



The LEAD Group Inc. aims to create a lead-safe Australia and New Zealand by 2031 and a lead-safe world by 2041, and to protect the environment from lead.



Model National Public Health Policy on the Prevention of Lead Exposure and Lead Poisoning

An Outline Proposal

By Elizabeth O'Brien, Lucinda Curran and Anne Roberts, The LEAD Group Inc., Australia

Introduction

This outline policy is aimed at the Health Ministers of national governments.

The proposals for policy are numbered and in bold type.

0.1 Determine and allocate responsibility for prevention of lead exposure and lead poisoning

Prevention of lead exposure and poisoning is commonly divided, in health literature, as consisting of Primary, Secondary and Tertiary Prevention.

Primary Prevention is the responsibility of national governments, and possibly international government bodies, in some cases. It is concerned with preventing lead poisoning occurring in the first place.

Secondary Prevention is more diversified, in that it is not necessarily possible to designate, in advance, whose responsibility it is. Secondary Prevention is concerned with individuals, and is about removing the individual from the source of lead exposure, or removing the source from the individual. A typical example of the former would be a person changing their occupation or place of residence in order to stop being exposed to lead. An example of the latter would be removal of lead contaminated soil, from a backyard.

Tertiary Prevention is concerned with preventing the lead already in a person's body from doing further harm. Responsibility for this is also diversified, from the individual seeking to counter the effects of lead poisoning through diet or treatment, to governments sponsoring long-term studies of the effects of certain treatment protocols.

There must be strategies for carrying out or encouraging all three forms of prevention. These strategies need to be tailored to the specific circumstances of the particular country, but public awareness campaigns as to the health effects of lead, possible sources of exposure, and what can be done, are essential.



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0.2 Carry out a national survey of blood lead levels (in all age groups) within 6 months of Health Minister endorsing the Prevention of Lead Poisoning Policy

The first step in implementing a national policy for preventing lead poisoning in a population is to do a national blood lead level survey of all ages. It is not a question of doing a survey to find out if anyone in the population of a particular country has lead in their blood. Exposure to lead in some form or another is genuinely universal. Hence, for the well-being of its population, every country needs a health policy for the prevention of lead poisoning. A national blood lead level survey is needed in order to develop specific strategies.

Participants in the blood lead level survey will need to complete (or have their parents complete) a lead risk factor questionnaire and a general health questionnaire that specifically includes incidence of lead-related health outcomes in the person (and their family health history), such as hypertension, stroke, heart attack, heart disease, cataracts, hearing loss, dementia, Alzheimer's Disease, Parkinson's Disease, joint pain, tooth decay, osteoporosis, balance problems, renal problems, loss of libido, reduced sperm count, miscarriage, lower than average IQ, behavioural problems, ADHD and ADD, delinquency, criminal behaviour.

The lead risk factor questionnaire would include –

- **For children and adults:** year of construction and description of home (including condition of paint and presence of lead lighting), presence during or following renovation/s, home in a leaded community (such as inner city, lead mining or smelting town, and proximity to a general aviation airport), use of Ayurvedic medicine, whether anyone smokes in the house, consumption of backyard chicken eggs, tank water, or water from a new tap installed in the previous three years, whether anyone living in the house has occupational and/or hobby exposure to lead, or is a shooter, pica, if the home is carpeted, gender, date of birth (in preparation for being resurveyed)
- **For children:** chewing or mouthing of potentially leaded items (such as painted toys, jewellery), year of construction of any other building/s where the child spends a significant amount of time and the renovation history of the building
- **For adults:** consumption of alcohol and/or cigarettes, pregnant or breastfeeding, perimenopausal or menopausal, occupational and/or hobby exposure to lead, have been tattooed

This health history combined with data collection about lead exposure risk factors will enable the results to be immediately useful across a variety of research areas.

A national blood lead level survey should also include testing for levels of iron, zinc and iodine, as these “nutritional” elements have a connection with lead and its effects: low levels of iron and zinc in the blood increase the rate of uptake of lead, and iron and iodine deficiency can be mistaken for one of the effects of lead poisoning – problems with brain development.

Because of the impacts of both lead exposure and COVID-19 infection/s on heart health, a national blood lead level survey should include any incidence of COVID in the person and parameters of heart health in order to determine whether there is a relationship whereby people who have a higher blood lead level are more likely to die from heart attack or stroke following COVID-19 infection/s.



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Steps in Primary Prevention of Lead Exposure

1.1 Use the results of the national blood lead level survey to identify persons/groups at risk of elevated blood lead levels

1.2 Identify sources and pathways by which lead poisoning has occurred

A national blood lead level survey will identify individuals with elevated blood lead levels. Analysis of the results will identify who, in general, is at risk of high blood lead levels.

Known risk factors include age, where the person lives, their gender, occupation and place of work or where they go to school, mouthing behaviour and leisure activity (e.g. fishing, shooting), certain food or water sources, and frequent contact with specific consumer products.

The survey will help identify sources and pathways by which lead poisoning has occurred.

“Isotopic fingerprinting” – an expensive process – should be used to identify the mine source of lead (and thus indicate the sources and pathways) in those with elevated blood lead levels, that is above 3.5 micrograms per decilitre ($\mu\text{g}/\text{dL}$).

It is important to note that sources and pathways are not the same for every country, so the results of one country’s national survey cannot be applied automatically to another country. For example, paint and petrol have been identified as the major source of lead poisoning of children and adults respectively in the United States whereas a national survey may reveal that air pollution, use of Ayurvedic medicine and/or use of human sewage as fertiliser on food crops are the major sources of lead poisoning of all ages in any country with such practices.

1.3 Set a national goal, to be reviewed within a definite timeframe, applicable to everyone, including workers, for reduction of blood lead levels

At this point it is necessary to define the goal, above which a blood lead level is considered to be “elevated” and below which a blood lead level is considered to be “acceptable.”

What is considered to be an elevated blood lead level is NOT fixed. Initially, below 80 $\mu\text{g}/\text{dL}$ was the “acceptable level” and was progressively reduced (to 60, 50, 40, 25, 10, 5 and most recently 3.5 $\mu\text{g}/\text{dL}$) in the light of research revealing connections between blood lead levels and serious health risks.

Currently, the widely used goal is a blood lead level no greater than 3.5 $\mu\text{g}/\text{dL}$, based on US policy which determined that 95% of young children in the US had a blood lead level below 3.5 $\mu\text{g}/\text{dL}$.

As a result of research carried out by members of The LEAD Group’s Technical Advisory Board and others (including Professor Bruce Lanphear), many researchers now recommend no greater than 1 $\mu\text{g}/\text{dL}$ of blood as the goal.

*Because research into the health effects of lead has demonstrated over many decades that the “acceptable” level will always need to be lowered further on the basis of health effects, it is vital to **acknowledge** that the blood lead level goal set by any government will be chosen on political and economic grounds. On health grounds alone, the ONLY safe level of lead is zero and zero should be the final goal.*



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It is a political absurdity to set the level very low in a country which has no hope of achieving it, especially if it still permits the use of Ayurvedic medicines containing metal bhasmas, leaded AvGas for general aviation aircraft, the use of human sewage on food crops, etcetera - and tragically irresponsible to set the level very high.

1.4 Determine staged reduction of target levels

A target is a blood lead level to be achieved by the entire population by a certain date. The final target in a policy will be the goal level.

For example, The LEAD Group would like Australian and New Zealand governments to consider political and economic factors in order to determine staged reduction of the target levels set out below:

- below 10 µg/dL by 2025,
- 5 µg/dL by 2028, and
- below 1 µg/dL by 2031.

Each country's government will have to decide on what is politically and economically viable, but stepped targets will enable the development of specific strategies so that the goal can be achieved over a set timeframe.

Any province, state or other level of government (which for instance is dependent on the income of a large lead facility) within the country, can set its own target levels, as long as the economic and political factors for choosing the targets are **acknowledged**.

1.5 Define success in achieving a particular target as being no incidence of blood lead level exceeding the target level by the target date, as revealed by follow-up national surveys

By setting a target, a country has something by which to measure its progress in reducing the incidence of lead poisoning in its population, but actual measurement via blood lead monitoring is vital for re-evaluating the strategies needed to meet the targets.

1.6 Ensure ongoing blood lead monitoring in at-risk groups

Lead education campaigns and occupational health and safety regulations need to ensure that every potentially lead-exposed person is blood lead tested prior to the lead exposure and regularly re-tested if lead exposure has not been controlled. Leaded communities need to be a priority in these campaigns.

Regulations need to be created in countries outside of the United States to ensure that renters and home buyers are advised of potential lead hazards prior to moving into a property and that blood lead testing of children is warranted prior to occupancy.

Blood lead tests should be requested (including for children) whenever a person is about to renovate leaded paint or demolish any part of an old building, and again, after the work has been completed, in order to determine that no further clean-up is required.



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1.7 Having identified persons/groups at risk, and sources and pathways by which lead poisoning has occurred, introduce regulations to prevent poisoning occurring in the first place, so that each target can be met

This is Primary Lead Exposure Prevention and is the responsibility of national governments, but may, by international treaty, become an international issue.

An example is countries wanting to join the European Union or receive World Bank infrastructure funding have been required to phase out leaded petrol for on-road vehicles.

Examples of national Primary Lead Exposure Prevention measures include:

- Banning the addition of lead to ammunition, aviation fuel or plumbing materials,
- Banning the use of leaded ingredients such as metal bhasmas in Ayurvedic medicine,
- Severely limiting the acceptable contaminant level of lead in certain products, as in paints including anticorrosive and marine paints, and
- Reducing exposure to lead in certain processes or activities, such as paint or demolition management

Lead, however, is found in many existing products and by-products, including, for example, leaded paint, motor vehicles, lead-acid batteries and used ammunition.

Primary Lead Exposure Prevention policies should include requiring the removal of leaded paint that is already on surfaces in all government-controlled facilities for children, as well as restricting lead in newly produced or imported coatings or painted products, e.g. building components and mirrors.

It is the responsibility of national governments (or international) to ban or reduce the use of lead in all paint, and national or state government to require the addition of health warnings on tools which are available for general purchase in hardware stores, such as sanders and heat guns, as to the need to test paint for lead as well as safe temperatures for removal of paint containing lead.

Each country's government will have to decide what reduced level of lead in the product or process is necessary to achieve the blood lead level target it has set.

This will need a re-think of ways of doing things, including by people actually involved in producing the product or carrying out the process. It will not necessarily require hi-tech research.

Industry will always claim it is too expensive to make any changes. This may or may not be an impediment to change, depending on the nature of the country's system of government. Autocratic governments will have less difficulty in imposing standards, but, unfortunately, may have less incentive to do so, if concern for their people's welfare is not as high as the desire for economic growth.

1.8 Set standards for the certification of tradespeople involved in the removal of lead hazards

It is the responsibility of government to determine standards for the certification of persons trained in the safe removal of contaminated ceiling dust, paint containing lead, or lead contaminated soil, etcetera.



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1.9 Develop strategies to increase public awareness of the dangers of lead and inform relevant professionals of appropriate prevention actions

1.10 Do follow-up national surveys to see if the target was met and to motivate and inform increased development or implementation of strategies to achieve the next target

Steps in Secondary Prevention of Lead Exposure

Responsibility for identifying individuals who need Secondary Lead Exposure Prevention is broad – it includes anyone who might suggest a blood lead test for an individual, with priority being given to referring children for blood lead testing.

For example:

- A teacher or learning intervention professional who notice behaviour associated (not necessarily exclusively) with high blood lead levels, such as hearing loss, poor handwriting, poor coordination, delinquency, learning difficulties, ADD or ADHD
- A doctor or other health professional who finds out through questionnaires and/or detailed case history that identifies a patient is at risk of lead exposure or is presenting with lead-related symptoms (see above) or exhibiting lead-related learning behaviours or difficulties, or is the playmate or sibling of a child with an elevated blood lead level; or who is trying to conceive, pregnant, breastfeeding, menopausal or perimenopausal
- A vet who recognises a likely lead exposure in a pet or backyard poultry and advises the family to test the blood lead levels of their children
- A lead advisor or site assessor who recommends blood lead testing on the basis of elevated lead levels in soil, dust, degraded paint, drinking water, backyard eggs, Ayurvedic medicines, or any other lead source

Government's role in Secondary Lead Exposure Prevention, at any level (national, state, local), consists of creating appropriate legislation for intervention to prevent further lead exposure to the affected individuals, and raising awareness through information programs directed at teachers, doctors and health professionals, vets, employers in industries where lead exposure is probable or possible, and so on.

For example, government funded laboratory lead testing of soil, dust, paint, water, backyard eggs, Ayurvedic medicines, and interest-free grants or other financial support aimed at identifying and safely addressing sources and pathways of lead exposure, and reducing the blood lead levels of those individuals, particularly in lead-smelter and mining towns, in public housing, Indigenous communities, and poorer rural or inner-city areas. Although some individuals will be able to afford laboratory testing of environmental samples themselves, in terms of social equity, testing and abatement costs need to be covered for those who are unable to meet these financial demands.



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2.1 Identify persons at risk, using known risk factors, and set intervention levels to prevent further lead exposure. The intervention blood lead level should be identical with the country's current target blood lead level and should apply universally, including for workers

The intervention blood lead level is the level at which the government will intervene, or create regulations which require others (e.g., employers, or state or provincial agencies) to intervene, to bring down an individual's blood lead level.

Secondary Lead Exposure Prevention deals with people at an individual level. It is about identifying - from either a national blood lead level survey, or other blood lead level research, or individual blood lead level testing - groups of persons likely to be at risk of elevated blood lead levels, and encouraging individuals who fit into such groups to have a blood lead level test.

Secondary Lead Exposure Prevention is mainly aimed at identifying people with a blood lead level above the target level, and stopping further lead exposure by identifying what in the individual's environment is the probable source/s of the person's current exposure to lead, and removing or safely abating the source/s until the blood lead level falls below the target level.

Having determined that the person has an elevated blood lead level, secondary prevention is about preventing further exposure, by either removing the source of the lead from the person's environment, or removing the person from contact with the source of the lead, and by nutritional intervention designed to decrease the rate of absorption of any lead encountered in future.

The information (in educational materials) given by a health department or given by a health professional in an effort to determine or test for lead sources in the individual's environment needs to be specific to the country and indeed the region as local sources can impact hugely on case management. Some of these local sources include:

- Lead, zinc, tin, silver, and gold mines and smelters
- Lead manufacturing plants
- Lead-acid battery and/or vehicle recycling plants
- Incinerators
- Crematoria
- General aviation airports (while leaded AvGas remains in use)

Any adult, including workers, with a blood lead level above the national target level should be eligible for source and pathway identification and nutritional and other interventions using the Hierarchy of Control of occupational exposures, in order to prevent further lead exposure. Looking at the recent research into health effects, there is no longer any justification for accepting a higher blood lead level in an adult than in a child.

A good Secondary Lead Exposure Prevention strategy would prioritise those people with the highest blood lead levels.



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2.2 Re-educate lead-workers, employers and health professionals as to new blood lead target and intervention levels

It is important to **acknowledge** that, if, in current regulations, a certain class of people, such as workers, are permitted to exceed the national target blood lead level, that this was a political and economic decision made in the past, not a health-based decision.

The decision to not include adults in public health policy on lead poisoning prevention was a common mistake of past programs based on inadequate information about health effects of lead exposure in adults.

Many employers and health professionals will need to be re-educated if they've always been taught that 20 or 30 or 50 µg/dL is the appropriate intervention level for workers or that an elevated blood lead level above the national target level is only of concern in a young child.

Many doctors are reliant on statements provided by laboratories on the pathology report of blood lead levels when interpreting the results to the patient, rather than to continuing medical education.

In Australia and New Zealand, at this point in time, what is reported is the result and a range, e.g., 3.5 µg/dL (0-5 µg/dL). Unlike other pathology parameters, such as iron or cholesterol, where the range provided on the report is actually the healthy range, **there is no healthy range for blood lead levels**. Yet, many patients receive the message from their doctor that their blood lead level is “normal” or “average” when it is below the “action blood lead level” or “notifiable blood lead level”, for instance, in Australia of 5 µg/dL.

It has always been wrong to report blood lead levels together with a range that can be misinterpreted as being healthy, average or acceptable. Blood lead levels should only be reported by pathology laboratories in such a way that they can be compared to the recommended levels and action levels.

Using the statements on this laboratory report well becomes the challenge for good public health policy.

The following are example statements that could be included on a report.

The only safe level of lead in the blood is zero.

This laboratory has a limit of detection of 0.2 µg/dL.

The national target blood lead level is to be below 3.5 µg/dL.

The national notifiable blood lead level where the government recommends that action be taken is above 5 µg/dL.

Also noting, that in most countries, the average blood lead level is unknown, which will remain the case until national blood lead surveys are conducted. Once averages are known by age range, pathology reports should include the average relevant to the age range of the patient.

Governments also have a role in requiring pathology laboratories to continually upgrade their equipment if the limit of detection of blood lead results is higher than, say, half the average blood lead result as determined by the national survey.

For example, blood lead levels in all age groups in the United States currently average <1 µg/dL, yet numerous Australian laboratories have a limit of detection of 2.1 µg/dL resulting in most patients being told that they have non-detectable lead in their blood, when they could in fact have more than twice the US average.



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2.3 Ensure ongoing blood lead monitoring to achieve Secondary Lead Exposure Prevention

When the first blood lead result is above the target blood lead level, ongoing blood lead monitoring is essential following the initial identification of lead sources and pathways and nutritional intervention for the individual, particularly in lead-smelter and mining towns, in public housing, Indigenous communities, and poorer rural or inner-city areas.

Lead workers and hobbyists such as leadlighters, ceramicists, ammunition-makers, sinker-makers, shooters, jewellers etc should be regularly informed of the need for ongoing blood lead monitoring and the available assistance should they return an elevated blood lead level.

Any child who presents with pica, possible autism, ADD, ADHD, learning or development problems, or criminal behaviour/delinquency should be monitored for blood lead and iron levels, have their environment tested and nutrition assessed and retested for blood lead following abatement measures.

All blood lead results above the target level should be followed up until re-testing determines that the blood lead level has fallen below the target.

Steps in Tertiary Prevention of Lead Poisoning

Tertiary Prevention of Lead Poisoning is concerned with preventing the lead which is already in a person's body from causing further harm.

Aside from the Secondary Lead Exposure Prevention measures noted above, very high blood levels may require treatment of the individual at the time of the lead exposure and it is likely that treatment and nutritional intervention is beneficial at any time later in life, even after lead exposure has been eliminated.

The health impacts linked to elevated blood lead levels or the combination of elevated blood lead levels and other factors such as COVID-19 infection, will continue to expand as further research is conducted.

3.1 Carry out further research to discover if there are links between elevated blood lead levels at any age and the development of certain adverse health effects in later life

For example, it is possible that development of schizophrenia, depression, Alzheimer's disease and other diseases associated with aging are linked to exposure to lead either in utero or later in life.

Discovery of such links would be a step in reducing or eliminating a source of great suffering and misery. Such research would require government or philanthropic funding and could be followed by the next step.



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3.2 Carry out or request the carrying out of research to test whether certain intervention protocols succeed in reducing the risk of development of associated adverse health effects

Longitudinal controlled studies are needed to determine whether, once further lead exposure has been prevented by source identification and removal, a particular combination of nutritional intervention and chelation therapy or other treatment, will avert anticipated adverse health outcomes.

Research is needed on whether treatment or other interventions prevent any of the associated adverse effects that are linked with lead, including: infertility and sub-fertility, sub-optimal foetal and childhood development, and hypertension (causing stroke or heart attack), in later life, of persons with an elevated blood lead level.

For example, a longitudinal controlled study could determine whether persons with known elevated blood lead levels, where cohorts undergo one of a variety of combinations of nutritional intervention and treatment, improve their morbidity and mortality, compared to controls who receive no nutritional intervention or treatment.

A country that is unable to do its own research, should request such research be carried out by the World Health Organisation or funded by philanthropic organisations or other countries.

3.3 Require independent research of detoxification claims and constantly inform health professionals and the public of research findings

The manufacturers of any treatment which claims to detoxify the body by any means (e.g., sauna, foot pads, supplements, exercise plus liquid-only diets, liver cleanse, colloidal silver, Epsom salts, zeolite, mega-dose vitamin C or other chelating agents traditionally utilised in cases of extremely elevated blood lead levels) should be required by government to fund independent research into the veracity of their detoxification claims including the treatments' ability to both reduce blood lead levels and reduce adverse health impacts of lead poisoning.

It is only when health professionals and the public are constantly informed of the results of such research that they can adequately manage the lead already in patients in a way that minimises the future adverse health effects and does no harm, while utilising tertiary prevention methods that have been proven to work.