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LEAD ISSUES

This issue of the *NSW Public Health Bulletin* focuses on lead.

- It contains two articles reporting investigations of lead exposure in primary school environments.
- On page 126 is the first in a new series of occasional reports giving a roundup of recent or current public health action being carried out by the NSW Public Health Network to assess or deal with specific problems. This month's Public Health Network Report is on lead. Readers' comments on the Network Report would be welcomed.
- The following is an invited commentary on the status of the lead problem in NSW, written by Garth Alperstein, Area Community Paediatrician, Central Sydney Area Health Service.

– Editor

LEAD – WHERE ARE WE NOW, AND WHERE TO FROM HERE?

Garth Alperstein
Area Community Paediatrician
Central Sydney Area Health Service

Over the past decade in Australia there has been a resurgence of interest in environmental lead contamination and lead exposure of children. This has resulted in several major initiatives which are having significant effects in reducing children's exposure. Perhaps the most important initiative was the introduction of unleaded petrol in Australia in 1986. About 55 per cent of vehicles use unleaded petrol, and recently the amount of lead in leaded petrol has been decreased.

In the past most research has focused on communities exposed to high levels of lead contamination from point sources such as smelters or mining operations. However, over the past five years the attention of researchers has begun to turn to the lead burden in large urban centres and its possible effects on children.

In June 1993 the National Health and Medical Research Council (NHMRC) revised its guidelines on Lead in Australians[1]. The NHMRC recommended that a goal be set to achieve a blood lead level below 0.48 µmol/l (10 µg/dl) for all Australians, particularly targeting the 1-4 year age group because of the adverse effects of lead exposure on intellectual development of young children. The strategy to achieve this goal included sample surveys of populations at increased risk of harmful lead exposure, and associated environmental surveys. The NHMRC also developed protocols for public health and individual management responses appropriate for various blood lead levels.

In November 1994 the NSW Government endorsed the NSW Lead Management Action Plan developed by the Interdepartmental Lead

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Correspondence

Please address all correspondence and potential contributions to:

The Editor,
NSW Public Health Bulletin,
Public Health Division,
NSW Health Department
Locked Bag No 961,
North Sydney NSW 2059
Telephone: (02) 391 9191
Facsimile: (02) 391 9029

Lead – where are we now?

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Taskforce[2]. This plan dealt comprehensively with the lead issue. Its recommendations accorded with those of the NHMRC for lead exposure of children and other high risk groups.

This issue of the *Bulletin* contains two articles reporting investigations of lead exposure in primary school environments (pages 121 and 124). Two very different instances of possible environmental lead contamination were investigated, and their relationship with children's blood lead levels was explored. Both reports have important implications for public health responses, research and policies in relation to lead exposure.

Other than studies of children living near point sources of lead (such as those at Broken Hill, Port Pirie and Boolaroo, near Newcastle), a limited number of surveys has targeted groups at increased risk of lead exposure. These groups include children aged 1-4 years living in, or frequently visiting, environments with the potential for high levels of lead exposure. These sources of exposure include houses built before the 1970s and painted with leaded paint (particularly houses being renovated, or having peeling, powdering of chalking paint); living on major roadways; and hobbies involving the handling of lead. The five published studies carried out in urban areas of Australia over the past decade provide some information on blood lead levels among children[3-7]. However, most have biases in sampling techniques and/or design, limiting the accuracy with which they characterise the distribution of blood lead levels in preschool children and identify target groups.

The investigation by Aldrich et al, reported on page 121 of this issue, was conducted as a public health response to a request from a school following concern by parents and teachers about lead exposure of children resulting from the construction of a four-lane motorway behind the school. In view of the public attention the lead issue has received over the past five years or so, the concern of the parents and school personnel was understandable. However, by many criteria, these children would be considered to have been at very low risk. Protective factors included the following:

- The children were older than the age at which hand-mouth behaviour frequently occurs.
- Physical barriers had been constructed to reduce noise pollution.
- Trees along the road also provided a physical barrier.
- The school grounds were some distance from the road.
- As a result of the local topography, the road was some metres below the level of the school.
- Although the estimates for the number of vehicles that would use the motorway were not available when the concerns were raised, it was unlikely that traffic would exceed 30,000 vehicles a day, and around 55 per cent of cars now use unleaded petrol.
- Research among preschool children in Eastern Sydney indicates that the blood lead level rises 0.05 µmol/l (1µg/dl) for every 10,000 vehicles a day, similar to results from overseas studies (personal communication: Dr Stephen Corbett, NSW Health Department, October 1995); the effect on school children is likely to be even less.

This survey highlights the problem where community concern demands a public health response, but the community's perception of risk does not have a scientific basis. The community's concern is understandable on the basis of mass media portrayals of the lead issue. However, the resources used to allay this concern could be used more constructively to survey a preschool population of children at risk of exposure from:

- Leaded paint; or
- Living near to a lead smelter.
- Close proximity to a roadway travelled by at least 30,000 cars a day; or
- Pica (repetitive ingestion of non-food substances) in high lead environments.

Further debate between the community, the public health system and the media is needed to moderate inaccurate perceptions of risk associated with lead exposure, promote an understanding of the risk and evolve appropriate forms of communication about it.

The report by Bawden-Smith et al (see page 124) provokes the question, how many children with aggressive or destructive behaviours or with "difficult temperaments" have, or have had, elevated blood lead levels, especially in the presence of pica? The article refers to an autistic child who required chelation. The child had exhibited aggressive and often violent behaviour for at least 18 months. The child's mother (and presumably also their doctor) had assumed this behaviour was part of autism. After chelation, the mother commented on the subsidence of her child's aggression and on how easy the child had become to manage, in comparison with behaviour before chelation.

The article should also stimulate debate and the formulation of a policy on blood lead testing for children with behavioural problems and significant developmental delay who attend special schools, and on environmental assessment of such schools. Because blood testing of these children can often be a difficult and traumatic experience, should all special schools be evaluated for lead contamination of paint and dirt? In response to the contamination discovered at the school assessed in the report, the NSW Health Department recommended to the Department of School Education that all Special Education schools be evaluated for lead contamination and remedied as appropriate.

The development of the Action Plan by the Interdepartmental Lead Taskforce was a significant step forward. The Taskforce recommended the establishment of a Lead Reference Centre within the Environmental Protection Agency to "co-ordinate the implementation of effective strategies by organisations identified in the Lead Management Action Plan which are aimed at reducing lead hazards, and to develop and implement the lead education strategies contained in the Lead Action Management Plan". Establishment of a functioning centre is a priority.

Finally, the two articles raise questions about directions for research. How much more research do we need on the contribution of lead in petrol to the environment, when this contribution will only decrease in the future? Leaded petrol will go away, but leaded paint which accounts for most of

ASSESSING THE IMPACT OF A NEW MOTORWAY ON CHILDREN'S BLOOD LEAD LEVELS

Rosemary Aldrich, Public Health Physician
Ruth Toneguzzi, Clinical Nurse Specialist
John Wlodarczyk, Medical Statistician
Michael J Hensley, Director
Newcastle Environmental Toxicology Research Unit
John Stephenson, Director
Hunter Public Health Unit

This article reports on surveys of blood lead levels in children attending a primary school adjacent to a new four-lane motorway. The surveys were carried out immediately after the motorway was opened in 1993, and again one year later.

It has been estimated that emissions from motor vehicles are responsible for the major part of Australian children's body burden of lead[1]. Other major sources of environmental lead exposure include point sources such as lead smelters, and deteriorating lead-based paint. The impact of leaded petrol on children has received increasing political, public and media attention in recent years and has been the subject of a federally-funded health promotion campaign[2]. International studies have detailed the contribution of heavy traffic to environmental lead and schoolchildren's blood lead levels[3,4].

The day before the four-lane M23 motorway opened on June 24, 1993, parents and teachers at a school in suburban Newcastle, NSW, raised concerns about possible environmental lead contamination from traffic using the motorway. The school principal asked the Newcastle Environmental Toxicology Research Unit (NETRU) to conduct a survey of children. The objectives were to measure baseline blood lead levels and to assess the impact of one year's traffic use of the motorway by repeating the blood lead testing in 1994. Estimates of the traffic volume on the motorway were not available.

NETRU and the Hunter Public Health Unit (HPHU) undertook to offer blood lead testing to the children at the school as a community service. However, the surveys also provided potential opportunities to examine dose-response relationships between traffic volumes and blood lead levels of children, thereby contributing to scientific understanding of the impact of lead exposure. Accordingly, information was collected on children's blood lead levels and on lead levels in soils and dusts.

METHOD

Initial survey

All children and teachers at the school were offered blood lead testing. The children's ages ranged from five to 13 years. Initial testing was carried out in July 1993, 10 school days after the motorway was opened. The test procedure was approved by the NSW Department of School Education, but the survey proposal was not submitted to a research ethics committee because the investigation was conducted as a matter of urgency. Children participated in the initial survey only with the written consent of their parents or legal guardians. Experienced blood collectors from the Hunter Area Pathology Service (HAPS) obtained samples by venipuncture over a three-day period, drawing sufficient

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the levels seen above 0.72 µmol/l (15 µg/dl) will not. There is a pressing need to obtain the baseline data specified in the NHMRC recommendations for the preschool population at high risk of lead exposure.

In summary, the articles highlight the need for clear policy regarding research and surveillance of blood lead levels among high risk exposure groups; policy regarding environmental evaluation, blood lead testing and abatement of lead contamination; and a commitment to action.

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5. Fett MJ, Mira M, Smith JB, Alperstein G, Causer J, Brokenshire T, Gulson B, Cannata S. Community prevalence survey of children's blood lead levels and environmental lead contamination in inner Sydney. *Med J Aust* 1992; 157:441-445.
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EDITOR'S COMMENTS

With regard to Dr Alperstein's recommendations:

- During 1995 the NSW Department of School Education carried out environmental sampling in five Special Education schools with buildings constructed before 1970 and which had recently undergone cyclic maintenance. One of the schools was found to have high lead levels in carpet dust and the carpet was replaced. No excessive lead levels were found in the other four schools.
- A Lead Reference Centre is being established in December 1995. It is a joint initiative of the NSW Environmental Protection Authority and the NSW Health Department, with other participating agencies. The Centre is at the Gladesville Hospital premises of the Health Department's Public Health Division.
- A national survey of blood lead levels in preschool-aged children was completed in June 1995. The survey was carried out under the auspices of the Australian Institute of Health and Welfare. Only preliminary results were available at the time of writing, and a full report had not been published.