

Encouraging Small Businesses to Adopt Effective Technologies to Prevent Exposure to Health Hazards

Laura C. Leviton, PhD, and John W. Sheehy, PhD

Small businesses are heterogeneous and the prospects are low for direct OSHA inspection and enforcement. Opportunities are explored to encourage voluntary adoption of new technology to reduce workplace exposures. The case of radiator repair shops is used in this paper to illustrate an approach to the dissemination of control technology to small businesses that will encourage these companies to adopt controls. Several behavioral theories are applied to the case. © 1996 Wiley-Liss, Inc.

KEY WORDS: control technology, behavioral science, small business, intervention research, occupational health, radiator shops, lead exposures

INTRODUCTION

Small businesses present a challenge for assuring worker health. As with industry in general, workers in small businesses may be exposed to a variety of safety and health hazards. Businesses with fewer than 100 employees constitute 98.3% of all businesses [State of Small Businesses: A Report of the President, 1993]. Yet small businesses are extremely heterogeneous with respect to potential workplace hazards. Moreover, small business owners may be less sophisticated about such matters than their counterparts in larger businesses, and may have limited resources both to protect workers or to contend with health care costs that may arise as a result of workers' hazardous exposures.

Small businesses also present a challenge because regulation, inspection, and enforcement are not currently sufficient in and of themselves to assure that workers are adequately protected even under existing standards. Historically, OSHA has been able to inspect only a minute proportion of all small businesses. Data from the Minnesota Health Department (David Parker, personal communica-

tion), for example, indicate that only 0.02% of small businesses undergo inspections by Minnesota OSHA in any given year. The prospect for adequate regulation of worker health protection in small business is unlikely. Alternative mechanisms, such as voluntary adoption of cost-effective technology, become exceedingly important to study, so that regulatory resources can be conserved, and concentrated instead on the small percentage of workplaces that have the worst violations of health and safety standards and pose the largest threat to worker health.

Radiator repair shops and control technology for reducing worker lead exposure will be used to exemplify some issues to consider when attempting to influence worker health and safety in small businesses. The major sources of exposure for radiator repair workers are lead fumes generated during soldering and lead dust produced during radiator cleaning [Goldman, 1987]. Radiator shops are small businesses that fall under the OSHA standards for lead exposure, and if a worker falls ill from lead exposure, the owner will have to pay workers' compensation benefits. Yet the prospects for enforcement of the standard in this sector of small business are not good, given available OSHA resources.

At least three control technologies have been shown to be effective in reducing lead exposures in radiator repair shops. These are (1) ventilated enclosures, (2) movable exhaust hoods, and (3) ventilated booths. Each of these three control systems effectively reduce radiator repair workers'

School of Public Health, University of Alabama-Birmingham (L.C.L.).

National Institute for Occupational Safety and Health (J.W.S.).

Address reprint requests to Laura C. Leviton, PhD, University of Alabama-Birmingham, School of Public Health, 121 Mortimer Jordan Hall UAB, Birmingham, AL 35294-2010.

Accepted for publication August 25, 1995.

lead exposures to levels substantially below the OSHA PEL [MMWR, 1991] and typically cost less than \$1,000 to install. The performance of each control system was evaluated by collecting personal breathing-zone samples for lead and measuring local exhaust-ventilation system airflow capacities. These three economical and effective ventilation control systems have the potential for widespread application in relatively small radiator shops that lack resources for purchase of elaborate ventilation systems.

Three issues will be addressed in this case study:

1. What does behavioral science theory say about the best approaches to encourage radiator shops to install and maintain protective equipment?
2. How does a small business determine which of the available products provides the best technology?
3. How can the National Institute for Occupational Safety and Health (NIOSH) and the Occupational Safety and Health Administration (OSHA) obtain small business' acceptance of such technological controls?

Two behavioral theories seem relevant to this situation. The first is the Transtheoretical Model [Prochaska et al., 1992]. Although this model is most appropriate to individual level behavior change, the ways in which the theory categorizes readiness for change fit the four categories into which radiator repair shops may be placed. These are: (1) workers and owners who did not yet understand the importance of hygiene in the situation; (2) workers and owners who did understand the lead exposure problem, but were not yet planning to do anything to abate the problem; (3) workers and owners who were aware and were planning to do something by studying available technologies; and (4) owners who had already installed the technology (very few to date). Moreover, the theory tailors the behavior change message to the stage of readiness to change. It is clear, for example, that shops remaining unaware of the hazards require a different message than shops that are aware and are choosing among the available ventilation systems. The second relevant theory is the Diffusion of Innovations [Rogers, 1983] and the related field of social marketing [Kotler and Roberto, 1989]. In diffusion theory, innovations are adopted in identifiable "waves," first by a few advanced thinkers, then by a group of "early adopters," then finally by a group of late adopters. People observe, discuss, and appraise the benefits and costs of the innovation over time. Social marketing can speed the adoption process by recruiting relevant social networks and influential sources to assist in the appraisal process.

Relevant sources of information and influence for radiator shop owners include:

1. The trade association, with which some, although not all, shop owners are affiliated. The trade association is

a credible source of information about trends affecting the industry. The trade association is convinced that its members have problems due to lead exposures, and is therefore helping to spread the message that this technology is available at relatively low cost.

2. The supplier of the lead, who has a vested interest in making sure the product is used safely and who must provide a material safety data sheet. Suppliers become the product stewards, and could work with manufacturers and trade associations to develop a more readable and usable material safety data sheet. For some shops, the supplier's sales representative may well be the most consistent and personal contact available to make owners and workers aware of the hazard and of the availability of technology [Gjessing and Ayres, 1992]. The sales representative could potentially disseminate the innovation in the same way that a drug company sales representative persuades physicians to adopt a new product, or in the way that a seed merchant promotes the adoption of a new hybrid among farmers.
3. OSHA consultation programs can make shops aware of the hazard. Although OSHA's ability to enforce a standard is limited by staffing resources, its regulatory power may assist in motivating quicker adoption of the technology.
4. NIOSH could improve its influence over the situation by informing the shop owners about choices among the ventilation systems. Some shop owners hesitate because uncertainty about the most cost-effective model presents a barrier. In addition, some owners feel that an even more effective and cheaper technique for lead exposure protection may become available in the near future. If they were to lead their industry and adopt a technology prematurely, they might be placed at an economic disadvantage. NIOSH could test the ventilation systems and identify the ones that were likely to be most cost effective, similar to the way that Consumer Reports does for the person contemplating the purchase of a stereo. Findings could be publicized through the trusted trade association publication.
5. Occupational health clinics can multiply the effects of NIOSH knowledge, because the clinics are in contact with affected workers and can portray the effects of worker compensation costs to shop owners. Clinics can publicize their findings through the cooperation of the trade association and perhaps the suppliers of lead as well.

DISCUSSION

For several reasons, radiator repair shops provide an interesting illustration of intervention implementation in small businesses. First, the example invites us to study the reasons why an industry would be motivated to comply with

regulation or guidelines. To date, occupational health research has not adequately studied how to facilitate worker protection or make it easier. Second, it may offer a model with some common elements that could be adopted in the study of worker health in other small businesses. It is worthwhile to inquire into the feasibility of this or a similar approach across small businesses.

With respect to the generalizability of the radiator repair situation, some issues need to be considered. First, not all small businesses have active trade associations. However, a substitute might be located if needed. For example, several publications appeal to small business owners, such as *INC*, the magazine that focuses on entrepreneurial small firms. Also, a business contact in the form of a supplier is probably a common feature of most small businesses. It is reasonable to expect some incentive for the supplier of a hazardous material to take an active role in the dissemination of new technologies to control the hazard, in conjunction with the material data sheet.

Unfortunately, not many small businesses have inexpensive and effective means for worker protection from exposures. The radiator shop provided a happy conjunction of circumstances to make voluntary diffusion of the technology a realistic choice. Perhaps in this area NIOSH scientists could make their biggest contribution to a voluntary

adoption of worker protection. Finally, it is likely that the constituencies that are affected by occupational health and safety programs need to refocus their mindset. Regulation, inspection, and enforcement of standards may not be the exclusive ways to protect worker health. An important adjunct in some circumstances may be to encourage the voluntary adoption of technologies for worker protection.

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