micromoles per litre);**
- **there is particular urgency in reaching this level in children aged one to four years because of the adverse effects of lead exposure on intellectual development.**

Target

That achievement of this goal be facilitated through the establishment of a target date to be set by Council at its 116th Session (November 1993), after the Public Health Committee has considered relevant information which includes the Royal Melbourne Institute of Technology (RMIT) Report 'Revising Australian Guidelines for Lead — An Assessment of Impacts' (Final report).

Strategy

That to achieve this goal, an immediate national education and environmental management strategy be developed.

The strategy should specifically address:

- **the accelerated reduction of lead in petrol;**
- **increased use of unleaded petrol;**
- **provision of information on safe removal of lead based paint; and**
- **risks from home renovations.**

Public Information

That, as an immediate general measure, public information programs be put in place to ensure that health professionals and the community are fully aware of:

- **the sources of lead in the environment;**
- **the health risks associated with elevated blood lead, particularly in children; and**
- **the means of controlling exposure.**

In particular, in developing specific strategies, account should be taken of the recommendations being developed in the RMIT report.

Graduated responses to blood lead levels

That there should be a range of graduated responses to blood lead level measurements, as the concept adopted in 1987 of setting a 'level of concern[1] is no longer an appropriate way of dealing with this complex issue:

* in the case of communities where representative surveys show more than five percent of one to four year old children in the community having blood lead levels above fifteen micrograms per decilitre (0.72 micromoles per litre)
  - public health action should be taken through a program of graduated responses as detailed in the table of action guidelines;
- In relation to individual children (all ages)
  - there should be a range of graduated responses depending on blood lead concentrations, commencing at fifteen micrograms per decilitre (0.72 micromoles per litre), as detailed in the table of action guidelines.

Table

Action guideline* for managing the health risks of environmental lead — recommended public health and individual management responses at various blood lead levels

Note: Representative surveys for lead are only called for in communities at higher risk as noted at 1 below.

Recommended responses in relation to communities where representative surveys [li2] of blood lead concentrations in children aged 1-4 years show:

- Investigate lead sources In the affected community;
- develop environmental management plans with effective strategies for community involvement in design and implementation;

>95% below 29 µg/dL (1.20 µmol/L)
but >5% above13 µg/dL (0.72 µmol/L)

- plan to
  - particularly target sub-populations in the community showing blood lead levels above 15 µg/dL (0.72 µmol/L);
  - Include specifically prepared community education programs;
  - set a time-frame for on-going re-assessment of community blood levels.

Recommended responses in relation to individual children (all ages) with a

15-24 µg/dL
(0.72 - 1.16 µmol/L)

- undertake personal exposure evaluation and source re mediation/abatement;
- provide personal education and counselling on exposure control for guardian(s) and child, as indicated;
- repeat test, as appropriate in Individual circumstances to assess effectiveness of actions taken.

>*5%* above 25 µg/dL
(1.2 µmol/L)

- investigate and make plans as above, but on a more intensive and broader community basis;
- Consider earlier re-assessment of community blood lead levels.

>=25 µg/dL
(1.20 µmol/L)

- obtain a, detailed medical history and examination with particular focus on possible adverse effects based on exposure history and blood lead level;
- undertake personal exposure evaluation including environmental sampling as indicated;
- arrange remedial ion /abatement of exposure source;
- provide personal education and counselling on exposure control for guardian(s) and child, as indicated. If exposure control not possible, consider relocation;
- Re-test in about 3 months to assess the effectiveness of actions taken.

>=55 µg/dL (2.65 µmol/L)

- respond as detailed above for >25µg/dL (1.20µmol/L);
- undertake urgent clinical assessment regarding immediate medical management.

Footnotes.

1. The need for and extent (e.g. age range, geographic area) of community surveys should be assessed by health authorities on the basis of known risks factors for lead exposure.
2. In community based surveys, protocols for the follow-up of children Identified as requiring individual management should be established

Surveys

That the responses be supported by a survey of sample populations to:

- determine the extent and intensity of environmental management required to achieve the goal in the general population;
- identify the severity of the problem among communities at heightened risk of harmful lead exposure; and
- assess progress in achieving the goal.

Government action

That these recommendations be brought to the immediate attention of Commonwealth, State and Territory Departments of Health, Environment, Energy and Education for the development of appropriate programs, to ensure ongoing reduction in environmental sources of lead so that human blood lead levels in Australia will be as low as is reasonably achievable.

Considerations of Council

In making the above recommendations Council considered the conclusions from recent national and international scientific health evaluations of exposure to lead. Of particular relevance was the accruing evidence from studies conducted both in Australia and overseas indicating a dose related decrement in intellectual development in young children aged up to four years. These studies, while noting that some uncertainty persists, indicate that adverse health effects are associated with blood lead levels greater than ten to fifteen micrograms per decilitre (0.48 to 0.72 micromoles per litre).

Council noted that while children older than four years can lose up to five points in IQ (on a scale with a standard deviation of fifteen) if they have a blood lead level averaging ten micro grams per decilitre (0.48 micromoles per litre) over a sustained period, the most likely effect on them is a loss of between one and three IQ points.

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