

Philadelphia Combats "Silent Epidemic" in the Ghetto

lead poisoning control

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Childhood lead poisoning, frequently called the "silent epidemic," afflicting pre-school children of the urban ghetto has had a history in Philadelphia much like that of other large urban centers. It threatens the health and development of children who live in the "lead belt" surrounding the inner city where high lead poisoning exists. Although fatal cases occur much more infrequently than heretofore, a substantial number of children sustain permanent brain damage and mental retardation.

The pediatric problem of lead poisoning began to receive attention in cities in the 1920's and 1930's, and in 1950, lead poisoning was made a reportable condition in Philadelphia. During the first few years relatively few cases were diagnosed and reported. From 1950 to 1955, a total of 53 cases, or an average of 8 cases annually, were reported. Fifteen (15) of the 53 cases or 28 percent were fatal. However, in 1956, the Accident Control Section of the Philadelphia Department of Public Health in the expansion of poison control activities investigated the 38 cases of lead poisoning that were reported in that year. Epidemiological investigations were conducted in all reported cases and aided in documenting the problem of lead poisoning in children.

In an attempt to create awareness of the problem in the community, a Lead

Poisoning Advisory Committee composed of medical, professional, trade and civic groups to assist the Health Department in the development of a comprehensive plan was established. Through those efforts, a greater awareness was created in the medical community and the number of reported cases climbed steadily, but the grossly inadequate and lacking laboratory facilities to aid in the diagnosis of lead poisoning was a serious handicap.

In 1961, the Electric Storage Battery Company of Philadelphia, ESB, Inc., offered to do up to 1,000 free blood and urine lead determinations as a public service. This service immensely aided diagnosis and stimulated reporting. As a result, 109 cases were reported in 1961 doubling the number of any previous year. Fatal cases reached a peak of 12 in 1959, which was also repeated in 1960 and 1962. ESB, Inc. has continued to provide this free public service and has done as many as 2,500 blood-lead determinations in a given year.

The increased diagnosis, reporting and investigation of cases enabled the Accident Control Section in the documentation of the problem and in planning a program designed to control lead poisoning in Philadelphia. In each case investigated, efforts were made to determine the source of lead in the environment. As in other cities, children who became lead poisoning victims had a condition known as pica, the compulsive habit of ingesting inedible substances, including paint chips and flakes, or chewing on painted sur-

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faces. Pica is believed to be a result of factors rooted deep in the psyche of the individual. The homes in which these victims lived were in the older parts of Philadelphia which surround the center city.

Most of these homes, which were built at least 100 years ago, were row homes which are characteristic of Philadelphia but now have been cut up into a number of small apartments and have many layers of paint on the interior surfaces. Paint samples from these homes were analyzed and most were found to contain large concentrations of lead. Practically all of the paint which was applied before 1940 contained large amounts of lead. Although most of the homes had peeling, flaking and falling paint with walls and woodwork in disrepair, in some homes paint was found intact but toothmarks on window sills and woodwork indicated the extent of the child's pica condition. In a few cases, the source of lead was not found. In rare instances, cases were traced to ingestion of pieces of soft metal toys or flashlight batteries, to the practice of burning old battery casings or painted lumber, the intentional inhalation of tetra-ethyl lead gasoline by adolescents or lead absorbed by drinking illegal whiskey distilled in automobile radiators by adults.

The need for legislation to control lead poisoning was cited by 1958, however, the community had to be sold on the need. As the documentation continued and the number of cases rose steadily, community leaders became aware of the problem, and the need for legislation became more acute. In the continuing study of cases, the accident control section attempted to achieve voluntary removal of lead paint from the environment of a lead poisoning victim by appealing to landlords and tenants, but compliance was achieved in only 31 percent of the cases. This data accentuated the need for legislation. In 1966, the Philadelphia city council passed an ordinance amending the Health Code which declared lead paint to be a health hazard and enabled the Board of Health

to promulgate regulations to implement the ordinance. Specifically, the ordinance and regulations require precautionary labeling of lead paint stored, sold or transferred in Philadelphia, prohibits the application of lead paint on toys, furniture and any interior surface of dwellings or facilities occupied or used by children, prohibits the transfer and delivery of toys or furniture on which lead paint appears from any premises where the presence of such is creating a health hazard to children.

Implementation of the ordinance and regulations have been carried on with existing personnel and without program re-direction until recently, when some re-direction has taken place so preventive efforts could be initiated. This includes investigation in all cases where a child has a blood-lead level greater than .04 mgm/100 gms of blood and the detection of children with pica or other symptoms suggestive of lead poisoning by visits made by Community Health Workers in other programs.

Up to 1970, implementation of the lead poisoning control program has been carried out on a decentralized basis utilizing sanitarians and public health nurses assigned to one of the 10 health districts. The administration of the program is conducted by the Accident Control Section. With limited resources through the years, we have conducted epidemiological investigations and the necessary follow-up inspections in enforcing regulations in all reported cases. In addition, we have examined the labels of lead paint sold in Philadelphia for conformance with labeling requirements.

A case of lead poisoning is reported to the Division of Epidemiology; however, the Accident Control Section may have already become aware of the case through a copy of the blood-lead analysis done by ESB, Inc., and a check-list from the physician indicating symptoms and other clinical criteria which are completed when the blood is drawn. Table I shows blood-lead results in reported cases and numbers of symptoms reported. Note that a number of cases which are asymptomatic are reported as

TABLE 1
Lead Poisoning in Philadelphia Children
Blood Lead Levels and Symptoms Noted by Attending Physicians
(1964-1968)

Lead Levels	Diagnosed Total Cases			Symptoms					
			Cum. Percent	None		One or More		Not Reported	
	No.	Percent		No.	Percent	No.	Percent	No.	Percent
Total	777		100	116	100	265	100	396	
0-.02	13	(2)	2	3	2	8	3	2	1
.03	30	(4)	6	7	6	14	5	9	2
.04	46	(6)	12	11	9	18	7	17	4
.05	107	(14)	26	23	20	54	20	30	8
.06	140	(18)	44	30	26	51	19	59	15
.07	105	(13)	57	17	15	(39)	15	49	12
.08	53	(7)	64	9	8	23	9	21	5
.09	32	(4)	68	4	3	15	6	13	3
.10	52	(7)	75	8	7	31	12	13	3
.20	07	(1)	76	0	0	3	1	4	1
.30	04	(1)	77	0	0	3	1	1	1
.40	06	(1)	78	2	2	2	1	2	1
Unknown	182	(24)	100	2	2	4	1	176	44

confirmed cases and also that some symptomatic cases have shown relatively low blood-lead levels. Symptomatic cases normally show a lead level of at least .06 mgm.

The official report is sent to the accident control section by the division of epidemiology which in turn notifies the environmental health supervisor and the nursing supervisor of the district where the victim resides. Visits to the home are made by both the sanitarians and the public health nurse. The object of each visit is different.

The sanitarian is chiefly interested in the source of the lead in the child's environment and conducts an epidemiological investigation including collecting a number of paint samples throughout the house. He may also take paint samples from another address such as a baby sitter's, the grandmother's or a previous address. Normally, the minimum number of samples taken include one from a window sill and one from a door or door frame from each room and any peeling or flaking paint which may exist. Samples of putty, painted plaster and painted wallpaper may also be taken. The number of samples taken from homes average between 20 and 25.

The nurse, on the other hand, is interested in the health care of the child, that the mother is keeping clinic appointments, the possibility of lead poisoning

in other siblings, supervision of the child and other health needs of the family.

When results of the paint analysis are received and samples indicate presence of lead in amounts of more than 1 percent, the environmental health supervisor will issue an order to the responsible party for removal of paint. In most cases, this will be the owner of the property. In some cases it could be the tenant if the tenant applied the paint or if furniture or toys are involved. Paint with more than 1 percent lead is regarded as hazardous by Standard Z66.1—1964 of the American Standards Association. The belief is that lead ingested in lesser amounts will be excreted and not stored by the body. In the investigation of cases during the five year period, 1964-1968, a total of 5,466 paint samples were analyzed of which 57 percent were positive as indicated in Table 2. Although there was no significant difference in the results from one room to another, woodwork samples were found to be hazardous with a much greater frequency (65-74 per cent) than samples from wall areas (17 per cent); and much more likely to be responsible for the intoxication because of easily accessible surfaces for chewing.

Along with the order for removal that is issued, a specification sheet giving instructions as to the extent of the removal is included. Areas to be removed are

TABLE II

Sampling of Paint from Sources of Home Environment of Lead Poisoning Victims (1964-1968)

Rooms	Total Surfaces Sampled			Door and Door Frames			Walls			Woodwork			Windows			Handrails and Spindles			Stair Steps			Other Surfaces			Fences		
	No.	Pos. Per-cent	No.	Pos. Per-cent	No.	Pos. Per-cent	No.	Pos. Per-cent	No.	Pos. Per-cent	No.	Pos. Per-cent	No.	Pos. Per-cent	No.	Pos. Per-cent	No.	Pos. Per-cent	No.	Pos. Per-cent	No.	Pos. Per-cent	No.	Pos. Per-cent			
Living Room	873	51	192	70	200	10	138	62	289	67	4	25	1	100	49	22	...	...	...	...	...	...	...	...	...		
Dining Room	341	53	116	75	95	6	40	68	73	74	...	...	...	100	16	37	...	...	...	...	...	...	...	...	...		
Kitchen	834	57	277	70	184	22	109	66	106	69	...	...	...	...	57	40	...	...	...	...	...	...	...	...	...		
Hallway	705	48	196	80	209	19	74	64	29	76	103	39	90	56	5	40	...	...	...	...	...	...	...	...	...		
Bedroom	1,374	59	491	80	317	15	165	68	574	75	1	100	...	...	126	25	...	...	...	...	...	...	...	...	...		
Bathroom	388	63	160	78	74	20	32	62	98	74	...	...	...	...	24	46	...	...	...	...	...	...	...	...	...		
Other Rooms	294	55	95	81	36	45	16	50	61	77	12	67	12	67	74	19	...	...	...	...	...	...	...	...	...		
Outer Premises	346	83	149	80	6	100	13	85	33	88	52	92	6	83	60	72	27	89	...	...	...	...	...	...	...		
Unknown	10	10	6	17	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		
Total Rooms Sampled	5,466	57	1,682	74	1,121	17	588	65	1,364	73	160	56	112	57	411	34	28	86	...	...	...	...	...	...	...		

limited to all intact lead paint surfaces below a level of five feet where a chewable edge is presented and all areas where lead paint is loose, flaking, or falling. Holes in plaster and wall areas must be repaired. Removal of paint on surfaces which are intact and have no chewable edges is not required. Paint in designated areas must be removed and approved by the sanitarian. Instead of removal, covering with a hard durable material is permitted. It is suggested that the person responsible for the removal meet with the sanitarian on the premises in order that the procedure be adequately explained and there is no question as to the areas listed for removal. Removal by burning is the usual method although the owner is advised about the safety precautions he should use in whatever method he employs. The use of respirators approved by the U. S. Bureau of Mines when burning, sanding, scraping or using solvents is recommended.

Following inspection and approval, the responsible party is given permission to repaint with a safe paint although he is not required to do so. Failure to comply with the order to remove hazardous paint results in a request for legal action. Initially, legal action was taken in a Magistrate's Court which was in existence at the time and fines ranging from \$25.00 to \$300.00 could be imposed. When a new Municipal Court system replaced the Magistrate's Courts, the same procedure was followed although there was a tendency to impose higher fines in second offenses. Beginning in 1970, the enforcement procedures were revised, and cases are currently being heard in a Court of Common Pleas in which an injunction is requested by the Health Department for failure to comply. If awarded by the court, compliance must be effected within a specified time or a contempt citation is issued with the violator subject to a fine and/or imprisonment. This has resulted in compliance in difficult cases. In certain cases, where a summons cannot be served, such as in the case of absentee owners of property, and in cer-

tain hardship cases, the Department of Licenses and Inspections is asked to abate the hazard by use of their abatement fund for the abatement of housing violations with a placement of a lien on the property for the cost of removal. This is provided for because of companion ordinance amending the Housing Code requiring the removal of lead paint when so certified by the Health Department which was adopted in 1966.

Our enforcement program is working. We have found that by issuing orders for removal of hazardous paint and court action in some cases through 1968, we achieved an overall compliance rate of 79 percent, show in Table 3. From 1966 through 1968, a total of 348 properties were made safer by eliminating the hazard of lead paint. The unsuccessful cases are, chiefly, those with absentee landlords in which we are unable to obtain service of the summons and hard-

ship cases where the owner is the occupant and financially unable to comply.

During the 19 years since lead poisoning became a reportable condition, a total of 1,544 cases and 88 deaths were reported as shown in Table 4.

In the five-year period, 1964-1968, 777 cases were reported with 13 deaths or an average of 155 cases and two deaths annually. Compare this with the five-year period, 1956-1960, when activities in lead poisoning control began, when 225 cases and 38 deaths were reported on an average 45 cases a year with seven deaths. This statistic indicates that death from lead poisoning today is a much rarer instance. By awakening the physician, the hospital staff, the community and members of the Health Department team to the problem of lead poisoning, there has been intensive surveillance in early detection and treatment and elimination of the hazard from the environment. Phy-

TABLE III
Effectiveness of Enforcement of Regulations for the
Removal of Lead Paint

Year	No. of Cases	No. of Orders Issued	Orders Where Compliance Was Achieved	Percent of Compliance
1966	163	110	90	81
1967	176	153	124	84
1968	184	175	134	77
TOTAL	523	438	348	Average 79

TABLE IV
Lead Poisoning in Philadelphia Children by Year and Race
Philadelphia 1950-1968

Year	CASES				DEATHS				
	Total	White	Non-White	Un-known	Total	Per-cent	Case Fatality Rate	White	Non-White
Total	1,544	177	1,357	10	88	100	6	26	62
1968	184	22	162	0	1	1	1	1	0
1967	176	8	168	0	2	2	1	0	2
1966	163	8	149	6	3	3	2	1	2
1965	132	7	125	0	5	6	4	2	3
1964	122	15	103	4	2	2	2	0	2
1963	136	15	121	0	3	3	2	2	1
1962	244	21	223	0	12	14	5	2	10
1961	109	9	100	0	7	8	6	0	7
1960	56	14	42	0	12	14	21	4	8
1959	50	7	43	0	12	14	2	4	8
1958	53	22	31	0	6	7	11	1	5
1957	28	7	21	0	3	3	11	0	3
1956	38	14	24	0	5	6	13	4	1
1950 to 1955	50	8	45	0	15	17	28	5	10

TABLE V
Lead Poisoning by Philadelphia Children by Age, Race and Sex
Philadelphia 1964-1968

Age in Months	RACE						
	Total		White		Non-White		Not Reported
	No.	Percent	Male	Female	Male	Female	
Total	777	100	36	26	362	333	20
0-6	0	0	0	0	0	0	0
7-12	16	2	0	2	7	7	0
13-18	134	17	6	0	55	70	0
19-24	243	31	7	10	123	99	4
25-30	139	18	8	5	69	55	2
31-36	111	14	7	6	51	46	1
37-42	40	5	2	2	11	25	0
43-68	31	4	2	0	13	14	2
49-60	22	3	2	0	12	8	0
61+	29	4	2	1	17	9	0
Unknown	12	2	0	0	44	0	8

sicians who see many of these cases tell us that they see the severely brain damaged child less often and the grave consequences of lead poisoning in children have been substantially reduced.

Childhood lead poisoning is distributed in Philadelphia similarly to other cities where an awareness to the problem has been created. The victims range chiefly from 13-36 months in age. Non-white children outnumber white by a ratio of 11 to 1 with no appreciable difference in sex as shown in Table 5. The greater incidence during the warm months fits the pattern of other cities and this is shown in Table 6. The large majority of cases are found in the Philadelphia ghetto (encompassing Health Districts 1, 4, and 6), the areas which surround center city. This "lead belt" is depicted

in Figure 1 and Table 7. In recent years, cases are found to be more common in the fringes of the belt as the population

TABLE VI
Lead Poisoning in Philadelphia Children by Month and Reported Outcome
Philadelphia 1964-1968

MONTH	OUTCOME		
	Total	Non-Fatal	Fatal
Total	777	764	13
January	64	63	1
February	49	48	1
March	47	47	0
April	59	58	1
May	52	51	1
June	57	54	3
July	71	71	0
August	100	99	1
September	100	97	3
October	57	56	1
November	51	50	1
December	34	34	0
Unknown	36	36	0

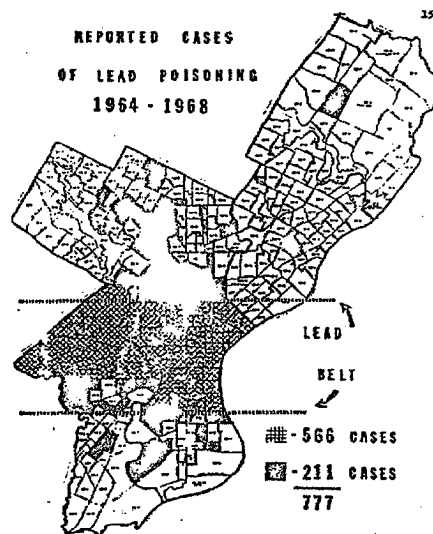
TABLE VII
Lead Poisoning in Philadelphia Children by Health District
Philadelphia 1964-1968

Health District	CASES			DEATHS	
	No.	Percent	*Average Yearly Morbidity Rates†	No.	Case Fatality Rate*
Total	777	100	6.4	13	1.6
1	102	13	22.7	0	0
2	53	7	4.6	2	3.7
3	41	5	3.8	0	0
4	95	12	8.2	2	2.1
5	217	28	14.7	2	1
6	152	20	13.5	5	3.2
7	5	1	.3	0	0
8	61	8	4.8	0	0
9	1	4	2.1	2	6.2
10	1	1	.1	0	0
Unknown	18	2	0	0	0

*To nearest 1 percent.

†Based on 1960 Health District Census; per 10,000 children in the age group through 5 years.

moves outward. As the people move, the lead poisoning problem moves with them as old housing exists in most parts of the city and the socio-economic and cultural patterns have not substantially changed. The greatest activity of urban renewal and rehabilitation is occurring in the lead belt and it is helping to solve the problem by providing numbers of housing units free of lead paint, but the problem is of such great magnitude that an intensive preventive program is most seriously needed, if it is hoped that the hazard of lead will be removed from the home environment during our lifetime. The community at large most recently has been awakened to this problem and tremendous interest has been generated on the national, state, and local level.



In Philadelphia, citizen groups have become involved and have formed a coalition of citizen and professional groups to support the Health Department in expanding its program. Their request has been for the Health Department to mount a massive preventive program which would essentially screen every child at risk, and inspect each home for lead in the enforcement of regulations. These were the elements of a resolution which was adopted by the American Public Health Association when it met in Philadelphia in November 1969. A com-

prehensive plan for the eradication of lead poisoning in Philadelphia has been developed which encompasses these elements. For the first year of operation such a program would cost approximately \$3 million and would provide mobile units for intensive health education about the dangers of lead poisoning and for drawing blood from all children between one and six in high risk areas for screening, mass inspection of houses for the presence of lead paint and orders for its removal, and establishing abatement crews for removing lead paint where enforcement procedures were not successful. We estimate that approximately 45,000 children could be screened annually and the hazard of lead eliminated from 50,000 dwelling units each year with the lead belt cleared in five years. A continuing program at a reduced level would be needed in succeeding years as the population at risk continues to move outward from the lead belt. The plan includes hiring people who live in the target areas and establishing a citizens board to advise the health department. The recent development of a portable fluorescent analyzer utilizing a radioisotope to detect lead in paint has brought such a massive program within the realm of practicality since heretofore paint samples could be collected at a much faster rate than they could be analyzed.

The major concern of the community appears to be that a large number of children who are asymptomatic may be experiencing a certain degree of physiological damage from the high level of lead in their system which prevents them from performing up to their fullest capacity in school and affects their future adversely. They contend that the diagnosed and reported cases are only the tip of the iceberg and that perhaps as many as 5-10 percent of the pre-school children in the ghetto may have absorbed more lead than is generally recognized as normal background, and if this absorption continues it will be sufficient to produce overt symptoms. While there is insufficient evidence to support these claims, it appears there is some merit

to a massive program to detect sub-clinical cases and eliminate the hazard from the environment not only in saving lives and preventing and minimizing injury, but insuring children of becoming useful, productive citizens. Therefore, the need of a comprehensive prevention program is justified. This program staggers the imagination when we compare it to the comprehensive plan to control lead poisoning which we conceived in 1958. The time seems ripe for lead poisoning to receive some well deserved attention by health departments. Unless lead poi-

soning control ranks as one of the most urgent priorities in environmental health in other cities, the situation may become as explosive as it did in Philadelphia.

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Good Boat Trailer Aids Water Safety

With forecasts of increased boating as much as 100 percent during the 1970's, and new types of water craft for recreation, we will need significant changes in today's boating laws and regulations to maintain safety on recreation waters.

During the 1960's, boats registered under the Federal Boating Act increased from 3.4 million to 4.7 million, and between 1962 and 1968 gained another 37 percent. Estimates are that by 1975, there will be as many as 6.5 million registered boats, and 8.5 million by 1985. If all boats become registered, there may be as many as 10 million pleasure craft registered by 1980.

Since many boats are damaged while on a trailer, it is important to have a good, oversized trailer. Each keel roller should support its share of the weight. All points requiring lubrication should be attended to; all bolts should be kept tight, and long carpet covered pads should be inspected to insure equal distribution of weight over the hull. The trailer should be long enough. If aft supports are too far forward of the transom, the hull can be seriously damaged. The combined dead weight of engine, fuel tanks, battery and extras stowed in the hull create a good-sized load for the transom supports, so they must be placed and adjusted properly.

It is important to have good tires on the boat trailer, and to have a good spare, and a small hydraulic jack or axle jack for the trailer.

Two other important safety features are the tongue weight of the rig and the hitch to fasten the rig to the automobile. Tongue weight on a average 16 foot boat should be about 75 pounds. Too much or too little tongue weight will cause the trailer to nose dive. Since automobile bumpers are largely ornamental, bumper hitches are unsafe. A quality frame hitch, installed by a professional is the only acceptable route to safe trailering. The United States Coast Guard and the United States Power Squadron in your area offer courses in basic seamanship and small boat handling. Boaters should all take these courses.

—Richard Waite

Oil Spill Chemical Stocked in New York

An oil spill dispersant, Polycomplex A-11 is being stocked at Bayonne, N. J. as a precautionary measure in case of any major oil spill in New York harbor. Guardian Chemical Corporation officials say that speed in treatment is important to control oil spills and prevent them from reaching beaches and rocks. The compound was used to treat spills in Puerto Rico harbor and Santa Barbara channel.