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Occupational Health and Safety Hazards in Colorado Small Industry

Dawn Tharr, Column Editor

Reported by James K. Haas and Roy M. Buchan

The goal of occupational health and safety is to prevent illness, injury, and death in the workplace through primary prevention strategies, thus promoting the health and well-being of workers. An organized, effective approach needs to be followed so the greatest impact can be made toward reducing hazards in the workplace. Surveillance strategies which look at injury, illness, and/or hazard data are needed to identify high-risk industries or populations so resources can be directed toward them. Since published information on hazards in small industry is minimal, this study was undertaken to describe common health and safety hazards in small Colorado industries.

This article categorizes and summarizes employee exposures to specific types of hazards in small industry. It identifies hazard rates for different types of hazards in the construction, manufacturing, trades, and service industries, as well as in industry overall. Hazard rates were also stratified according to company size. Overall serious hazard rates in construction and trades and service industries were highest in companies with 11 to 26 employees. In manufacturing, companies with 1 to 10 employees had the highest rate overall.

In general, there were more serious safety hazards found than health hazards. However, health hazard rates were the same as safety hazard rates in the manufacturing industry. The most common serious hazards that placed the most workers at risk were electrical hazards.

Introduction

The National Safety Council (NSC) estimated that in 1991, there were approximately 368,300 occupational illnesses recognized or diagnosed in the U.S. private sector, or about 490 illnesses per 100,000 full-time workers. In 1992, there were at least 8500 accidental deaths on the job (7 deaths per 100,000 workers), and 3.3 million disabling occupational injuries (2821 per 100,000 workers). The total time lost in 1992 for disabling injuries, including time for injuries prior to 1992, added up to 105 million work days. The 1992 total cost for work accidents was estimated to be $115.9 billion.[1] If occupational illnesses were included in this cost estimate, it would be much higher. Since these estimates do not include injuries or illnesses that go undiagnosed or unreported, these figures are low.

The goal of occupational health and safety is the primary prevention of illness, injury, and death in the workplace. To date, little has been published that surveys hazards specifically found in small industry. This study was undertaken to identify and assess the common hazards in small Colorado industry. Hopefully, this information will lead to a better understanding of the hazard scenario in small industry so the health and safety professionals might target their efforts and resources to make a more positive impact on worker health and safety.

Identified are hazards that existed in three different types of small industry in Colorado: construction, manufacturing, and trades and services. Data used were from files which belong to the Occupational Safety and Health Administration (OSHA) 7(c)1 Occupational Health and Safety Consultation Program (OHSCP), located at Colorado State University. Data from these files were extracted, organized, and summarized to create an occupational hazard profile for Colorado small industry.

Methods

Data were from reports of comprehensive health and safety consultation visits. The following information was gleaned from each report and entered on a data collection form:

1. visit number,
2. company Standard Industrial Classification code,
3. average employment of company (number of employees),
4. number of company employees covered by the consultation visit,
5. date of consultation visit, and
6. each serious health or safety hazard identified, the number of employees at risk from that hazard, and the specific standard in the Code of Federal Regulations, Title 29 Part 1910 or 1926, which was referenced in identifying that hazard.

The health and safety hazards were organized into groups, using the referenced OSHA standard. To summarize hazard occurrence in industry, a Crude Hazard Rate (CHR) was used to quantitate the number of hazards present per number of company employees covered by the consultation visit. The CHR was expressed as the number of hazards identified per 100 employees. The CHR was calculated as follows:

$$\text{CHR} = \frac{\text{the sum of the number of times each employee was exposed to a hazard}}{\text{the total number of employees covered during that specific consultation visit}} \times 100 \quad (1)$$

The following is an example. If there were five employees covered during a visit, and all five were exposed to an electrical hazard and three of the same employees were exposed to another electrical hazard, then the CHR for electrical hazards for this group would be:

$$\text{CHR} = \frac{(5 \text{ employees})(1 \text{ hazard}) + (3 \text{ employees})(1 \text{ hazard})}{5 \text{ employees}};$$

$$\text{CHR} = \frac{8 \text{ employee hazards}}{5 \text{ employees}}$$

$$= 1.60 \text{ employee hazards/employee};$$

$$\text{CHR} = 160 \text{ employee hazards/} 100 \text{ employees} \quad (2)$$

TABLE 1. Number of Comprehensive Consultations and Sites Visited According to Industry Type, Fiscal Year 1990

Type of Industry	Safety	Health	Total	Number of Sites
Construction	80	47	127	83
Manufacturing	31	29	60	36
Trades and services	21	19	40	22
Total	132	95	227	141

Results and Discussion

Table 1 contains the number of health and safety reports generated from comprehensive visits performed in the 1990 fiscal year and are categorized according to type of industry. More consultations were performed in construction than in the other two groups of industry because usually when the consultants visited a construction site, there were several subcontractors with just a few employees at that job site. Thus, it was convenient and time-efficient to do several companies during the single visit. Each company, by OSHA directive, was considered a separate consultation. Separate reports were then sent to each subcontractor under consultation, dealing with those hazards which were identified within that subcontractor's operations. Table 2 categorizes these visits according to company size. Note that as number of employees in a company went down, the number of consultation visits increased accordingly. This reflects the OHSCP's commitment to serve small businesses first.

Table 3 contains the average number of health and safety hazards identified per visit for each of the three types of industry. Manufacturing had a greater number of serious hazards identified per visit than did construction or trades and services. Table 3 does not take into account the size of the companies, nor does it take into account the number of employees at risk from these hazards.

The fact that an average of 11.7 serious hazards were identified per visit points to the fact that small businesses are in extreme need of industrial hygiene and safety services. This means literally thousands of workers are exposed to a multitude of serious hazards on a daily basis.

A more accurate estimation of employee exposure to hazards is the hazard rate. Tables 4 and 5 contain the crude and industry-specific hazard rates for the chosen general categories of health and safety hazards and for hazards overall.

The manufacturing industry had the highest overall hazard rate of the three types of industry. The OSHA violations or hazards which had the highest rating, in descending order, were electrical, hazard communication program deficiencies, means of egress, and machinery/machine guarding/hand and power tools. Hazards associated with flammable and combustible liquids, airborne contaminant exposure, materials handling, and first aid program deficiencies made a moderate contribution to the overall hazard rate.

A hazard communication program deficiency is not a real hazard per se, but it is an OSHA violation. OSHA considers a hazard communication program deficiency as having a great impact on worker health, because when workers are not trained or educated in the hazards of chemicals they work with, they are more likely to overexpose themselves or other employees in the course of their work. When one considers that the NSC estimates that in 1992, worker poisoning was the third leading cause of death in the private-sector workplace,[1] the importance of hazard communication becomes apparent.

Trades and services had an overall hazard rate slightly lower than manufacturing. Hazard communication program deficiencies and electrical hazards had the highest hazard ratings in this industry group. Hazards associated with machinery/machine guarding/hand and power tools, bloodborne pathogen program deficiencies, flammable and combustible liquids, welding and brazing, and housekeeping contributed moderately to the overall hazard rate.

Deficiencies in the bloodborne pathogen program were found in only two companies. Like hazard communication, one bloodborne pathogen program deficiency can potentially effect all employees, so a large percentage of workers in the company might be identified as being at risk from each hazard.

The construction industry in this study had a lower hazard rate than did manufacturing or trades and services. This is inconsistent with construction's ranking as a high hazard industry based on accidental injury experiences. There are reasons why this anomaly exists. Fundamentally, it was a problem of data reporting.

TABLE 2. Number of Comprehensive Consultations and Sites Visited According to Company Size (Fiscal Year 1990)

Company Size (No. of Employees)	Safety	Health	Total	Number of Sites
1–10	83	56	139	87
11–25	27	21	48	28
26–50	14	9	23	15
>50	8	9	17	11
Total	132	95	227	141

TABLE 3. Average Number of Serious Hazards/Visit (Fiscal Year 1990)

Type of Industry	Safety	Health	Total
Construction	3.64	0.47	2.46
Manufacturing	32.1	31.8	32
Trades and services	14.1	7.47	10.9
Average	12	11.4	11.7

TABLE 4. Safety Hazard Rates (Hazards/100 Employees) According to Industry Type

Type of Hazard	Construction (80 sites)	Manufacturing (31 sites)	Trades & Services (21 sites)	All Industries (132 sites)
Means of egress	0.0	94.5	19.5	45.2
Welding/brazing	6.5	5.4	28.7	10.4
Electrical	58.1	153.0	126.0	113.0
Fire protection	0.0	17.3	2.3	10.1
First aid	0.0	28.1	7.4	13.8
Machinery, tools, and guarding	6.4	81.1	43.4	46.5
Walking/working surfaces	80.5	21.4	10.8	40.9
Materials handling	0.7	29.4	1.8	13.6
Housekeeping	6.7	15.2	25.3	14.0
Flammable/combustible liquids	5.5	59.9	32.0	34.6

TABLE 5. Health Hazard Rates (Hazards/100 Employees) According to Industry

Type of Hazard	Construction (sites)	Manufacturing (sites)	Trades & Services (sites)	All Industries (sites)
Sanitation	0.0 (47)[A]	5.8 (29)	0.0 (19)	3.4 (95)
Ventilation	0.0 (47)	5.1 (29)	0.0 (19)	1.6 (95)
Respiratory protection	5.8 (47)	7.0 (29)	4.9 (19)	5.8 (95)
Hearing protection	1.0 (47)	0.3 (29)	0.0 (19)	0.3 (95)
Other PPE[B]	0.7 (47)	11.2 (31)	10.1 (21)	7.2 (132)
Noise exposure	1.0 (80)	6.1 (29)	0.4 (19)	3.9 (95)
Chemical exposure	4.8 (47)	35.5 (29)	1.0 (19)	21.9 (95)
Radiofrequency exposure	0.0 (47)	0.0 (29)	0.0 (19)	0.0 (95)
Bloodborne pathogens	0.0 (47)	0.0 (29)	43.4 (19)	10.4 (95)
Hazard communication	0.7 (47)	138.4 (36)	134.7 (21)	96.4 (140)
Other hazards	18.3 (83)	32.4 (60)	6.2 (40)	23.8 (227)
All hazards	179.6 (44)	811.6 (21)	477.8 (18)	582.5 (83)

[A]Total number of businesses surveyed within that industry type.
[B]PPE = personal protective equipment.

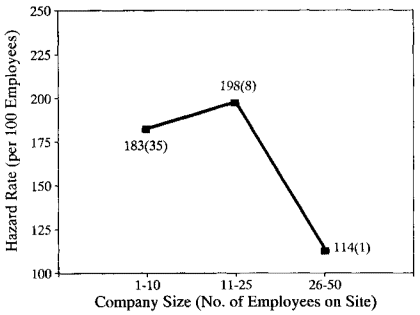

FIGURE 1. Hazard rates (per 100 employees) by company size in construction, Colorado small industry (Fiscal Year 1990).

OSHA directives dictated how "employees at risk" from a hazard were recorded. When a hazard was identified, the consultants could record only those employees at risk from the hazard if the employees worked for the company where the hazard existed. This may not have reflected the real risk the hazard had on the total workforce when more than one company was on site, as was the case at most construction sites.

Another probable reason for construction's low rate was that many of the general contractors in this study were repeat clients. This would indicate that through the use of the consultation services, contractors became more educated in hazard prevention, which resulted in safer and healthier work sites. This definitely points to program success.

The types of hazards in construction which placed the most employees at risk of injury or illness were, in descending order, walking/working surfaces, electrical, housekeeping, welding/brazing, and machinery/tools/guarding. Walking/working surfaces and electrical were the two hazard categories which resulted in the most exposures. The hazard rates for the other categories decreased greatly in the construction industry.

Electrical hazards placed the most workers at risk in industry overall. Hazard communication had the second highest hazard rate in industry for the companies in this study.

Finally, the crude and industry-specific hazard rates were compared according to company size to see if size had an impact on hazard occurrence. Figures 1 through 4 show the hazard rates according to company size. Although there was not a clear difference in hazard rates between each company, the general trend was that the smaller companies had a higher hazard rate than did the larger companies. In construction and trade and service industries, the company size category of 11 to 26 employees had the highest hazard rate. In manufacturing, the highest overall hazard rate existed in the company size category of 1 to 10 employees. In regard to the nature of hazards, serious safety hazards were generally more common than serious health hazards, with the exception of the manufacturing sector where health and safety hazards were equal in number.

The chemical and physical agents that were identified at the time of the inspection were limited to those currently regulated by OSHA or those with an established threshold limit value set by the American Conference of Governmental Industrial Hygienists. The hazard data were based on information collected on a one-day visit to each company.

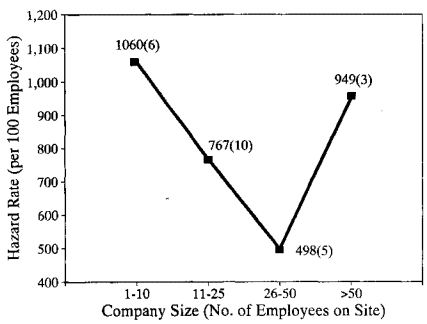

FIGURE 2. Hazard rates (per 100 employees) by company size in manufacturing, Colorado small industry (Fiscal Year 1990).

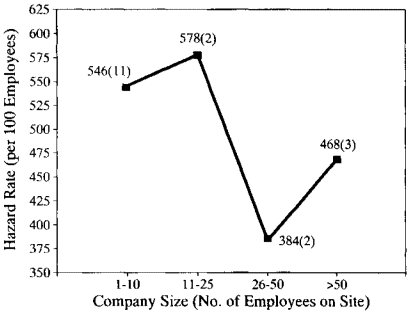

FIGURE 3. Hazard rates (per 100 employees) by company size in trades and services, Colorado small industry (Fiscal Year 1990).

Conclusions

The goal of occupational health and safety is the primary prevention of illness, injury and death, thus promoting health and well-being in the work environment. Hazard surveillance is needed in this effort so resources can be directed more effectively and, as a result, a greater impact can be made toward this goal. According to this study, working in small business is hazardous and should be targeted for occupational health and safety hazard prevention. Many companies who request OSHA consultation services from Colorado State University must wait a year or longer to receive a consultation visit due to the backlog of companies on the waiting list. It is clear that a large part of the small industry workforce is not being protected from occupational hazards. Much of the problem is that the OSHA 7(c)1 consultation program does not have the funding for a staff large enough to help small businesses protect their workers. Thus, people are being needlessly diseased, injured, disabled, and killed on the job.

It would be helpful to perform hazard surveillance on the same companies for visits on successive years to see if the hazard rate for each company drops significantly. One reason given for the low hazard rate in construction was that many clients in construction were repeat clients. If repeat clients tend to have lower hazard rates, priority could be given to clients in construction who have not used the OHSCP before. Another option could be that if historical data indicate that the company had low hazard rates from previous visits, that client would be

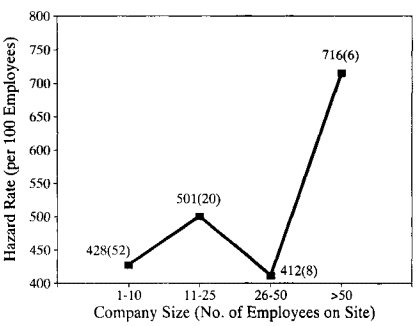

FIGURE 4. Hazard rates (per 100 employees) by company size in overall industry, Colorado small industry (Fiscal Year 1990).

given lower priority than a client who had not used the consultation service before.

According to this study, priority of services should be given to smaller companies, since most of these companies have higher hazard rates. This is consistent with OSHA policy of serving high hazard small businesses first under the 7(c)1 consultation program.

References

1. National Safety Council: Accident Facts, 1993 Edition, pp. 34–52. Library of Congress Catalog Card Number: 91-60648. Statistics Department, National Safety Council, Itasca, IL (1993).

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