RESOURCE ARTICLE

Proceedings of the 2016 Workshop Safety By Design – Improving safety in research laboratories

The principle aim of the 2016 Workshop: Safety By Design was to improve laboratory safety by promoting discussions, collaborative interactions, and problem solving between researchers and environmental health and safety (EH&S) professionals. The workshop provided a platform for participants to learn about effective safety programs and innovative approaches from colleges, universities, national laboratories and chemical industry. The program included talks by leaders in safety management and safety research, panel discussions by researchers and health and safety experts, and breakout sessions in which all participants joined together in small workgroups to explore laboratory safety challenges and provide recommendations for improving safety in specific areas. The workshop participants emphasized that Principal Investigators (PI) are responsible for the health and safety of their students and staff in the laboratory, and are instrumental in shaping a strong culture of safety. The institution's administrative leadership plays an important role in promoting a positive culture of safety through recognition and support of safety activities, and through financial commitment. Recommendations for empowering researchers to engage in laboratory safety were formulated, and the importance of supporting student leadership and involvement in student-led safety programs was underlined. Analysis of the post-workshop survey showed perceptions about laboratory safety changed as a result of participating in the workshop for 85% of researchers and 53% of EH&S professionals. This outcome supports the importance of creating a structured environment where researchers and EH&S experts can exchange ideas and work toward the common goal of safety.

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INTRODUCTION

The 2016 Workshop: Safety By Design was organized through a collaboration between the University of California Center for Laboratory Safety (UCCLS), the National Institutes of Health (NIH) Division of Occupational Health and Safety, Office of Research Services, the University of California Office of the President (UCOP), the University of California at Los Angeles (UCLA), and Northwestern University. The workshop took place on the NIH campus in Bethesda, MD on April 10 to 12, 2016. The 2016 workshop is the third workshop organized by UCCLS which are unique in exclusively focusing on current problems in research safety of academic institutions.[1,2] Other distinctive features of these workshops are that participants aim to learn from government and industry laboratory safety professionals and that the workshop provides a platform for researchers to voice their concerns and provide practical input. This meeting's participants also included representatives from the American Chemical Society (ACS), the Chemical Safety Board (CSB), and the Occupational Safety and Health Administration (OSHA). Attendance was by invitation only with the objective of balancing environmental health and safety (EH&S) experts with faculty, students and research staff, who are typically more difficult to attract to safety conferences as they do not receive funding for conferences outside their research area. Furthermore, researchers are generally more focused on scientific progress in their field rather than learning new

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topics in laboratory safety. To promote attendance, several researchers were supported through company sponsorships and through funds from the research administration at their universities. EH&S professionals comprised the largest group representing 53% of attendees, followed by 34% researchers from academia and government laboratories and 4% industry participants. Representatives from organizations including ACS, CSB, and OSHA contributed 9% of the attendees.

WORKSHOP OBJECTIVES

The objective of the 2016 Safety by Design Workshop was to explore practical means to improve researchers' safety in research laboratories. Safety concerns under consideration included risks associated with chemical hazards (bioactives, explosives, pyrophorics), physical hazards (pressure, temperature, noise, electricity, laser systems), nanomaterial-related hazards, and biohazards. The workshop provided a forum for the development of recommendations for promoting best safety practices while performing research in a laboratory setting.

The specific objectives of the workshop were:

1. Survey the roles of academic leadership, safety programs and funding agencies in supporting research safety.
2. Explore ways in which laboratory safety practices can be improved as an integrated part of research practices.
3. Examine the importance of safety culture on improving compliance behavior and decreasing accidents and injuries in the laboratory.

WORKSHOP AGENDA AND FORMAT

The workshop agenda was developed to stimulate communication among the industry, government and university participants.[3] A networking dinner preceded the workshop and provided attendees an opportunity to establish new connections and exchange information. The first full day of the workshop commenced with welcoming remarks from Dr. Michael Gottesman, NIH Deputy Director for Intramural Research, and was followed by keynote and guest speakers to set the stage for the interface between laboratory research and safety. A panel discussion about moving beyond lab accidents highlighted the need for Principle Investigators (PIs) to be engaged in laboratory safety.

The workshop proceeded with the centerpiece activity of eight workgroup sessions focused on achieving the workshop objectives. Each workgroup session was charged to address a specific problem in laboratory safety detailed below. During these sessions, participants in their assigned topic workgroups engaged in brainstorming ideas that were reflective of their research and safety experiences and expertise. Perspectives were discussed in small group settings and outcomes shared and debated with other workgroup members for input in a cross-pollination session on the second day. Final consensus opinions were incorporated into summary presentations.

Short presentations by invited speakers then featured safety approaches and practices in industry and national laboratories. Two additional talks by UCCLS personnel reported on specific actions that can lead to reduced accidents in research labs. The day concluded with a conference dinner that included an inspirational speech by UCLA Chancellor Gene Block who was honorary chair of the Association of Public and Land-grant Universities (APLU) Laboratory Safety Taskforce that produced the "Guide to Implementing a Safety Culture in Our Universities".[4]

A highlight of the second day was a plenary session where each of the eight workgroups presented the results of their discussions on identifying mechanisms for empowering researchers to engage in safety, utilizing resources, and establishing organizational structures to improve laboratory safety. The presentations are available online[3] and detailed summaries are provided below.

Invited talks for the day described the processes that led to, and the results of, the 2016 Laboratory Safety APLU Guidelines and Toolkit and the 2014 report by the National Research Council entitled "Safe Science: Promoting a Culture of Safety in Academic Chemical Research". The Workshop concluded with a presentation by Dr. Mary Beth Mulcahy of the U.S. Chemical Safety Board on current models for accident prevention and mitigation.

KEYNOTE AND INVITED TALKS

Selected keynote and invited talks and/or files of presentation materials presented during the Workshop are available online,[3] but detailed summaries are provided herein to allow an overview of the highlights and key points from the presentations and also to provide summaries for those presentations for which the full talks could not be placed online.

David Michaels

A keynote talk by Dr. David Michaels, Assistant Secretary of Labor for Occupational Safety and Health set the workshop's underlying tone and affirmed OSHA's stance on injury prevention in the laboratory environment. Dr. Michaels began his talk by reporting that more than 4,000 Americans die from work-related injuries and as many as 50,000 fatalities associated with occupational exposures occur in the workplace annually. Given the persistent risk of occupational injuries, he emphasized the employer's obligation to provide a safe workplace and OSHA's responsibility to ensure that the employer complies with health and safety regulations. Although human behavior may contribute to a workplace incident the onus of occupational safety ultimately rests with the employer. Dr. Michaels spoke of how today's dynamic workforce challenges traditional efforts for preventing injuries and illnesses, noting that many workplaces co-mingle employees from different employers (e.g. contractors, fellows, visiting researchers). With the emergence of contractor support in the laboratory and other work environments, OSHA has clarified that both the host employer and temporary agency have a shared responsibility for maintaining a safe work environment.

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