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Lead Poisoning in Telephone Cable Strippers: A New Setting for an Old Problem

Michael B. Lax, MD, MPH, James P, Keogh, MD, Nancy Jeffery, MPH, Paul K. Henneberger, ScD, MPH, Susan Klitzman, Dr PH, David G. Simon, MD, MS, and John Joyce, MD

Lead poisoning among workers processing lead sheathed telephone cable was identified at five worksites. High blood lead levels (BLLs) were identified during the medical evaluation of symptomatic workers following employer mandated air monitoring and through employer mandated blood lead levels. Once high BLLs were identified, governmental agencies became involved at every site, either as a result of worker complaints to OSHA or as a registry reporting mechanism. Workplace evaluation revealed significant overexposure to lead, particularly among workers mechanically stripping the lead sheaths. After intervention by a government agency, four of the workplaces chose to stop lead cable processing. Because the ongoing replacement of lead sheathed telephone cable with fiber optics may be continuing in many areas of the country, there is concern that the clusters we have identified represents a widespread and little recognized setting for lead overexposure. Recommendations for preventing overexposure to lead in this setting are given. © 1996 Wiley-Liss, Inc.

KEY WORDS: ***lead poisoning, telephone cable stripping, sentinel health events, workplace interventions, lead standard, OSHA enforcement***

INTRODUCTION

A relatively new and unrecognized source of lead overexposure occurs during the stripping and processing of lead coated telephone cables. Over the past several years, we have identified five clusters of lead poisoned workers in this industry. Currently, old lead sheathed copper telephone cable is being replaced with non–lead containing fiberoptic cable. Informal sharing of our five individual experiences alerted us to a possible industry-wide pattern of lead overexposure.

METHODS AND RESULTS

The five lead poisoning clusters were scattered geographically, dispersed in time, and evaluated by separate clinicians and government agencies. For each site, all known environmental and clinical data were collected. All of the facilities were metal recyclers seeking to resell copper cable. Telephone companies were the source of all cable processed. Table I describes some characteristics of the five metal recyclers. Cable was received in either precut three to four foot lengths or on reels. At all sites the cable was cut, baled, and shipped. At three sites the lead sheathing was stripped off the copper cable mechanically (sites D and E) or melted off in semienclosed furnaces (site C).

The sentinel lead poisoning cases were identified by

Central New York Occupational Health Clinical Center, College of Medicine, State University of New York, Health Science Center at Syracuse, Syracuse, NY (M.B.L.).

Occupational Health Project, University of Maryland School of Medicine, Baltimore, MD (J.P.K., J.J.).

Environmental Health Services, New York City Department of Health, New York, NY (N.J., S.K.).

NIOSH, U.S. Public Health Services, Morgantown, WV (P.K.H.).

NIOSH, U.S. Public Health Services, Syracuse, NY (D.G.S.).

Address reprint requests to Dr. Michael B. Lax, Central New York Occupational Health Clinical Center, 6712 Brooklawn Parkway, Suite 204, Syracuse, NY 13211.

The work was performed at the Central New York Occupational Health Clinical Center, State University of New York, Syracuse.

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TABLE I. Characteristics of Metal Recyclers Processing Telephone Cable

Site	Location	Dates of Operation	Type of operation
A	Syracuse, New York	1982–1986	Cable de-reeling, cutting, baling, shipping
B	Queens, New York	1990	Cable de-reeling, cutting, baling, shipping
C	York, Pennsylvania	Mid-1970s–present	Cable de-reeling, cutting, baling, shipping, melting[a]
D	Hagerstown, Maryland	1990	Cable de-reeling, cutting, baling, shipping, mechanical stripping
E	Syracuse, New York	1990	Cable de-reeling, cutting, baling, shipping, mechanical stripping

[a]Subsequent to initial investigation and identification of lead overexposure, this facility has begun mechanical cable stripping as well.

recognition of symptomatic lead poisoned workers by community physicians at three sites (B,C,E), employer mandated blood lead levels (BLLs) (site A), and worksite air monitoring, followed by blood lead testing (site D). Elevated BLLs were reported to government agencies via complaint or heavy metal registry mechanisms.

Blood Lead Level Assessment

Lead poisoning was documented through blood testing at all five sites. Information on blood lead levels was available for 37 workers and is summarized in Table II. As a group, 51% of BLLs were above 60 μg/dl, 59% were above 40 μg/dl, and 73% were above 25 μg/dl. The severity of poisoning correlated with the type of work process. Workers at sites where cable was handled and cut but not stripped (sites A and B) had mean BLLS one fourth to one third as high as workers employed in stripping operations (31 and 36 μg/dl vs. 91–124 μg/dl), although the range of BLLs was overlapping.

Evaluation of BLL and specific job title was possible at only one of the nonstripping sites (B). Cable cutters showed the highest BLLs (mean 77 μg/dl), followed by cable balers (mean 45.5 μg/dl). BLLs were comparable for buyer/sorters (mean 24 μg/dl) and office personnel (mean 21 μg/dl).

Environmental Assessment

Lead air levels based on 8 hr time-weighted averages (TWA) were obtained at three sites by government inspectors during active operations and are summarized in Table III. On initial sampling in 1983 at site A, mean air lead levels were 2.7 times the OSHA standard (50 $\mu g/m^3$ 8 hr TWA) [OSHA, 1983]. Mean air lead levels on the second round of testing, almost 3 years later, for all job titles tested were 1.3–4.4 times the standard and were highest among laborers.

At site C, where cable was stripped using a melting process, all samples (five) exceeded the standard. Mean exposure levels for workers loading the furnaces and washing the cable down following melting ranged from 2.6 to 4.8 times the standard. Even the lone supervisor sampled was exposed to a level of 1.2 times the standard. The highest air levels were obtained at site D, where cable was mechanically stripped. Levels for strippers at that site ranged from 127 to 200 times the standard. "Component breakers" working in areas the agency defined as non–lead exposed, were exposed to mean levels 1.92 times the standard.

At site B, where cable cutting was intermittent, workplace lead contamination was assessed via wipe and dust sampling on three separate occasions. Sampling revealed lead in all areas of the workplace tested, including offices and restrooms. Levels were highest around the cutting and baling machines. Repeated sampling following cleanup efforts resulted in diminished lead in supposed "non-lead" areas, with persistent levels around the cutting and baling machinery. At site E, no air sampling was carried out by OSHA, as the stripping operation had been stopped by the time of the inspection.

Regulatory Interventions and Employer Response

All of the workplaces were inspected by government agencies. The response of four of the five sites to the workplace evaluation was to cease processing lead sheathed telephone cable. Two sites inspected by federal or state OSHA stopped operations immediately (sites D and E), one voluntarily and the second shut down by the state OSHA as an imminent danger. A third site (A) closed after more than 3 years of operations and at least three OSHA inspections without coming into compliance with the OSHA lead standard. At site B, cable handling ceased after 6 months of unsuccessful efforts to reduce lead exposure.

In contrast to all other sites, site C had operated for a prolonged period prior to ever being inspected and only site C continues to operate. The company has expanded its operations and added a mechanical stripping component, processing telephone cable from much of the East Coast of the United States.

TABLE II. Blood Lead (BLL) and Zinc Protoporphyrin (ZPP) or Free Erythrocyte Protoporphyrin (FEP) Levels at the Time of Workplace Inspection

Site	No. of workers tested	Duration of Exposure (months) Range	BLL (μg/dl)		ZPP or FEP (μg/dl)	
			Range	Mean	Range	Mean
A	9	0.25–6.5	12–78	31	23–134	52
B	11	4	8–84	36	13–190[c]	75
C	4	120[a]	51–137	91	232–552	449
D	9	1–2	84–122			
E	4	3–8	45–167	104	132–558	325
	3[b]	3–8	100–167	124	188–558	390

[a]Information available only for index case.
[b]Excludes one individual who had last worked with lead 7 months prior to drawing the lead level.
[c]N = 10.

TABLE III. Lead Air Monitoring Results

Site	Date of testing	Job title	No. of personal samples obtained	No. of samples exceeding OSHA standard	Air levels μg/m³ 8 hr time weighted average (TWA)	
					Range	Mean
A	1/83	Unknown	3	2	20–280	133
	12/85–3/86	Assistant	3	1	29–140	67
		Shear operator	2	1	34–100	76
		Laborer	2	2	210–230	220
C	6/85	Supervisor	1	1	61	61
		Loader	2	2	180–300	240
		Washer	2	2	120–144	132
D	9/90–10/90	Stripper	4	4	6349–10015	8519
		Component breaker	2	2	87–105	96
		Shear operator	1	0	12	12
		Plastic cable stripper	1	0	41	41

[a]OHSA standard is 50 μg/m³ 8 hr TWA.

DISCUSSION

Our description of five clusters of lead poisoning documents an old and well-known exposure occurring in a new setting [Froines et al., 1990; Rudolph et al., 1989; Seligman and Halperin, 1991]. Technological change in the telecommunications industry is resulting in the removal of lead sheathed telephone cable and its replacement with fiberoptics. The spatial and temporal disperson of the clusters suggests that significant numbers of workers in a widespread area, possibly national in scope, are potentially overexposed to lead in a relatively ignored work setting.

Exposure data from our clusters indicate that lead exposure levels can be extremely high in these settings and that lead poisoning can occur rapidly. Those involved in the mechanical stripping of lead are most at risk, with air levels up to 200 times the standard, and BLLs over 100 μg/dl documented among workers employed for only a few months. The data also indicate, however, that activities such as melting, cutting, and baling lead-coated cables place workers at a significantly increased risk of lead poisoning. Even supervisors and others, including office personnel, working in ''non-lead'' areas of recycling facilities can be exposed to lead levels that carry health consequences [Fischbein, 1992].

The repeated occurrence of lead poisoning among telephone cable processors, despite the OSHA standard, may have several causes. While employer ignorance may be part of the problem, the sequence of events at the worksites we describe illustrate the limitations of current regulatory standards and practices in preventing lead poisoning [Silbergeld et al., 1991; Marino et al., 1989], even when an employer is informed. Prolonged regulatory intervention at two sites failed to reduce lead exposure to acceptable levels.

Technical issues and the nature of the metal recycling business are significant additional factors, making prevention difficult. Exposure control in this setting appears to require extensive and expensive measures beyond the reach of many recyclers, which are typically small businesses employing a transient, low paid, non-union workforce. As a consequence, four of the businesses we described stopped processing cable rather than develop the capacity to control exposures, after which the telephone company presumably located another recycler and the sequence of events may have been repeated. This experience suggests that other strategies for improving compliance need to be developed, especially for economically marginal businesses.

These recommendations include acknowledging that the telephone companies pulling cable are uniquely positioned to play a key role in prevention, possessing the knowledge and resources to advise recyclers on appropriate exposure control technology. The companies could choose only recyclers who meet specified criteria for preventing lead overexposures. At least one phone company has begun addressing the problem of cable processing by using a phone company subsidiary [Ken Shaw, Industrial Hygienist, New York Telephone, personal communication].

OSHA could take a more active role by recognizing metal recycling as a high hazard industry and targeting these workplaces for scheduled inspections [Seligman and Halperin, 1991]. These efforts could be aided by routinely obtaining information from area phone companies and from state based heavy metal registries to identify recyclers. One site we described (C) continues to process cable. This site should be further investigated to determine if exposures have been adequately controlled, and if so, the economic and technical factors contributing to primary prevention at this site could be identified and possibly generalized.

Other aspects of cable processing, including cable pulling, transport and disposal, as well as environmental/household contamination, may put significant numbers of workers and others at risk of lead poisoning [Fischbein et al., 1980]. Consequently, the clusters we have described may be an indication of a larger problem deserving evaluation.

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