

History of Laboratory Safety at UCLA

Research Administrators Forum
Office of Research Administration

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UCLA



UC | Center for
Laboratory Safety

UCLA Westwood Campus March 18 1929

- First class
- Chemistry 1A
 - held six months before official campus opening



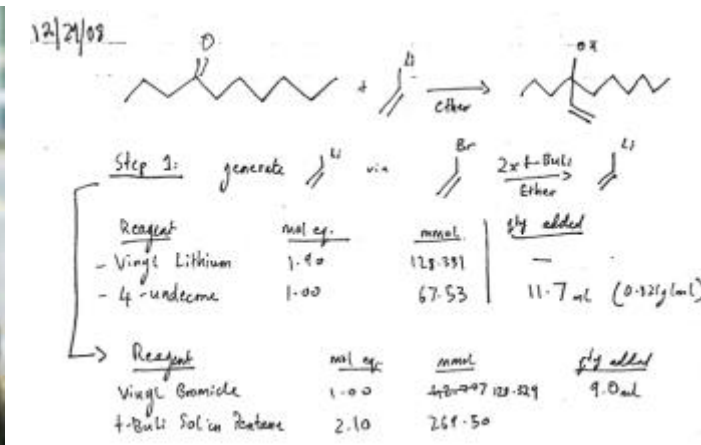
Chemistry Department building is now Haines Hall

UCLA Vermont Avenue Campus 1929

- California Hall – housed chemistry laboratories
– burned down in January



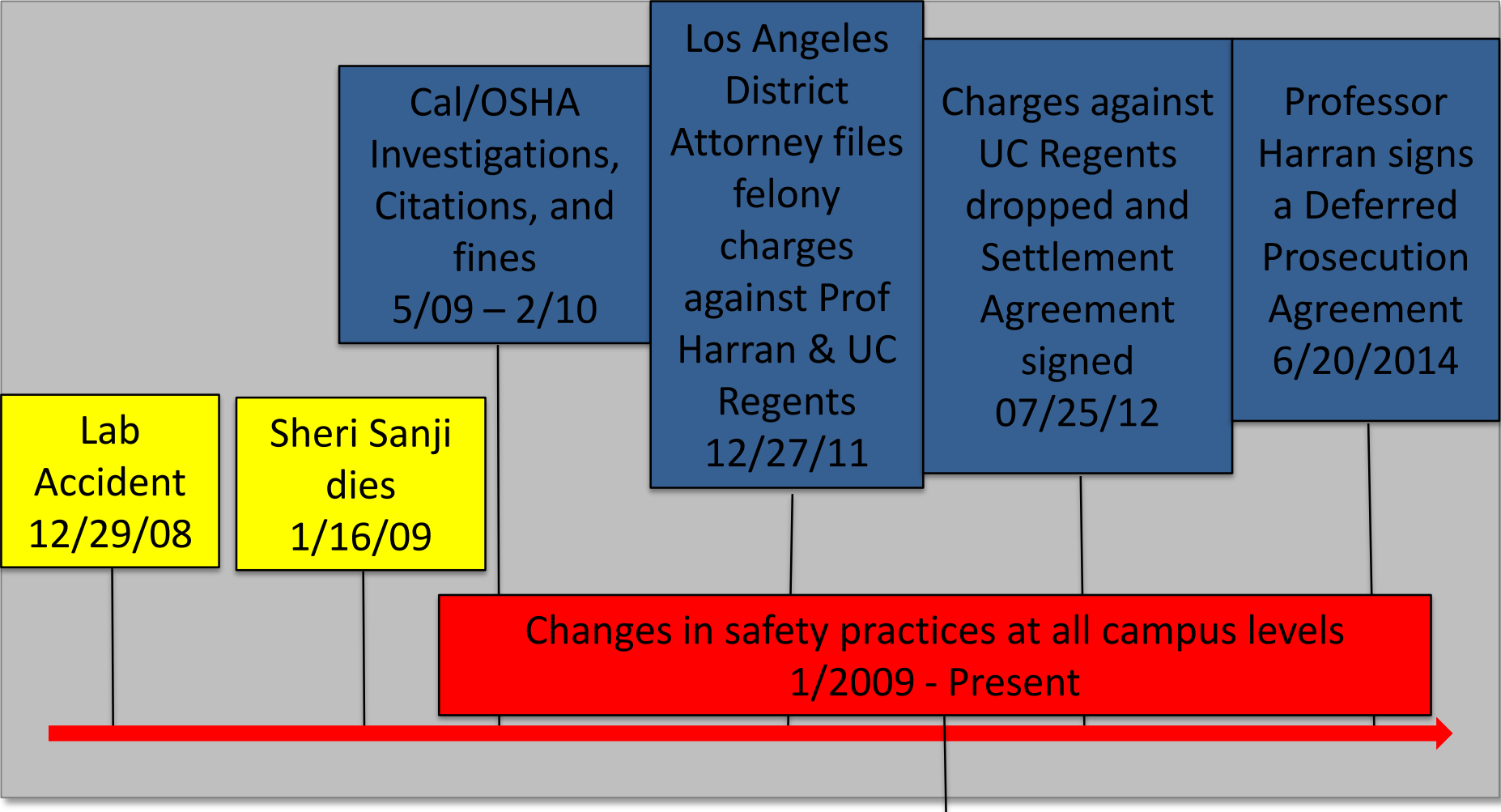
UCLA - December 29, 2008



Sheharbano Sangji



UCLA Timeline



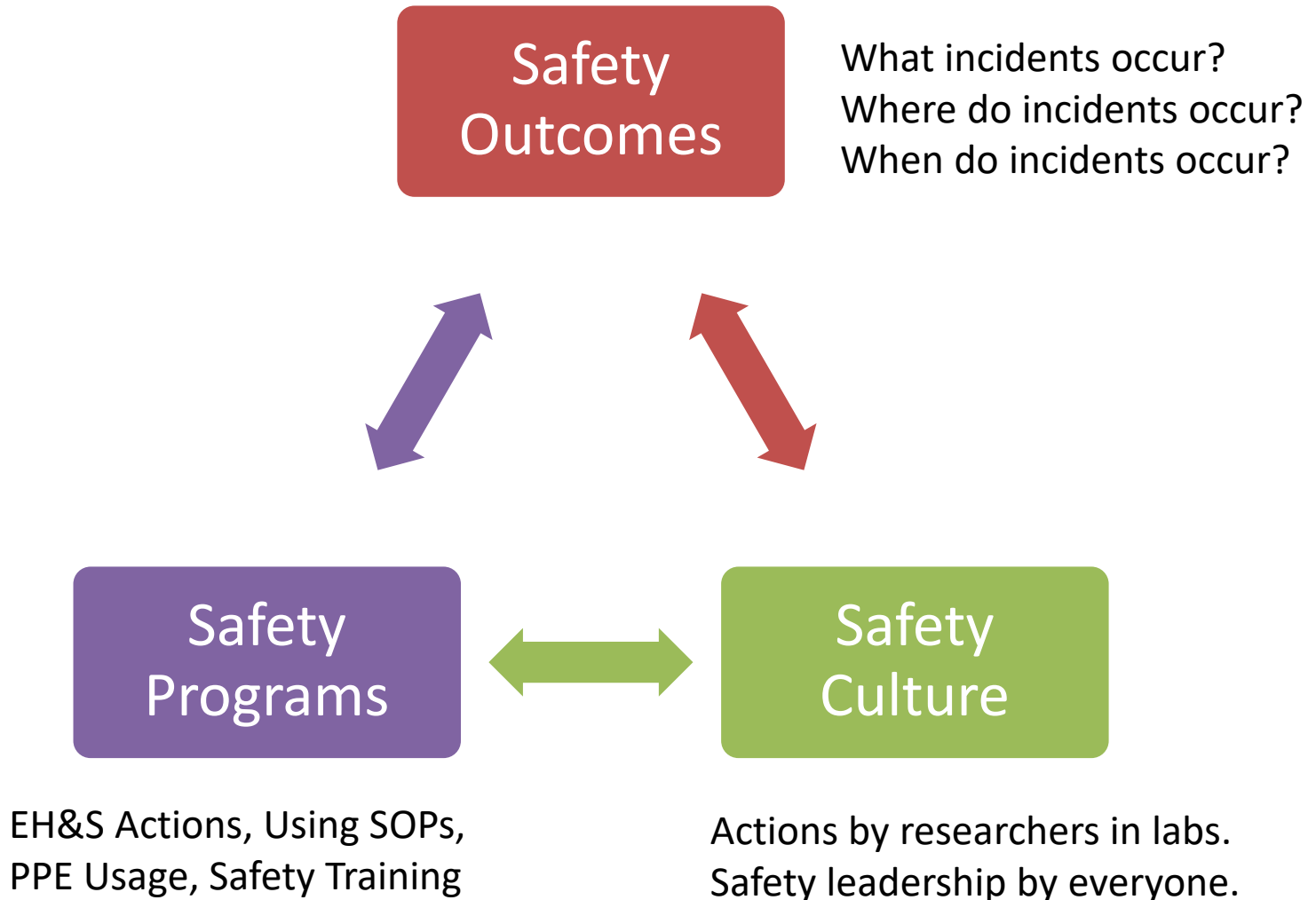
Accident Aftermath

Repercussions across

- UCLA campus
- University of California system
- Chemistry departments and universities nationwide
- Federal agencies
- Professional societies

A very tragic accident that has had true impact improving laboratory safety practices and the safety culture in ALL academic institutions.

Laboratory Safety Triad



Key Changes in UCLA Lab Safety

- **EH&S** – Rigorous lab inspections by knowledgeable staff
 - Active in safety training
- **PPE** – Mandatory use in labs (UCLA Policy 905)
 - Major one-time funding by UCOP
- **Safety Committees** – Proactive faculty-led across hazard areas
 - Empowered by Vice Chancellor, Research
- **Individual lab compliance**
 - Required faculty safety training
 - Required researcher safety training
 - Required response to lab inspections
 - Required adherence to lab safety standards

Evolution of Lab Coats – Reducing Chemical Exposures

Performance Requirements for Lab Coats

Comfortable material to wear
Non-porous for liquids
Chemically resistant

Breathable
Non-wicking for liquids
Flame resistant

\$35



Cotton or
Polyester

\$100



Flame Retardant
Treated Cotton

\$120



Flame Resistant
Nomex®

\$175



Flame and Chemical
Resistant ShieldCXP®

Laboratories can be High-Risk Environments

Chemical Hazards

- Flammables
- Acute toxins
- Carcinogens
- Reproductive toxins
- Corrosives
- Air/water reactives

Biological Hazards

- Infectious material
- Biological toxins
- Public health risks

Radiological Hazards

- Radioisotopes
- Radiation generating equipment (X-rays)
- Lasers

Physical Hazards

- Cryogenics
- High temperatures
- High and low pressures
- Loud equipment
- Cuts and needle sticks

Cannot eliminate all risks, so we use layers of risk management and safety controls, but accidents still occur!

Explosion in Laboratory

UCLA April 2014: Material Science Engineering

- Heating dicyclopentadiene in a pressure reactor in an oven
- Uncontrolled heating causes runaway reaction
- No pressure relief valve on pressure reactor
- **Student suffers modest injuries**

Oven before incident



Oven after incident



Explosion in Laboratory

UCLA September 2017: Chemistry & Biochemistry

- Pressure bottle for nickel / platinum nanoparticle synthesis
- $\text{Ni}(\text{acac})_2 + \text{Pt}(\text{acac})_2 + \text{NaBr} + \text{DMF} \quad 150 \text{ }^\circ\text{C} \quad \rightarrow \quad \text{NiPt}$
- Hotplate failure causes explosion
- **Student sustains major injuries**



Safety Outcomes:

Analysis of UCLA Safety Incidents

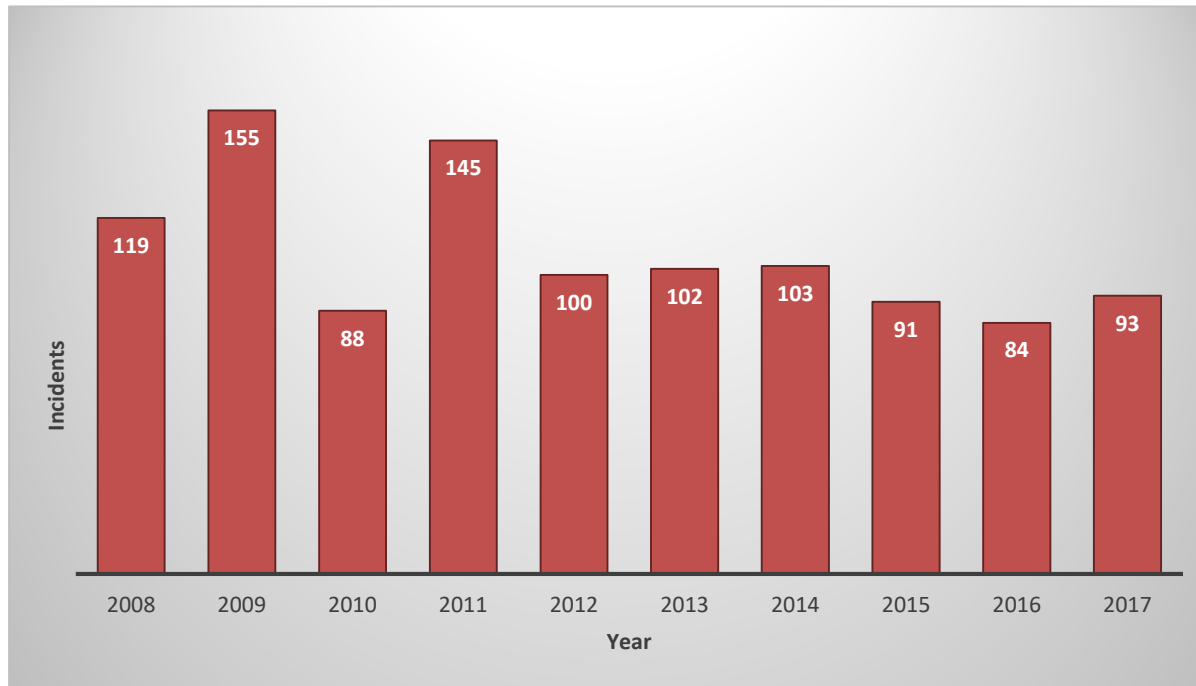
What incidents are happening in laboratories and how can we use that data to drive improvements in laboratory safety programs?

- What lab incidents are occurring?
- Where are lab incidents occurring?
- When are lab incidents occurring?
- What lab incidents are decreasing?
- What lab incidents are increasing?

What impact did implementing a compliance-focused laboratory safety program have on incidents, injuries, and exposures?

UCLA Incident Analysis

Total Laboratory Incidents at UCLA

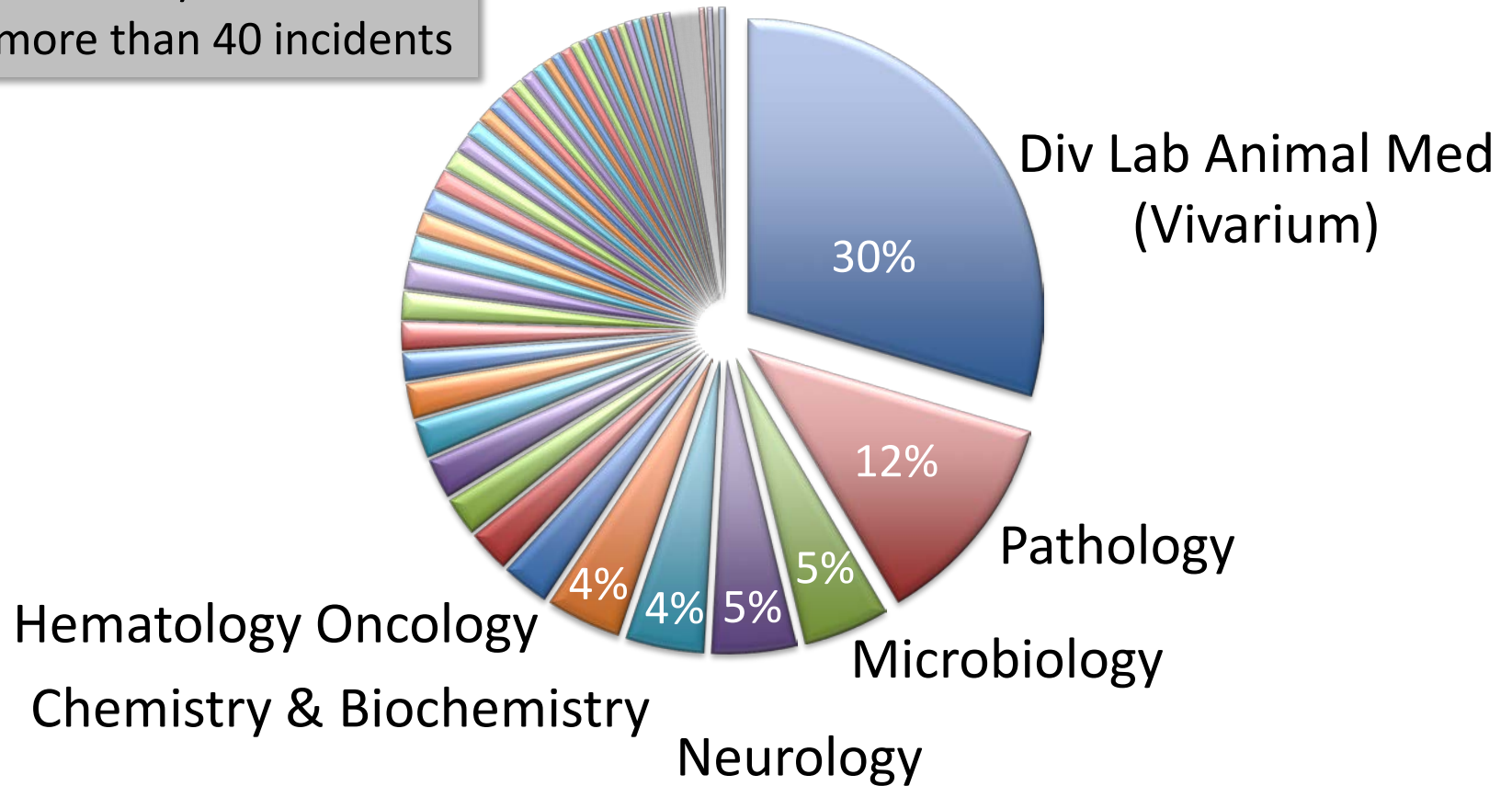


1080 incidents
over 10 years

Incidents are defined as events causing an injury or illness.
Data provided by UCLA Insurance and Risk Management.

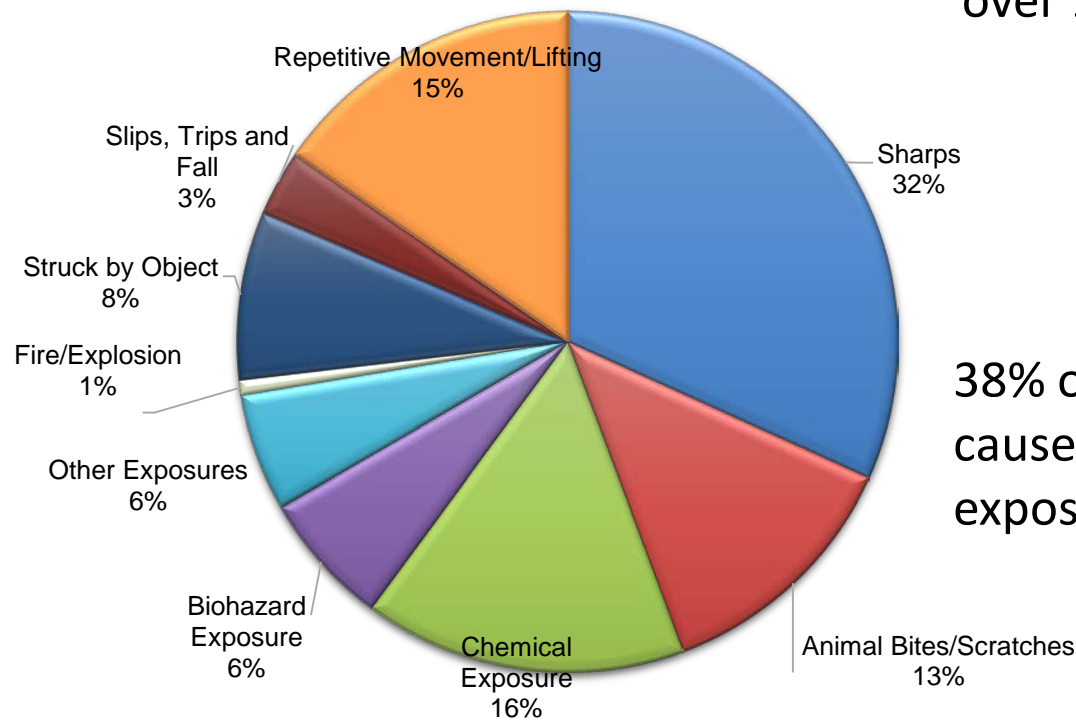
UCLA Incident Analyses

61 Departments/Divisions
6 with more than 40 incidents



UCLA Incident Analysis

Types of Laboratory Incidents



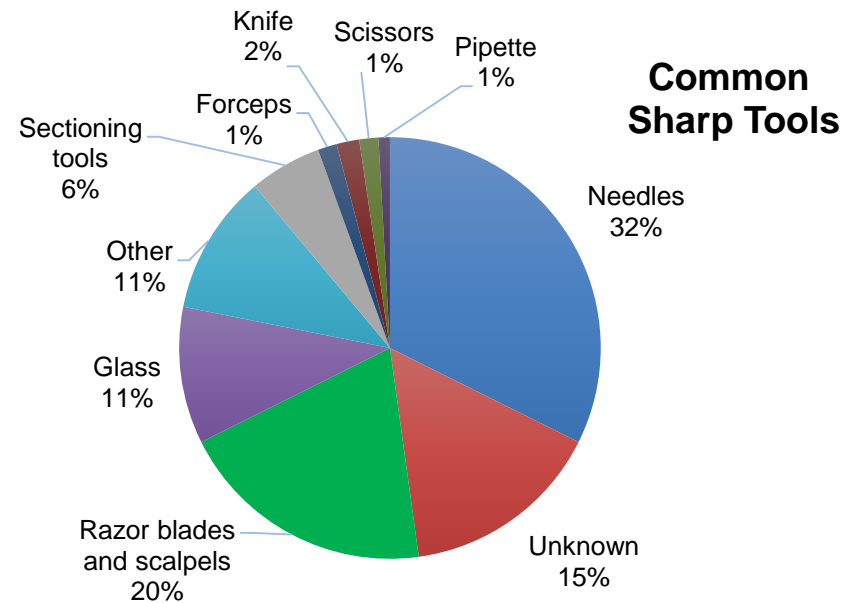
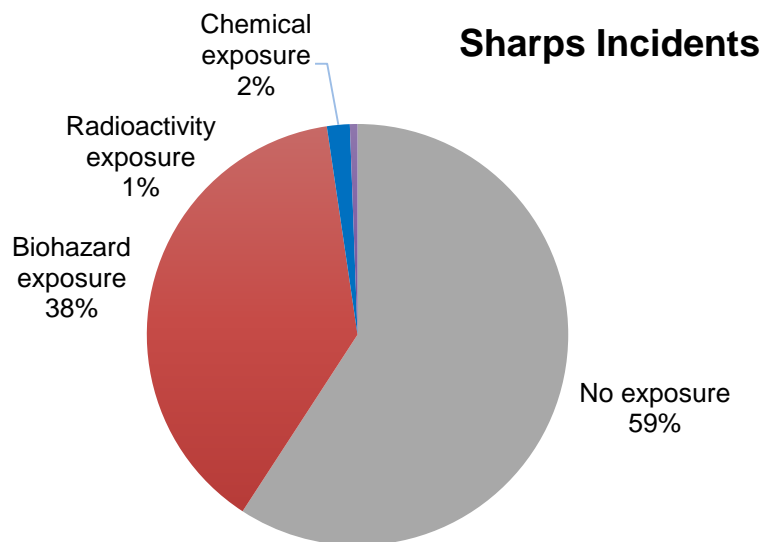
1080 incidents
over 10 years

38% of sharps incidents
cause a biohazard
exposure.

Action item: Improve sharps awareness and training.

UCLA Incident Analysis

Details on Laboratory Incidents

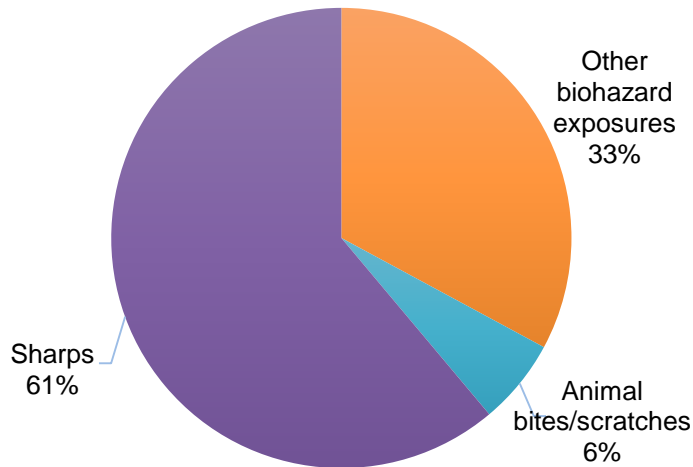


Action item: Loose razor blades should be replaced by razor blade knives

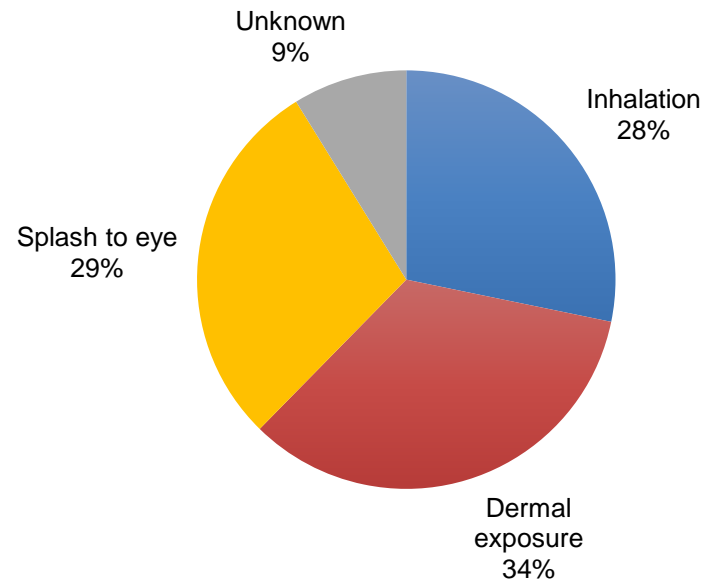
UCLA Incident Analysis

Details on Laboratory Incidents

Total Biohazard Exposures



Chemical Exposures



Action item: Address sharps use which causes 61% of all biohazard exposures

Safety Culture Survey

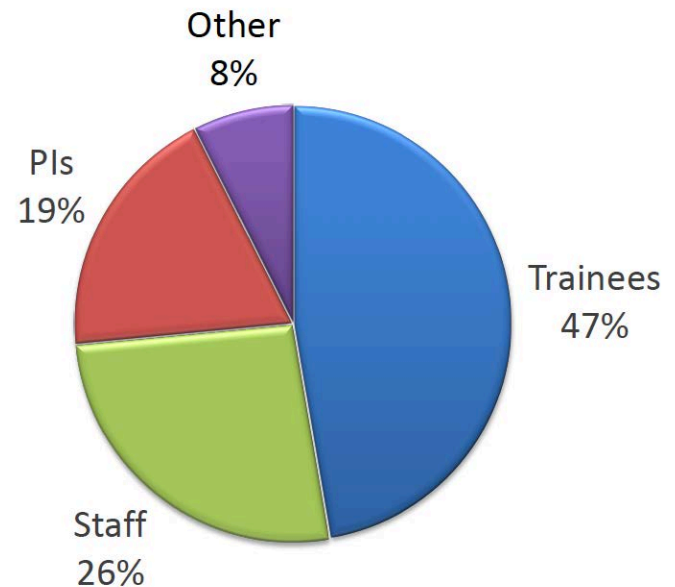
- Determine strengths and weaknesses of safety programs
- Determine the state of laboratory safety culture
- Identify factors that influence the safety culture
- Identify factors factors that correlate with injuries

GOAL: Use data to drive improvements in laboratory safety practices, culture and outcomes

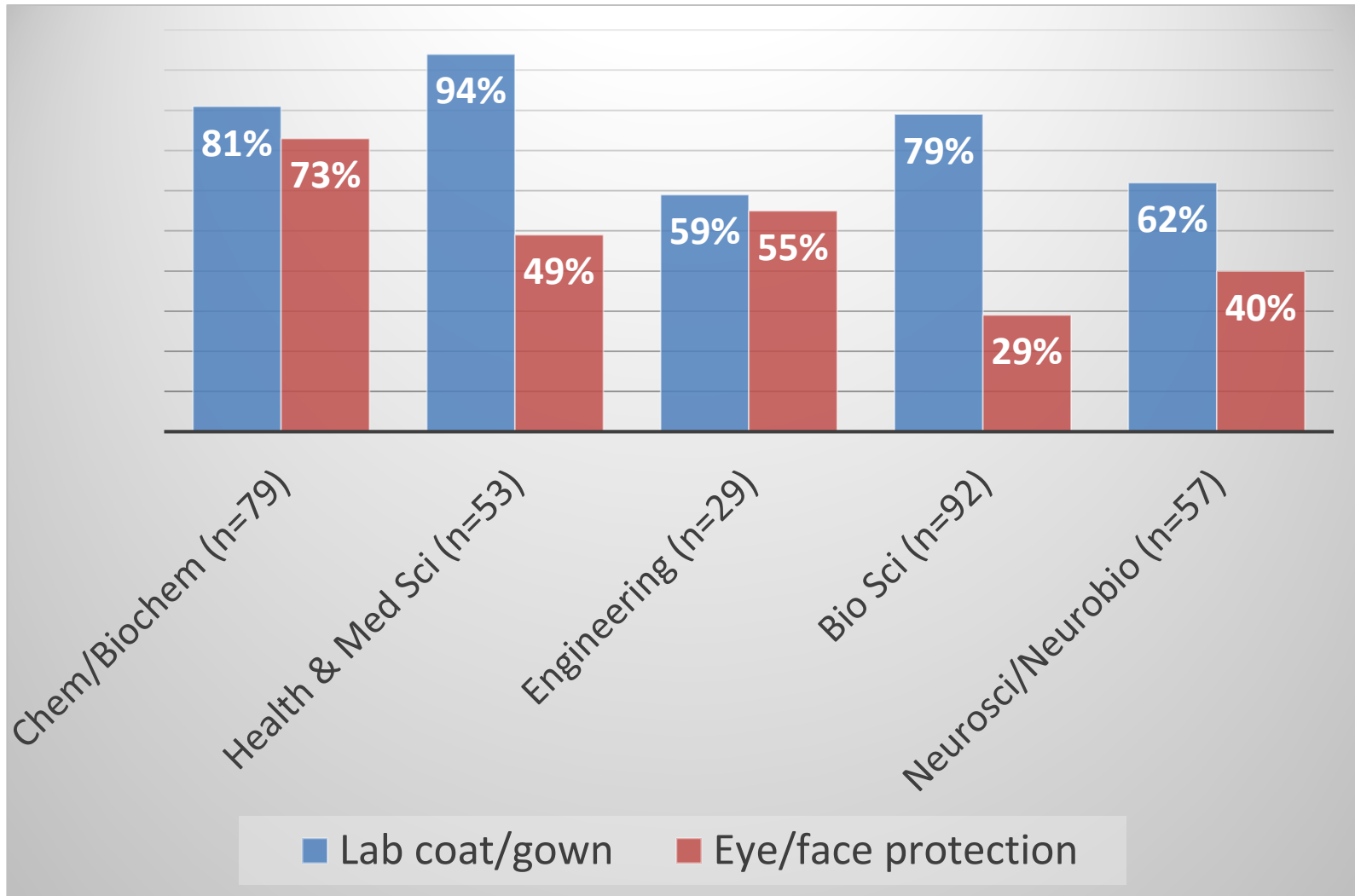
Safety Culture Survey

- Short: < 10 minutes
- 38 questions; 5-point Likert scale, 1 open-ended question
- Bifurcated survey: Students, postdocs & staff vs PIs
- Areas:
 - Demographics
 - Safety communication
 - Safety attitude
 - Safety behavior
 - Lab incidents and near misses
- 4 Research universities
- > 1000 respondents

Life Sciences	57%
Health Sciences	17%
Physical Sciences	14%
Engineering	11%
Other	1%



Trainee/Staff PPE Compliance by Work Area



Safety Culture Survey involving 469 UCLA researchers

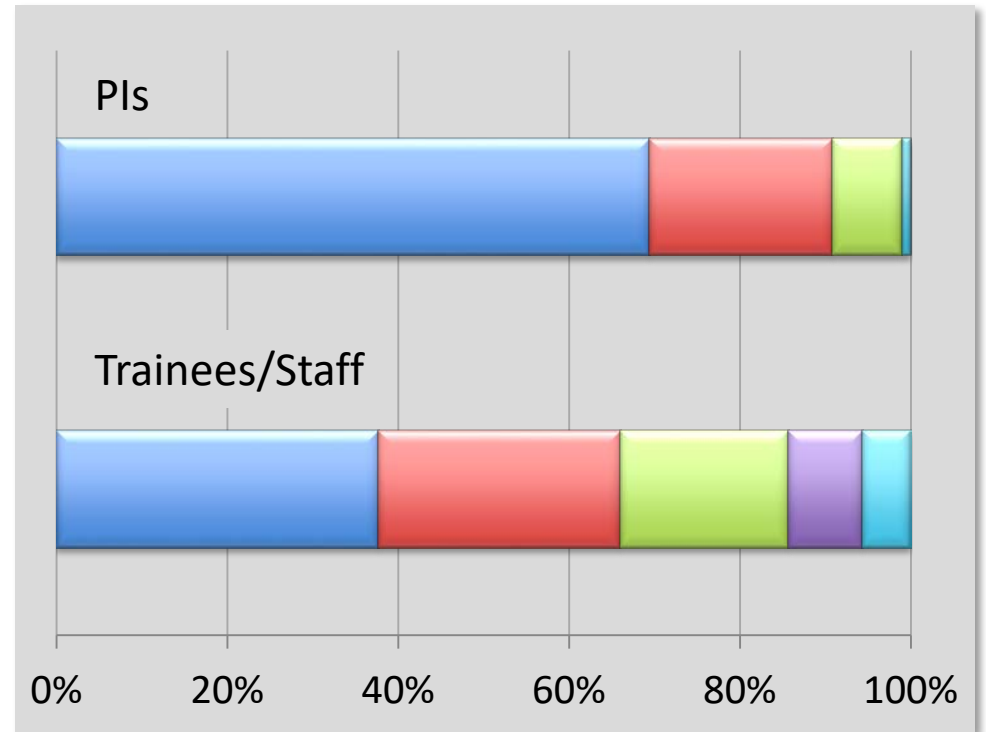
Perception Gap when Discussing Safety in Experiments

I discuss with my lab group how to conduct experiments safely.

89% Agree/Strongly Agree

My PI discusses with me how to conduct experiments safely

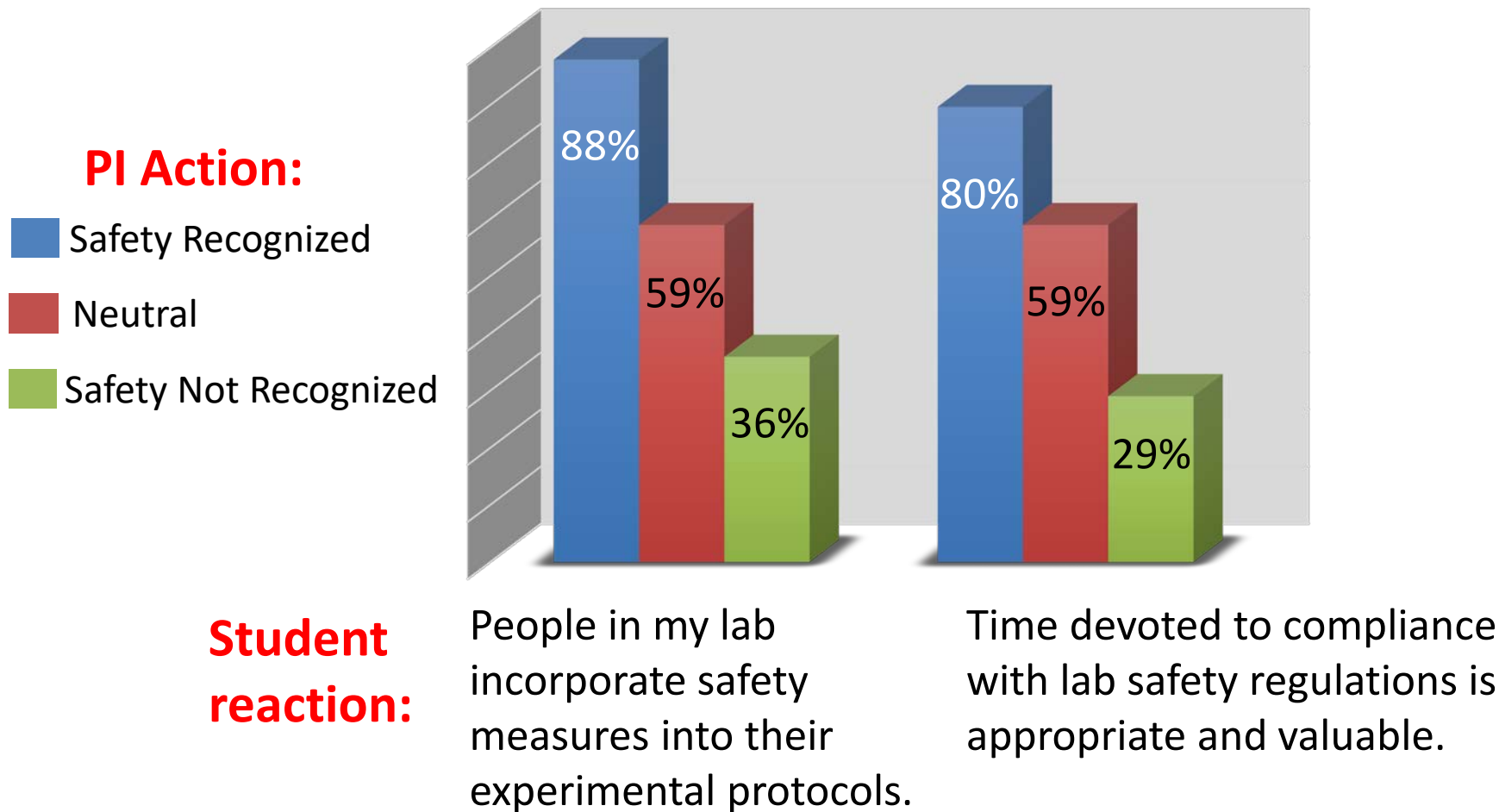
66% Agree/Strongly Agree



Strongly agree  Strongly disagree

Safety Culture Survey involving 1034 University researchers

Correlating PI Safety Recognition with Student Safety Behavior and Attitudes



Safety Culture Survey involving
1034 University researchers

Safety recognition by PI
correlates with safe lab practices

Correlating PI Safety Actions with Student Safety Attitudes and Behavior

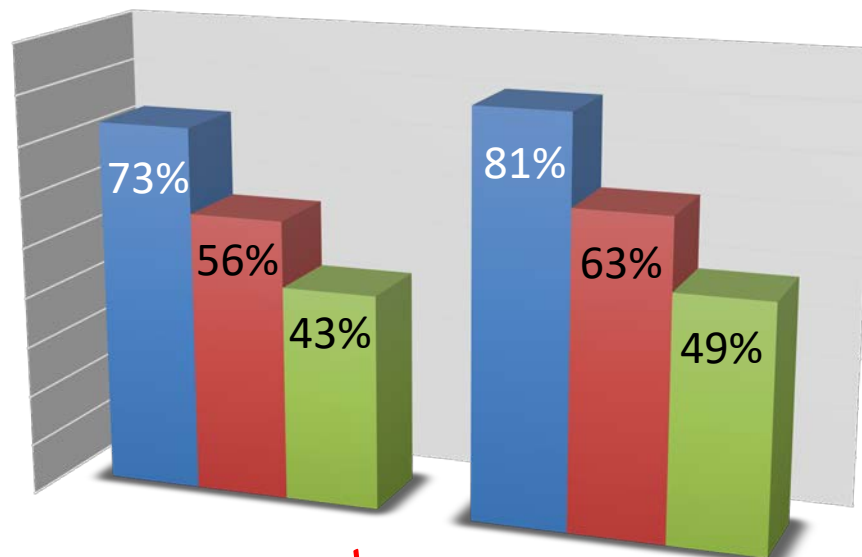
PI Action:

Formal Lab Safety Discussions:

Weekly / Monthly

Quarterly

Yearly / Never



Student Reaction:

Students/staff would report to PI:

A minor injury

A near miss

Regular and frequent lab safety discussions strongly correlate with higher incident reporting

Do Faculty and Student Safety Attitudes and Behaviors Impact Safety Outcomes?

How Can Injuries be Prevented?

Correlating behavior with Safety Outcomes:

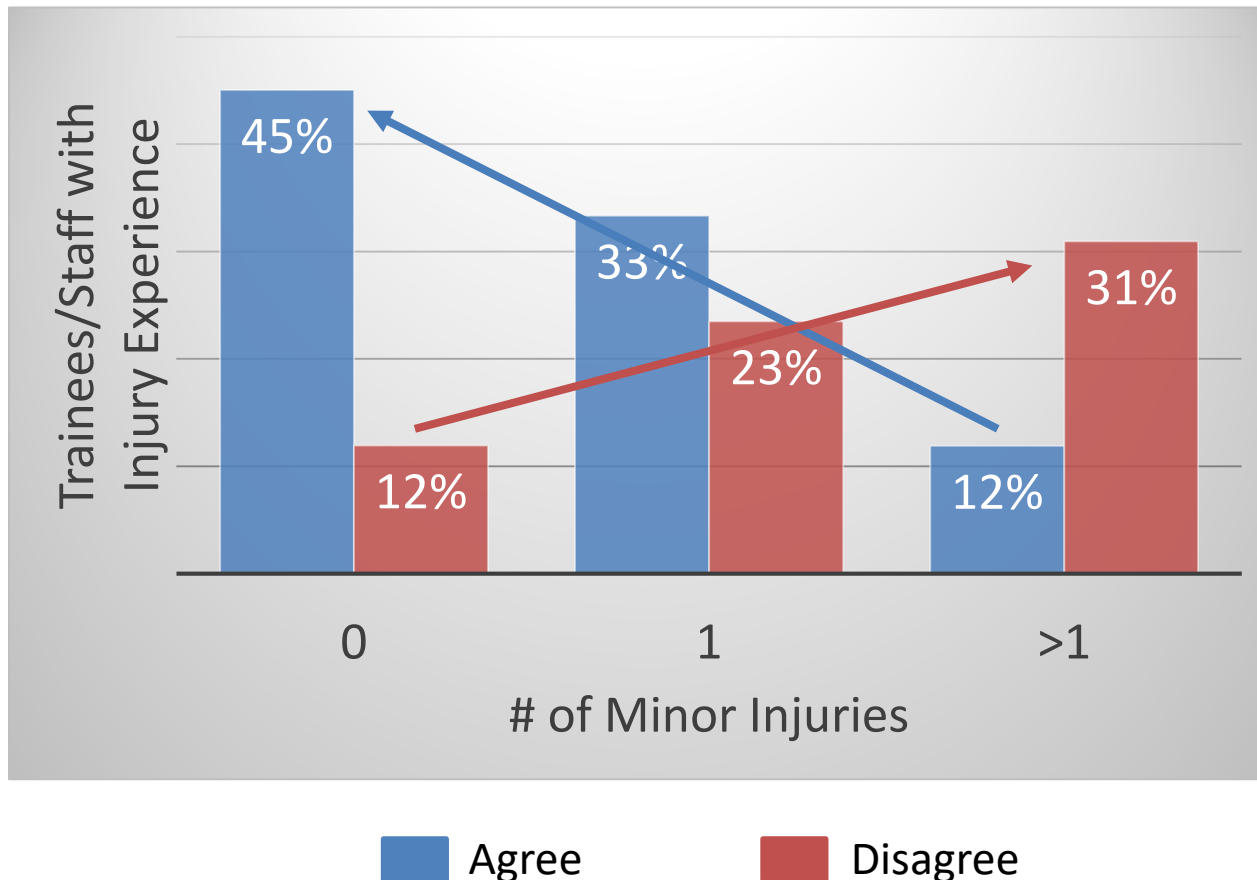
Near Misses

Minor injuries

Major injuries

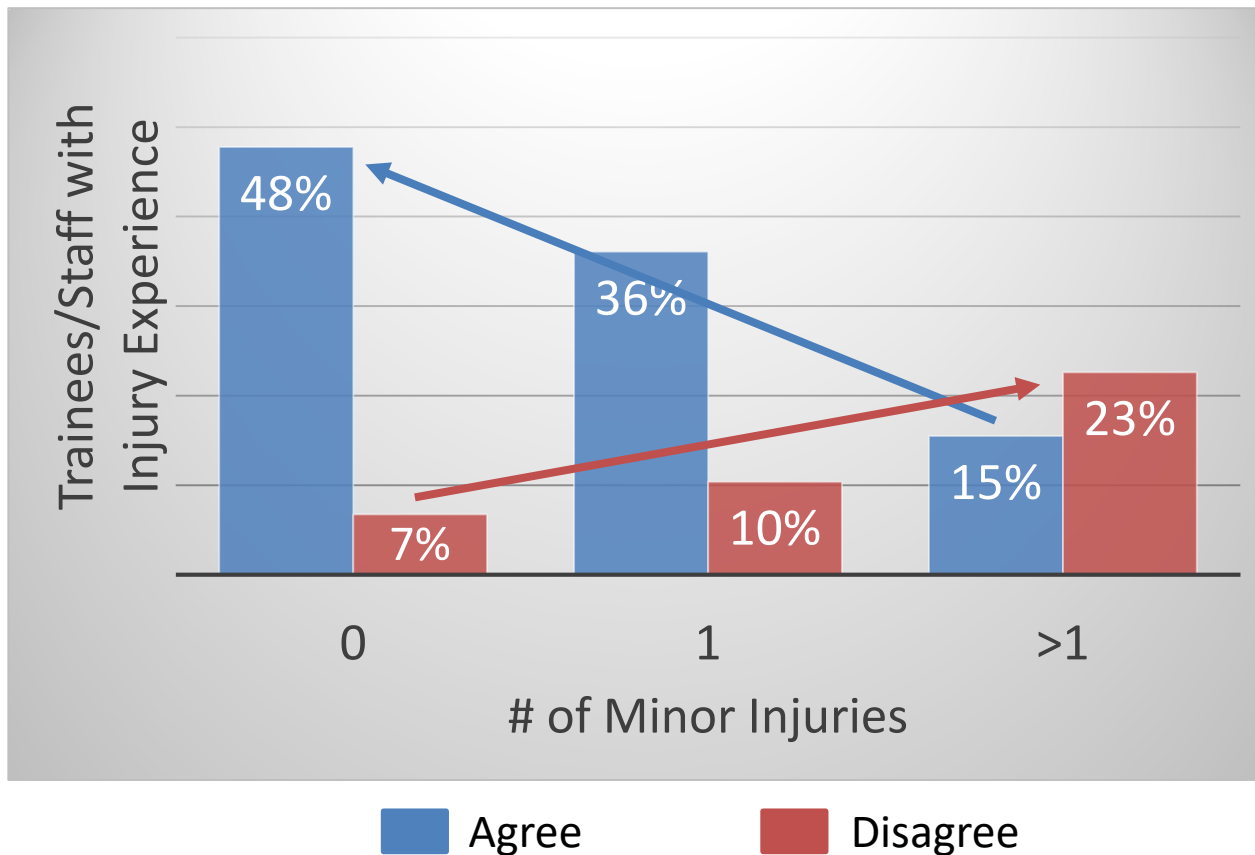
Fewer minor injuries are reported when PI includes risk assessment in experimental design

My mentor/professor discusses with me how to conduct experiments safely.



Fewer minor injuries are reported when students/staff perform risk assessments

People in my lab consider safety procedures before they conduct a new or scaled-up experiment.



Key Findings and Recommendations

Safety Programs

- Huge progress in changing safety practices at UCLA
- Funding needed for PPE and other safety issues

Safety Outcomes

- Low incidence of accidents, but still occur
- Need better incident messaging

Safety Culture

- Many measures of safety culture are positive
- PIs must be more engaged in the importance of lab safety

Think Safety

What could go wrong?

How can I prevent it?

How can I prepare for the unexpected

The End – Be Safe!

Thanks to my outstanding colleagues in the UC Center for Laboratory Safety:

Imke Schroeder - UCCLS Project Manager

Elizabeth Czornyj - UCCLS Researcher

Nancy Wayne – UCCLS Board Chair