

Actions for Deans and Vice Presidents for Research

Interest in promoting safety in academic research laboratories has grown in recent years, following high-profile incidents in which researchers were injured or killed. Many colleges and universities want to go beyond complying with regulations to fostering a safety culture: affirming a constant, institution-wide commitment to safety and integrating safety as an essential element in the daily work of researchers.

A report from the National Research Council, *Safe Science: Promoting a Culture of Safety in Academic Chemical Research*, identifies steps that everyone involved in research and other activities using chemicals—from researchers to principal investigators to university leadership—can take to create and promote this approach to safety.

Vice presidents for research and deans of schools and colleges have substantial responsibility and influence in establishing and sustaining a strong, positive safety culture in their institutions. They should take a range of actions to do so, such as ensuring that their institutions undertake research only when they have the capacity to do so safely, establishing policies and deploying resources in ways that support safety, and articulating clear roles and responsibilities around safety.

SAFETY CULTURE IN THE LABORATORY

An ideal laboratory safety culture ensures that anyone who enters a laboratory, from inexperienced students to senior investigators, understands that

WHAT IS SAFETY CULTURE?

Safety culture refers to an organization's shared values, assumptions, and beliefs specific to workplace safety—or more simply, the relative importance of safety within the organization.

A strong, positive safety culture is not a culture of compliance. A strong safety culture arises not because of a set of rules but because of a constant commitment to safety throughout an organization. A positive safety culture supports the free exchange of safety information and assigns greater importance to solving problems than to placing blame. High importance is assigned to safety at all times, not just when it is convenient or does not threaten personal or institutional productivity goals.

they are entering an environment that requires special precautions. They are aware of the hazards posed by the materials they and others in the lab are working with, and they are prepared to take immediate and appropriate measures to protect themselves and their co-workers, especially in the case of unexpected events. At a minimum, laboratory safety includes:

- awareness of the physical and chemical properties and health hazards of laboratory reagents and equipment being used, gained by conducting hazard analysis,
- availability and use of proper apparatus and infrastructure needed to carry out the procedure safely,
- knowledge of and ability to execute any additional special practices necessary to reduce risks,
- use of proper personal protective equipment,
- access to a well-organized workspace that facilitates unrestricted movement about the laboratory and appropriate segregation of materials and processes, and
- familiarity with emergency procedures, including the use of safety showers, fire extinguishers, and eye stations.

A strong, positive safety culture encourages all laboratory workers to place the highest priority on these practices. It is not enough to provide safe equipment, systems, and procedures if the culture of the organization does not encourage and support working safely.

One of the barriers to the development of safety culture in academic laboratories is the attitude that safety practices inhibit research productivity. But the occurrence of a serious incident in a laboratory, in addition to being a tragedy in itself, stops research and is certainly one of the most dramatic possible impacts on research progress, as anyone who has experienced or witnessed such an incident can attest.

Safety is a core element of research, not an impediment to it. Laboratory safety is needed not only to protect the health of the students and researchers involved but also to provide a positive example to younger scientists that laboratory research can be done safely and efficiently. Like publishing papers and acquiring grants, conducting research safely is key to the success of a research group, and it must be held in high academic esteem.

PROMOTING A CULTURE OF SAFETY

Vice presidents for research, deans, and other senior university leaders should take the following steps to help establish and sustain a strong safety culture in their institution's laboratories:

Demonstrate that safety is a core value of the institution. Deans and vice presidents for research should not only talk about safety but also demonstrate a concrete, ongoing commitment to laboratory safety. Faculty's perceptions about the institution's commitment to safety play a significant role in their actions. For example, if they perceive that deans and chairs will not provide resources for necessary or recommended safety and environmental procedures or for safety-related updates to facilities, they may be understandably skeptical of the same administrators' appeals to prioritize safety. And if faculty perceive that deans, chairs, and colleagues value grant income and research productivity above all else when deciding raises, tenure, promotions, and award nominations, they may adjust their efforts accordingly.

Incorporate efforts to foster a strong, positive safety culture as an element in the criteria for promotion, tenure, and salary decisions for faculty. The core missions of academic institutions—teaching, research, and service—are the criteria that many institutions currently use to make decisions about faculty tenure, rank, salary, and awards. Faculty members align their efforts with these criteria. Deans and vice presidents should work with the provost and faculty governance to add efforts to establish and promote safety to these criteria. Doing so will allow faculty members to align their work on safety to institutional expectations. This change will also allow institutions to recognize the substantial work required to identify the hazards associated with research, mitigate their risks, sustain a group culture of safe practices, and train and educate a constantly changing group of researchers.

Align research plans with resources available for safety. Providing resources for safety is the responsibility of institutions. To develop a safe and successful research program, provosts, deans, vice presidents for research, chairs, and individual laboratories must consider the resources they have available for safety when exploring options for research programs and selecting areas to pursue. Research should not be launched or expected when resources are inadequate for proper safety.

Institutions or units that face financial constraints should not conduct research less safely to try to



compete with institutions that have more resources. Excellent research can be conducted in low-resource environments with proper planning and judicious choices about research areas that match funding and infrastructure levels.

Establish policies and deploy resources in ways that encourage and enable safety. Each institution should have a comprehensive risk management plan for laboratory safety that addresses prevention, mitigation, and emergency response. And university leaders should develop policies—with input from departments, faculty, researchers, and environment health and safety personnel—that govern practices that affect safety, such as whether and under what conditions researchers may work alone in laboratories.

Designing and renovating laboratories with safety as a priority. The design of new laboratory buildings and the renovation of current facilities should provide adequate fume hoods, proper space for safe operation of laser experiments, and areas where students can work and eat that are separated from areas where experimental work is going on.

Articulate roles, responsibilities, and accountability clearly. Currently many faculty members are unaware of their responsibility for fostering safe practices in their laboratory research programs. Universities should ensure that all those involved in research—including principal investigators, laboratory researchers, and environmental safety & health personnel that support safety—understand their roles and responsibilities regarding safety.

Contribute to and use cross-institution information on near misses. A near miss is an undesirable or unexpected event that could have resulted in an injury or property damage had the timing, space, or sequence of events happened under slightly different conditions. It also represents a learning opportunity to share experiences with others. Establishing an anonymous

reporting system for incidents and near misses in laboratories across universities and colleges will help institutions and laboratories learn from one another's experiences. University leadership and department chairs should work together to incorporate the use of this system into their safety planning—both by encouraging their PIs and researchers to contribute to it and by using data collected on near misses across universities to enhance their own institution's safety practices.

Ensure that safety and environmental procedures apply to all laboratories in which chemicals are in use.

University leaders should be aware that researchers in many departments other than chemistry and chemical engineering (e.g., biology, engineering, physics, and art) are using potentially hazardous chemicals. In some cases, individuals working in these environments are not fully aware of—and may even be resistant to understanding—the risks they may encounter. University leaders should



ensure that the safety and environmental procedures discussed above apply to all laboratories and departments in which chemicals are in use.

Make stress management resources widely available and ensure that researchers and PIs are aware of them.

The intense competitiveness of chemistry departments across the country can have a strong effect on a unit's willingness to follow through in supporting a positive safety culture. Researchers and PIs often feel additional stress from striving to meet deadlines, make reports, obtain funding, and achieve milestones in completing one's degree. The level

of stress can distract researchers from disciplined safety practice and may overwhelm an individual's capacity to function safely in the laboratory. University officials should ensure that counseling and other stress management resources are widely available to the university and ensure that researchers, PIs, and department chairs are aware of them.

The National Research Council report *Safe Science: Promoting a Culture of Safety in Academic Chemical Research* was written by an independent committee of experts including members from university administration, chemistry faculty, behavioral sciences, EHS, private industry, and national laboratories. It was sponsored by the National Science Foundation, U.S. Department of Energy, National Institute of Standards and Technology, American Chemical Society ExxonMobil Chemical, and E. I. du Pont de Nemours and Company.

This pamphlet is one of a series summarizing *Safe Science: Actions for...Laboratory Researchers, Principal Investigators and Department Chairs, Environmental Health and Safety Staff, Deans and Vice Presidents for Research, and University Senior Leaders*. They are available at <http://dels.nas.edu/Report/Report/18706>. Read, purchase, or download a free PDF of the report at <http://www.nap.edu>.

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