Public Health Briefs

Laboratory-Acquired Infections and Injuries in Clinical Laboratories: A 1986 Survey

DONALD VESLEY, PHD, AND HEIDI M. HARTMANN, MS

Abstract: A mail survey of all 54 US State and Territorial Public Health Laboratories and the 165 Hospital Clinical Laboratories in Minnesota was carried out, soliciting information on laboratory-acquired infections and injuries for calendar year 1986. The aggregate infection incidence rates were 3.5/1,000 full-time equivalent (FTE) workers for hospital laboratories and 1.43/1,000 for public health laboratories. Injury rates were 21.2/100 FTE workers for hospital laboratories and 7.21/100 for public health labs. (*Am J Public Health* 1988: 78:1213–1215.)

Introduction

For many years knowledge of occupationally acquired infections among American laboratory workers was provided through a series of publications by Sulkin and Pike at the University of Texas.[1–6] Since 1979 new knowledge has been limited to a few anecdotal articles[7,8] and single laboratory[9,10] or geographically limited surveys.[11,12] Few investigators have studied both infection and injury rates in laboratories, and potential distinctions between clinical laboratories and research laboratories have been largely unexplored since Pike's 1976 assessment that clinical laboratories accounted for less than one-third as many infections as research laboratories.[4]

In the current survey, we have attempted to address some of these questions. We did not include laboratories with a primary research function although it is possible that some research is carried out in clinical laboratories. We surveyed all 54 State and Territorial Public Health Laboratories, and have included injuries as well as infections. We also surveyed all 165 hospital clinical laboratories in the State of Minnesota for calendar year 1986.

Methods

In January 1987, a mail survey was sent to the directors of the 54 State and Territorial Public Health laboratories and all 165 hospital laboratories in Minnesota. The survey form requested information on number of full time equivalent (FTE) employees, number who worked with infectious agents, quality of record keeping, number of definitely, probably or possibly laboratory-acquired infections (after the Sulkin and Pike classifications) in 1986, and more specific data on types and causes of laboratory-acquired infections. We also inquired about the total number of laboratory injuries in 1986, types of injuries, number of work days lost due to injury, and outcome of injuries. Information about the victim (job category, age, number of years of experience) was requested in both the infection and injury portions of the survey. Job categories specified were scientific/technical, non-professional (such as dishwasher and janitorial), non-laboratory (clerical), and management (after Sulkin and Pike).[1–6]

Results

The overall response rate for the survey was 90.3 per cent for the Minnesota hospital laboratories and 79.6 per cent for the public health laboratories. The response to the injury portion of the survey was 83.6 per cent for the Minnesota hospitals and 100 per cent for the public health laboratories. The mail survey obtained information on 4,202 public health and 2,290 hospital FTE clinical laboratory employees, an average of 98 FTE employees per public health laboratory and 15.5 FTE employees per hospital laboratory. Among respondents, 84 per cent of the public health and 89 per cent of the hospital laboratories rated their record keeping quality as excellent or adequate, reflecting OSHA (Occupational Safety and Health Administration) requirements for such record keeping. It was not possible to characterize non-respondents because of the strict anonymity guaranteed to those who did respond.

Laboratory-Acquired Infections

The annual incidence rate for FTE employees was 1.4 infections/1,000 for public health laboratories and 3.5/1,000 for hospital laboratories (Table 1). For employees who worked directly with infectious agents, the annual rates were 2.7/1,000 and 4.0/1,000 for public health and hospital laboratories, respectively. Infection incidence rates for hospital laboratories were higher than those for the public health laboratories in every category (definitely, probably, and possibly laboratory-acquired). In hospital laboratories, 87 per cent of employees worked with infectious agents, compared to only 52 per cent of the public health laboratory employees.

Since the number of reported infections was low, it was not possible to analyze trends in type of infectious agent. The one case of infection in a Minnesota hospital categorized as definitely laboratory-acquired was Coagulase Positive Staphylococcus. In addition, there were two reports from Minnesota hospitals of tuberculin conversion, not included in the calculation of incidence rates.

From the School of Public Health, University of Minnesota. Address reprint requests to Donald Vesley, PhD, Professor and Director, Environmental Health and Safety, School of Public Health, University of Minnesota, Room W-136 Boynton Health Service, 410 Church Street SE, Minneapolis, MN 55455. This paper, submitted to the Journal September 21, 1987, was revised and accepted for publication March 16, 1988.

TABLE 1—Annual Incidence Rates for Infection and Injury in Public Health and Minnesota Hospital Laboratories, 1986

	Public Health Laboratories	Minnesota Hospital Laboratories
Number of laboratories reporting	43	149
Incidence rate per 1000 FTE laboratory employees		
Type of infection	(N = 4202)	(N = 2290)
Definitely laboratory-acquired	0.00	0.44
Probably laboratory-acquired	0.48	0.87
Possibly laboratory-acquired	0.95	2.18
Overall	1.43	3.49
Incidence rate per 1000 FTE employees who worked with infectious agents		
	(N = 2193)	(N = 1986)
Definitely laboratory-acquired	0.00	0.50
Probably laboratory-acquired	0.91	1.01
Possibly laboratory-acquired	1.82	2.50
Overall	2.74	4.03
Injury incidence rate per 100 FTE employees		
	(N = 4202)	(N = 2230)
Overall	7.21	21.28
Range of individual laboratory rates	0–22.4	0–250.0

Causes of infection and conversion reported included a needlestick accident, aerosolization of the agent, laminar flow hood failure, microscope contamination, and in five cases simply "worked with agent". In one probable public health laboratory infection (with *Shigella B*), the outcome was reported as hospitalization with recovery. All other cases reported recovery without hospitalization.

The mean number of work days lost due to laboratory-acquired infections in Minnesota hospitals was 1.2 days. It was 1.3 days for public health laboratories when excluding the one hospitalized case which accounted for 48 lost days and would greatly skew the mean if included.

The job category of the majority of infection victims was scientific or technical staff, with one exception (a management employee). The ranges for years of experience were one to 35 for hospital laboratories and 0.5 to 35 for public health laboratories.

Laboratory-Acquired Injuries

The incidence of injury was an order of magnitude higher than that of infection. The rate in hospital labortories was three times that in public health laboratories [21.2/100 FTE hospital laboratory employees (range 0–250) and 7.2/100 FTE public health laboratory employees (range 0–22.4)]. The mean number of days lost per injury was 0.21 for the hospital and 0.64 for the pubic health department laboratories. The reason for the difference is unknown.

The major type of injury seen in hospital laboratories was needlesticks, which accounted for 63 per cent of all reported injuries, while cuts and scrapes were the second most prevalent (21 per cent). In public health laboratories, cuts and scrapes were the leading injury, accounting for 50 per cent of those reported (Table 2). The other public health laboratory injuries were evenly distributed among burns, sprains, eye injuries, needlesticks and inhalation, ingestion or dermal injuries, with 15 per cent classified as miscellaneous.

For 59 per cent of the reported public health laboratory injuries and 44 per cent of the hospital injuries, possible contributing factors were given. The leading factor cited was employee/victim failure to follow safety procedures, cited for 32 per cent and 30 per cent for public health and hospital laboratory injuries, respectively.

TABLE 2—Distribution of Injury Types Among Public Health Laboratories and Minnesota Hospital Laboratories, 1986

	Public Health Laboratories		Minnesota Hospital Laboratories	
Injury Type	N	%	N	%
Needlestick	17	6	300	63
Cut/scrape	152	50	101	21
Sprain	25	8	22	5
Eye injury	18	6	7	1
Burn	25	8	3	1
Inhalation, ingestion or skin injury	18	6	3	1
Other	45	15	18	4
Missing	3	1	19	4
Total	303	100	473	100

As with infections, the job category of the injured employees was predominantly scientific/technical staff (for 56 per cent of the public health laboratory injuries and 84 per cent of the hospital laboratory injuries).

Discussion

The results of this survey confirm a number of important presumptions relative to safety in clinical laboratories. The relatively low incidence rate, particularly for definitely laboratory-acquired infections implies that safety awareness and improvements in safety-related devices and equipment have served to reduce hazards of infection exposure in clinical laboratories. Although the response rate to this mail survey was good, there may be some bias due to non-response, particularly if the non-responders were the larger laboratories. However, there is no reason to believe this was the case.

The infection incidence reported for hospital laboratories is remarkably similar to the 3.0/1,000 workers reported recently for medical laboratories in Utah.[11] The significantly lower incidence in public health laboratories reflects an inverse correlation between infection rate and number of employees. The Utah study reported that same inverse correlation.

In contrast to the low incidence of infection, the injury rates appear to be relatively high. However, the majority of these injuries were minor and did not result in lost work time. The hospital laboratories reported three times as many injuries as the public health laboratories. It is not clear why this discrepancy exists. Nevertheless, even the hospital laboratory injury rate (21.2/100 employees) is lower than the injury rate of 25/100 employees reported by Harrington for English laboratories.[13]

It is not surprising that needlesticks accounted for 63 per cent of hospital laboratory injuries, but only 6 per cent of the injuries in pubic health laboratories. Hospital laboratory personnel use needles much more frequently, notably the patient contact blood drawing activity common among hospital laboratory personnel but rarely associated with public health laboratories.

ACKNOWLEDGMENTS

This study was supported in part by the Laboratory Section of the American Public Health Association.

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Fatal Occupational Injuries in US Industries, 1984: Comparison of Two National Surveillance Systems

NANCY STOUT-WIEGAND, EDD

Abstract: This paper compares the results of analyses of 1984 fatalities as identified in the National Institute for Occupational Safety and Health (NIOSH) National Traumatic Occupational Fatality (NTOF) data base with those of the Bureau of Labor Statistics' Annual Survey of Occupational Injuries and Illnesses (AS) for 1984. The fatality rates for industries were similar in both analyses; however, differences in number of injuries suggest underrepresentation in the AS of fatal injuries in several, high-risk industries. Differences and similarities in methods and results between the two national surveillance systems are described and their application to research and injury prevention are discussed. (*Am J Public Health* 1988; 78:1215–1217.)

Introduction

Estimates of the number of workers killed on the job vary widely and are based on a variety of incomplete data sources.[2] For example, the number of traumatic occupational fatalities in 1984 was estimated at 3,740 by the Bureau of Labor Statistics,[1] 4,960 by National Center for Health Statistics,[3*] and 11,500 by the National Safety Council.[2] While these discrepancies can be attributed in part to differences in methodologies and definitions, they illustrate the need for more definitive data.[3,4] The National Institute for Occupational Safety and Health (NIOSH) has recently completed collection and analysis of five years of data on fatalities resulting from injuries at work.[3] This data base, known as the National Traumatic Occupational Fatality (NTOF) system, fills a critical knowledge gap by providing an enumeration of traumatic work fatalities in the US for the years 1980–84, derived from all US death certificates.

Address reprint requests to Nancy Stout-Wiegand, EdD, Division of Safety Research, National Institute for Occupational Safety and Health, 944 Chestnut Ridge Road, Morgantown, WV 26505. This paper, submitted to the Journal September 29, 1987, was revised and accepted for publication February 9, 1988.

Editor's Note: See also related brief p 1218 this issue.

*Jeffery Maurer: National Center for Health Statistics, personal communication, April 16, 1987.

The Bureau of Labor Statistics (BLS) recently published 1984 and 1985 statistics on occupational fatalities from their Annual Survey of Occupational Injuries and Illnesses.[1] The 1984 occupational fatality numbers and rates from the BLS Annual Survey (AS) are compared here with those from the NIOSH NTOF and differences between the two sources are discussed.

Method

The NTOF data base comprises information obtained from death certificates of US residents who died as a result of a work-related injury. All 50 states and the District of Columbia cooperated in this project by providing death certificates for cases where: fatal injury occurred at work; the worker was at least 16 years old; and the cause of death was "external" (ICD-9th Rev. codes E800-E999). Because case identification is dependent on the knowledge and accuracy of those who fill out death certificates, some cases of fatal work injuries are probably excluded from NTOF. For example, it is suspected that occupational homicides and occupational highway fatalities may be under-enumerated due to inability or failure of persons completing death certificates to identify some homicides and highway deaths as work related. Despite limitations, the NTOF surveillance system is the most complete enumeration of fatal work injuries to date. The data base currently contains records of traumatic occupational deaths from the entire US for 1980 through 1984.

Numbers and rates of occupational fatalities by industry for 1984 are presented here for comparison with BLS data. The NTOF data base includes public sector employees; however, only private sector fatalities are reported here for consistency in comparison. To classify NTOF cases by industry, the entries on death certificates for "usual industry" were coded into division level industry categories in accordance with the Standard Industrial Classification Manual.[5] Seventeen per cent of the cases could not be classified by industry due to inaccurate, non-specific, or missing entries. For the purpose of this comparison, the assumption is made that "usual industry", at the division level, is equivalent to industry at time of injury. The denominator for these rates was the Bureau of the Census' County Business Patterns for 1984. The 1982 Census of Agriculture