It's time for a centralized registry of laboratory-acquired infections

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A recent serious outbreak of *Salmonella* linked to clinical and teaching microbiology laboratories highlights the dangers of working with laboratory pathogens—but it is probably not an isolated occurrence. Without a better system for reporting infections resulting from laboratory exposures, we risk seeing more of these types of outbreaks.

Accounts of highly infectious laboratory outbreaks should not read like a mystery novel. Sadly, in the absence of integrated reporting systems for laboratory-acquired illnesses, our investigations of such events can resemble a whodunit. The recent report of a multistate outbreak of *Salmonella typhimurium* infections offers a particularly disturbing example of how things can go wrong. In April, the US Centers for Disease Control and Prevention (CDC) reported that more than 70 individuals from 35 states had been infected with a particular strain of *S. typhimurium*, and at least ten people have been hospitalized with one death. Notably, almost two thirds of the infected individuals were either students in microbiology teaching laboratories or employees in clinical microbiology laboratories. As a result of the outbreak, the CDC appealed to members of the Association of Public Health Laboratories and the American Society of Microbiology through various electronic listservs for information about laboratory practices. But we can do better than this *ad hoc* approach.

An estimated 500,000 workers are employed in laboratories in the US, and an increasing number of these workers have chronic medical conditions or are on immunosuppressive therapy that may place them at increased risk of infection[1]. Lab workers, including these subsets, face an increased risk of acquiring infectious agents by virtue of their jobs. However, the actual risk of a laboratory-acquired infection is difficult to accurately determine, as there is no systematic reporting protocol at either the state or the federal level. Current available data are limited to retrospective and voluntary surveys conducted via mail, anecdotal case reports, and outbreaks that happen to grab the attention of the scientific community or media.

Perhaps the most exhaustive survey of laboratory-acquired infections was published in the mid-1970s. In the study, Robert Pike from the University of Texas Southwestern Medical School in Dallas scoured the scientific literature and collected first-hand accounts to provide details of close to 4,000 laboratory-acquired infections[2]. The paper reports 159 different infectious agents that resulted in 164 deaths (a 4.1% case fatality rate). Notably, all of the reported infections in this survey were symptomatic. It is likely that an even larger number of inadvertent exposures in microbiology laboratories occurred but did not result in disease severe enough to require medical attention.

The fact that we have to refer back to a paper from the 1970s for a picture of the problem of lab-acquired infections reflects that there is frustratingly scant information on current laboratory exposures. This is in large part because the US lacks a centralized database where such exposures can be reported so that the risk of infection can be accurately measured. In the absence of a systematic way of tracking exposures and coordinating treatment, exposed employees are often referred to their local hospital employee health clinics, which are frequently ill equipped to deal with many of the rare organisms handled in the lab.

Despite the large volume of pathogenic material handled by lab technicians, of whom 79% in the US are women according to 2005 estimates[3], the risk of handling specimens is sometimes unknown or poorly characterized in the literature. Take *Neisseria meningitidis*, for example. Individual case reports of laboratory-acquired infection due to this pathogen, which can invade the blood and cause rapidly fatal meningitis, have appeared in the literature for many years. Prompted by these reports, CDC neuroepidemiologist James Sejvar and his colleagues used postings on electronic listservs around the world to collect information related to infections. Their investigation uncovered 16 cases of laboratory-acquired meningococcal disease worldwide between 1985 to 2001, including six US cases[4]. Using the US cases alone, the authors calculated an infection rate of 13 per 100,000 microbiologists compared to an attack rate of 0.3 per 100,000 among US general population. The results of their analysis suggest that laboratory-acquired meningococcal disease represents a significant occupational hazard to clinical microbiologists and resulted in a recommendation for routine meningococcal vaccination of microbiology workers[5].

Tracing the source of an outbreak of *S. typhimurium* is particularly challenging, as this bacterium (together with *S. enteritidis*) is the most frequently isolated serotype of *Salmonella* in the US. Investigations can be confounded by other concurrent *S. typhimurium* outbreaks, such as the one associated with African dwarf frogs that cropped up in Utah. In the recent *S. typhimurium* outbreak, investigations from the CDC suggested that the infecting strain was indistinguishable from a commercially available *S. typhimurium* strain used in microbiology laboratories. It seems apparent that this link to the microbiology laboratory could have been more expediently made had there been a central database for reporting laboratory-acquired infections. Although it's not clear how the strain was spread from the lab, it probably spread from infected laboratory workers to the general public.

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It would clearly be helpful to establish a national surveillance system for monitoring of laboratory-acquired infections to alert workers and provide guidelines for managing exposures. An organization like the CDC is particularly suited for this role because of its unique expertise in outbreak investigations. This will allow a more careful study of the individual risks of laboratory exposures and ultimately a better understanding of how to improve behavior and engineer controls in the workplace to prevent infections altogether.

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1. Sewell, D.L. *Clin. Microbiol. Rev.* **8**, 389–405 (1995).
2. Pike, R.M.L. *Health. Lab. Sci.* **13**, 105–114 (1976).
3. US Department of Health and Human Services. http://bhpr.hrsa.gov/healthworkforce/reports/clinicallab.pdf (2005).
4. Sejvar, J. J. *et al. J. Clin. Microbiol.* **43,** 4811–4814 (2005).
5. US Centers for Disease Control and Prevention. *Morb. Mortal. Wkly. Rep.* **51**, 141–144 (2002).