THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

Building and Sustaining a Culture of Safety Via Ground-up Approaches

Quinton J. Bruch

University of North Carolina at Chapel Hill
Massachusetts Institute of Technology
August 21st, 2022

Safety in a Synthetic Laboratory

Compliance

Safety Culture

Safety in a Synthetic Laboratory

Compliance

- Rules or mandated actions
- Top-Down approach (EHS)
- Bottom-Up approach (lab initiatives)

Safety Culture

Safety in a Synthetic Laboratory

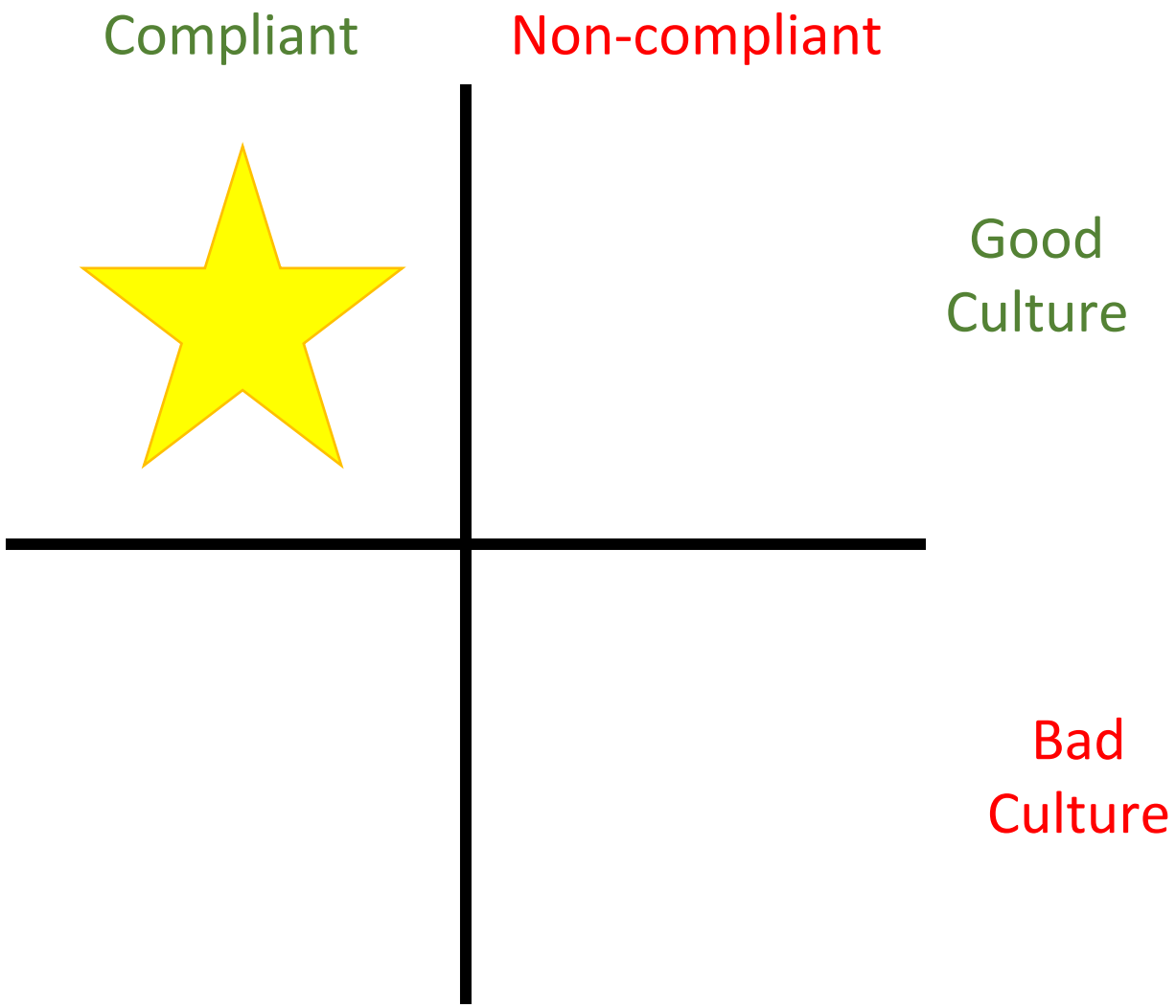
Compliance

- Rules or mandated actions
- Top-Down approach (EHS)
- Bottom-Up approach (lab initiatives)

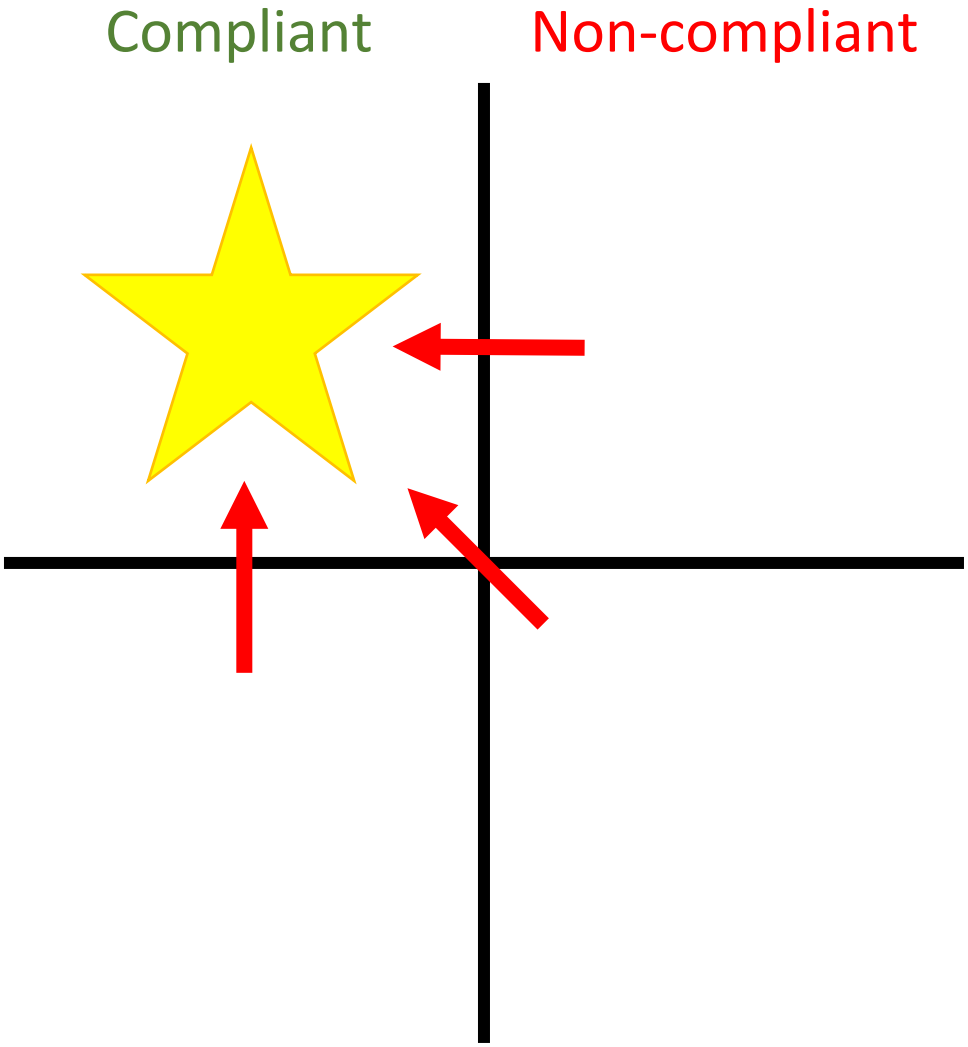
Safety Culture

- Active engagement by students in thinking about safety

Safety in a Synthetic Laboratory



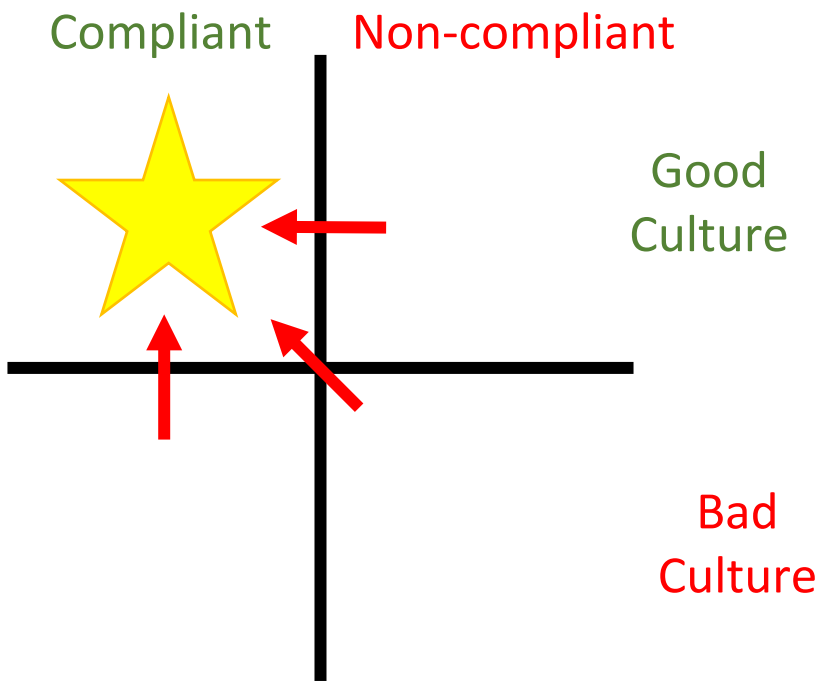
Safety in a Synthetic Laboratory



Fostering a grassroots safety culture

At the Laboratory Level

At the Departmental Level

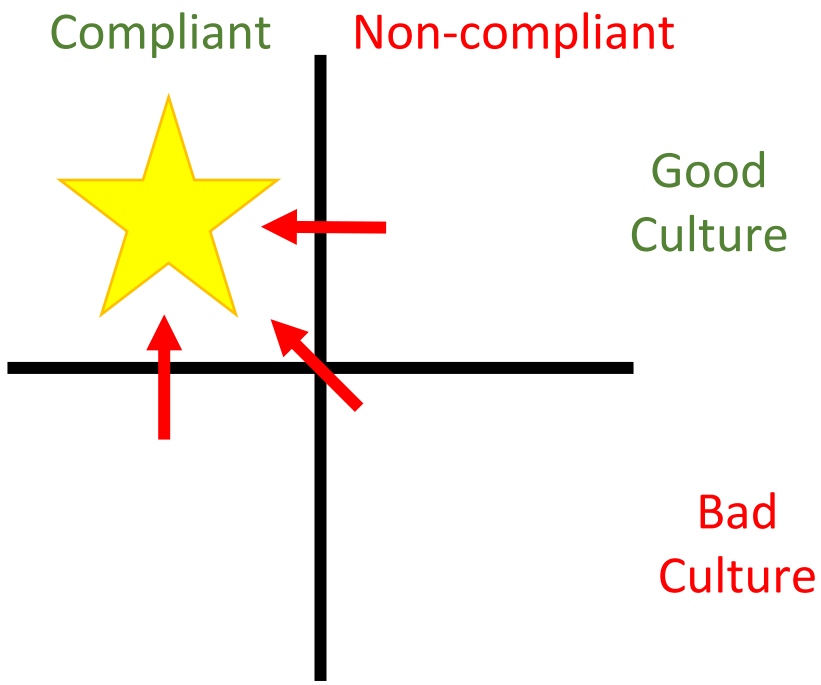


Fostering a grassroots safety culture

At the Laboratory Level

- Safety Minutes
- Safety Field Day

At the Departmental Level



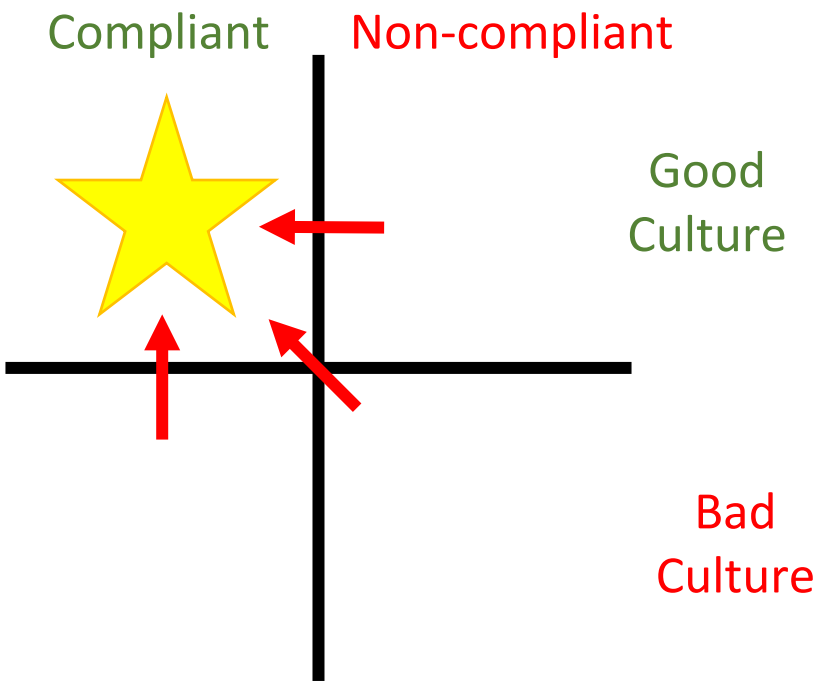
Fostering a grassroots safety culture

At the Laboratory Level

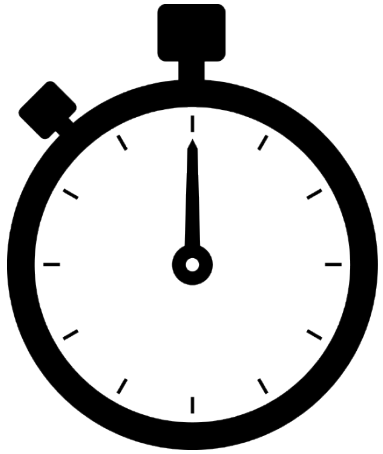
- Safety Minutes
- Safety Field Day

At the Departmental Level

- Joint Safety Teams

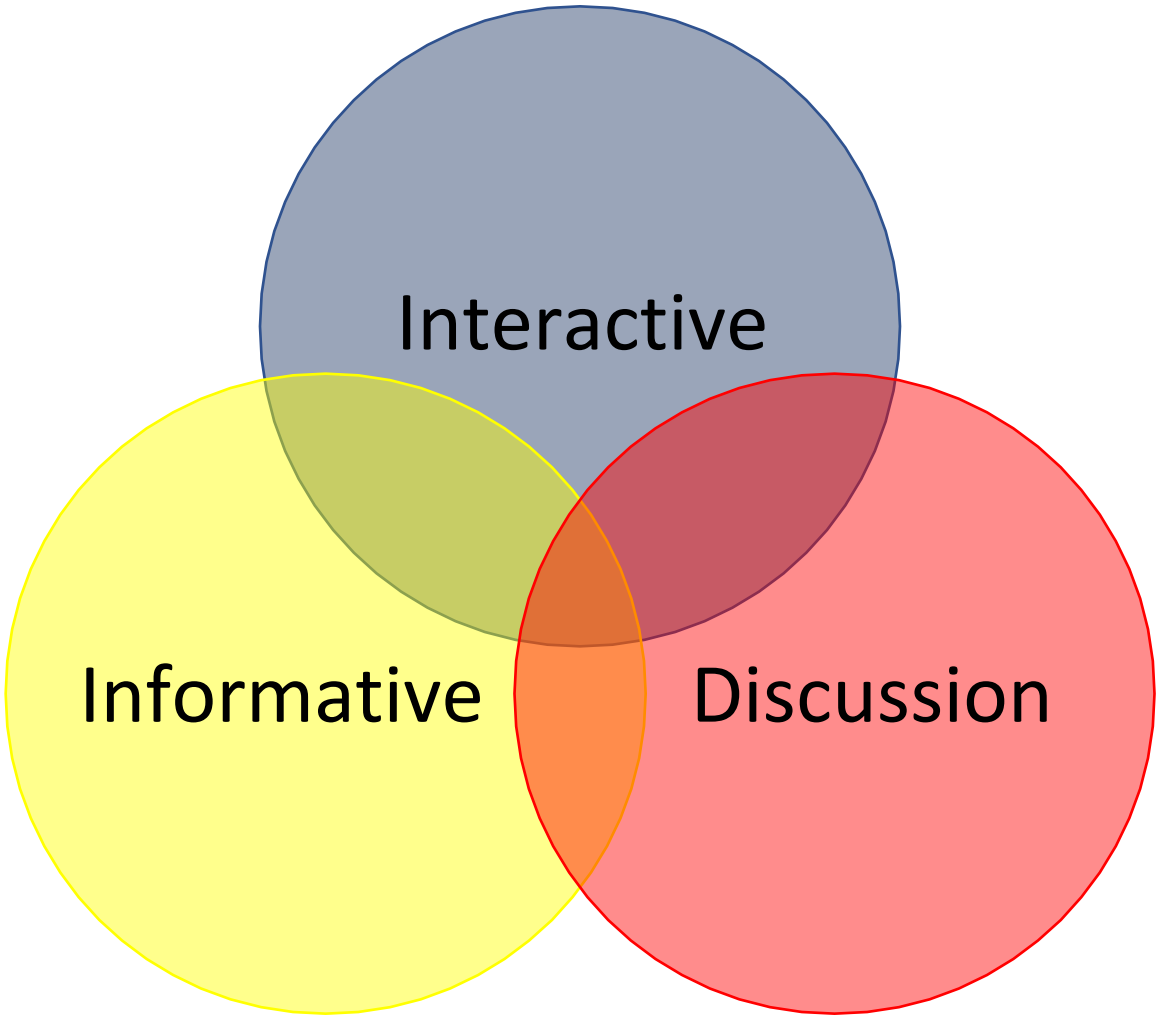


Peer Teaching: Safety Minutes



- A Safety Minute is a 10-20 minute interactive discussion on a topic presented by a researcher
- Can relate to a recent lab accident, a technique or procedure, a SOP, or hazard assessment
- It is a part of our weekly group meeting

Components of a Safety Minute

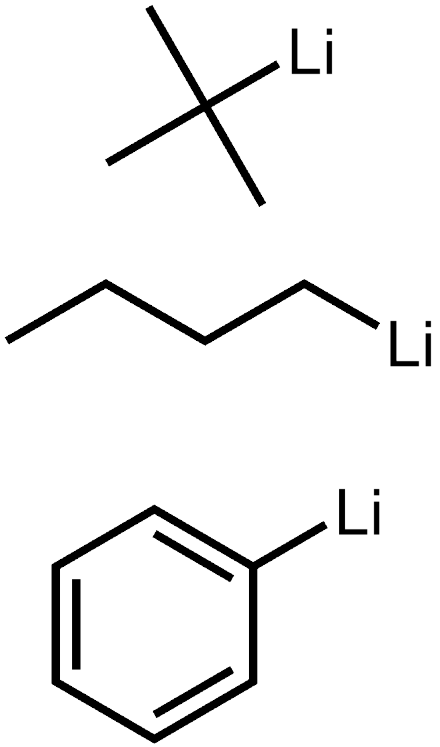


Cradle-to-Grave Planning

A complete risk assessment of a reaction

Prompt: Design a complete cradle-to-grave plan for using an organolithium reagent

- Interactive:
  - Prompt requires students to create something
- Discussion:
  - Students will discuss best practices and options on tackling potential hazards
- Informative:
  - Students are either exposed to new knowledge or get a refresher



Getting the Most From Safety Minutes

- Incorporating examples of past work or ongoing research
- Engaging everyone in discussion
  - Creating environments where new students will participate
- Choosing a topic that requires critical thinking
- A great way to be proactive and not reactive
  - Run through weather scenarios before the hurricane/blizzard

Peer Teaching: Safety Field Day

- Annual requirement to review safety with PI
- Created a day of demos and hands-on activities
- Builds in time for discussion on the safety of activities

Implementing Safety Field Day

- Ask for people to submit ideas for activities while planning
  - Student-led process
- Design activities around two types:
  - Important for everyone to review annually
  - A rare technique that can be shared as a teaching opportunity
- Rotate through activities/demos in small groups

Cannula Transfers, 2017

Example Activities

Those in bold are perennial activities

Hands-on

- **Gloveboxes**
- Sealing Ampoules
- Cannula Transfer

Discussions

- Crystallizations
- NMR Data Analysis

Demos

- **Vacuum traps**
- **Moving gas cylinders**
- Vac Transfer
- Soxhlet extraction
- Quenching Pyrophorics
- Air-free filtrations

Designing a Successful Activity

- Pick a topic that you are highly knowledgeable in
- Ensure there is a clear demo/hands-on activity
- Explain why the activity/technique is important
- Engage groups in discussion

Air-free filtrations, 2017

Building a Joint Safety Team

- Goal of starting a JST that works for our community and addresses
- First need to know what the problems even are

Results of a Departmental Climate Survey

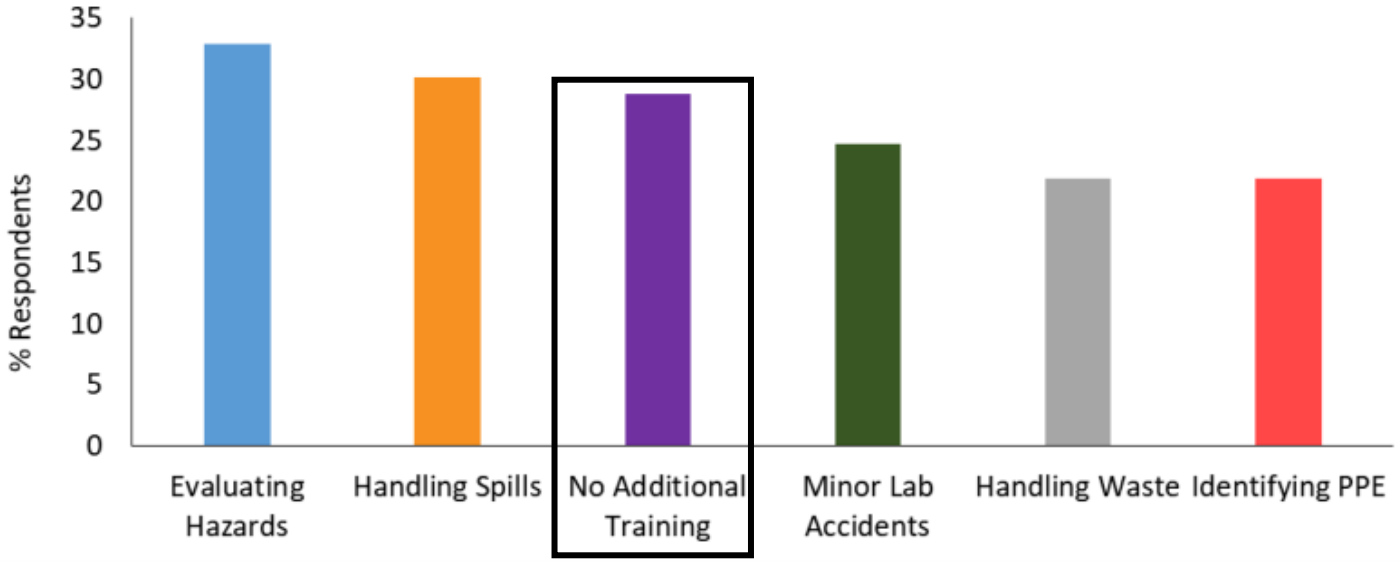
Safety Training

What additional training do you feel is missing?

Results of a Departmental Climate Survey

Safety Training

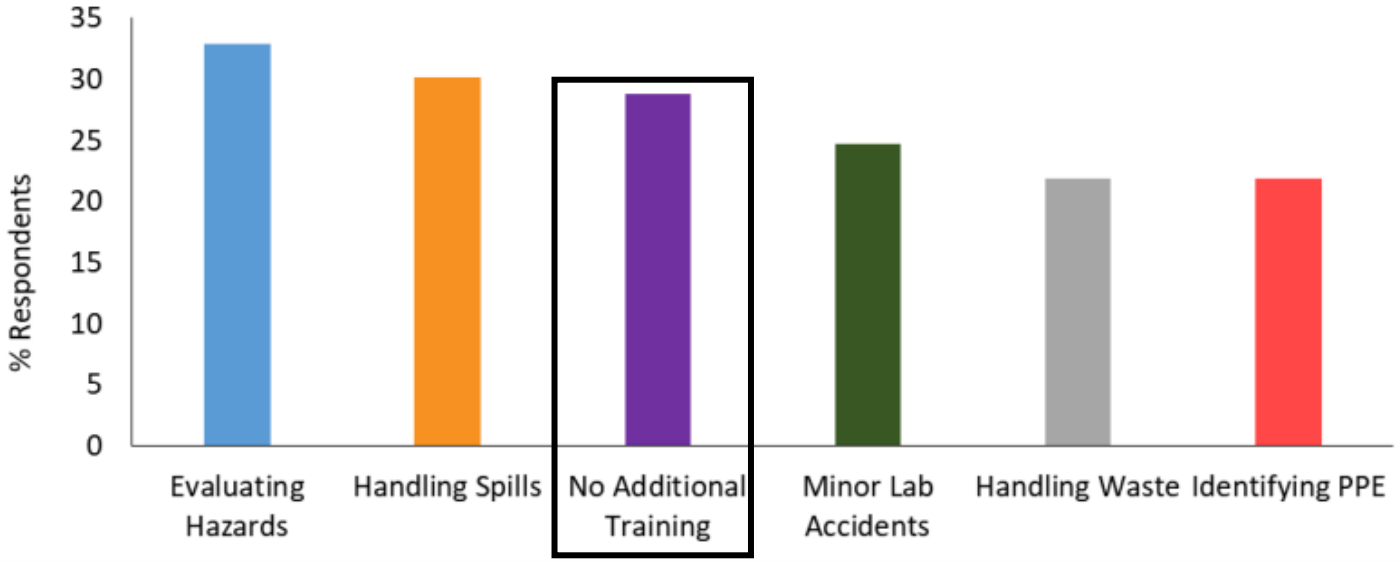
What additional training do you feel is missing?



Results of a Departmental Climate Survey

Safety Training

What additional training do you feel is missing?



- >80% of respondents have received hands-on lab training, safety walkthroughs, and fire extinguisher training

Results of a Departmental Climate Survey

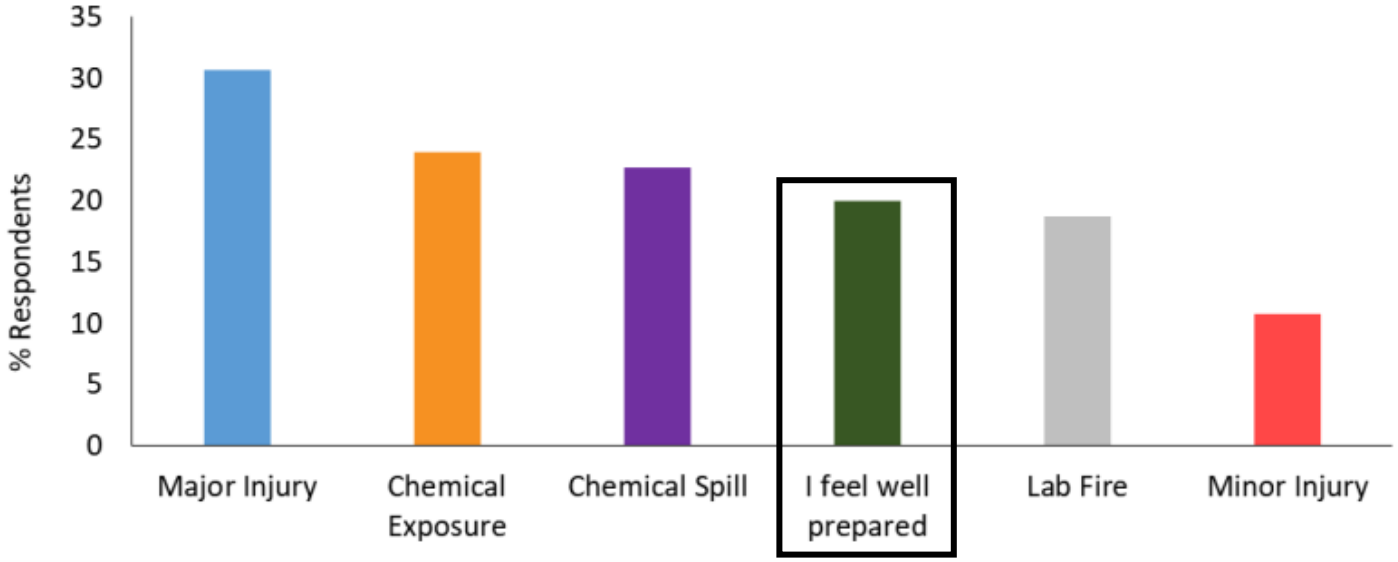
Emergency Response

What emergency situations do you feel unprepared for?

Results of a Departmental Climate Survey

Emergency Response

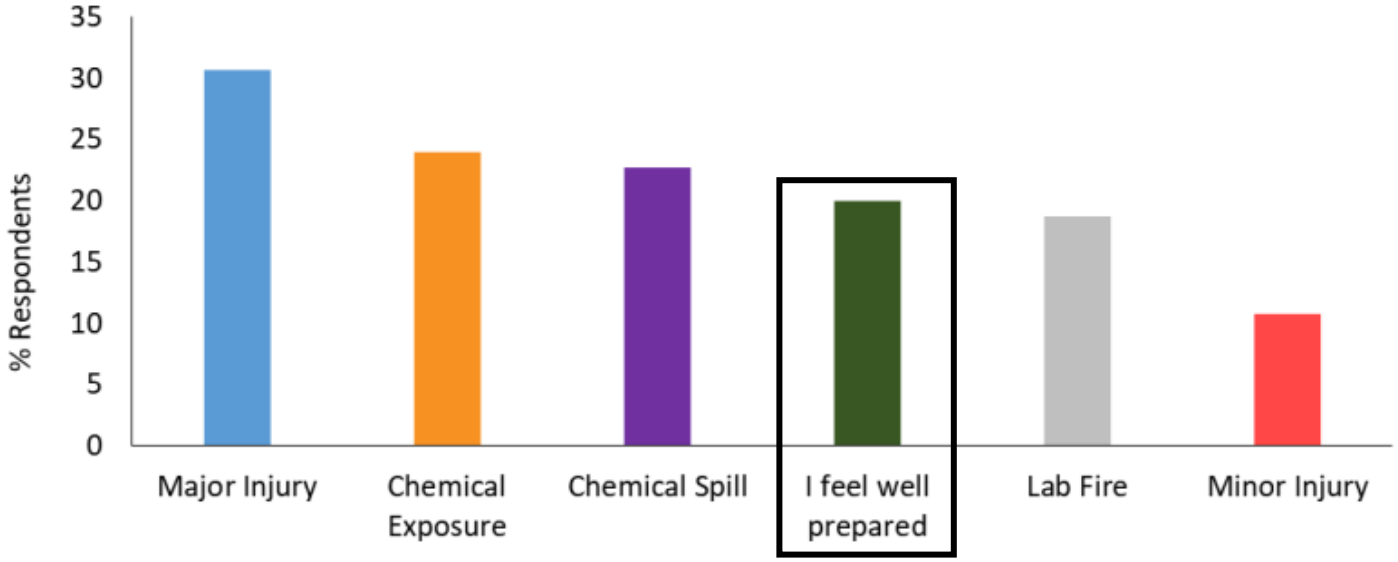
What emergency situations do you feel unprepared for?



Results of a Departmental Climate Survey

Emergency Response

What emergency situations do you feel unprepared for?



- 60% of respondents do not correctly know where to seek medical attention from a lab accident
- 65% of respondents are unprepared for a lab explosion

Results of a Departmental Climate Survey

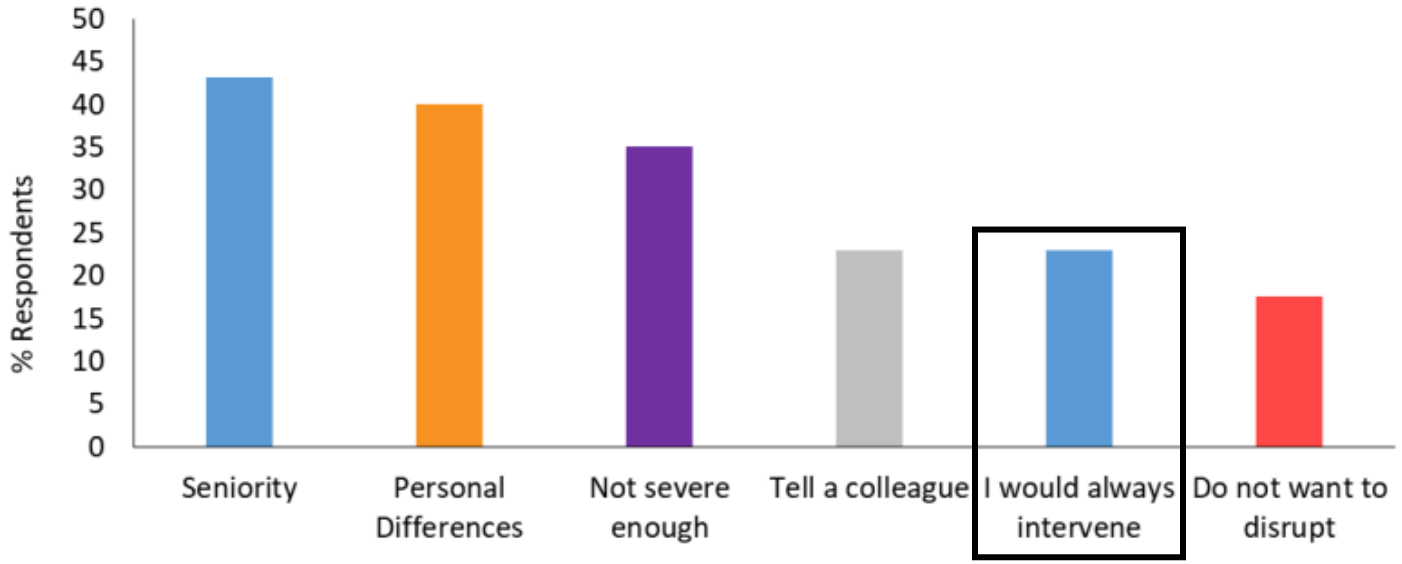
Safety Interventions

Why would you not say something to a lab mate being unsafe?

Results of a Departmental Climate Survey

Safety Interventions

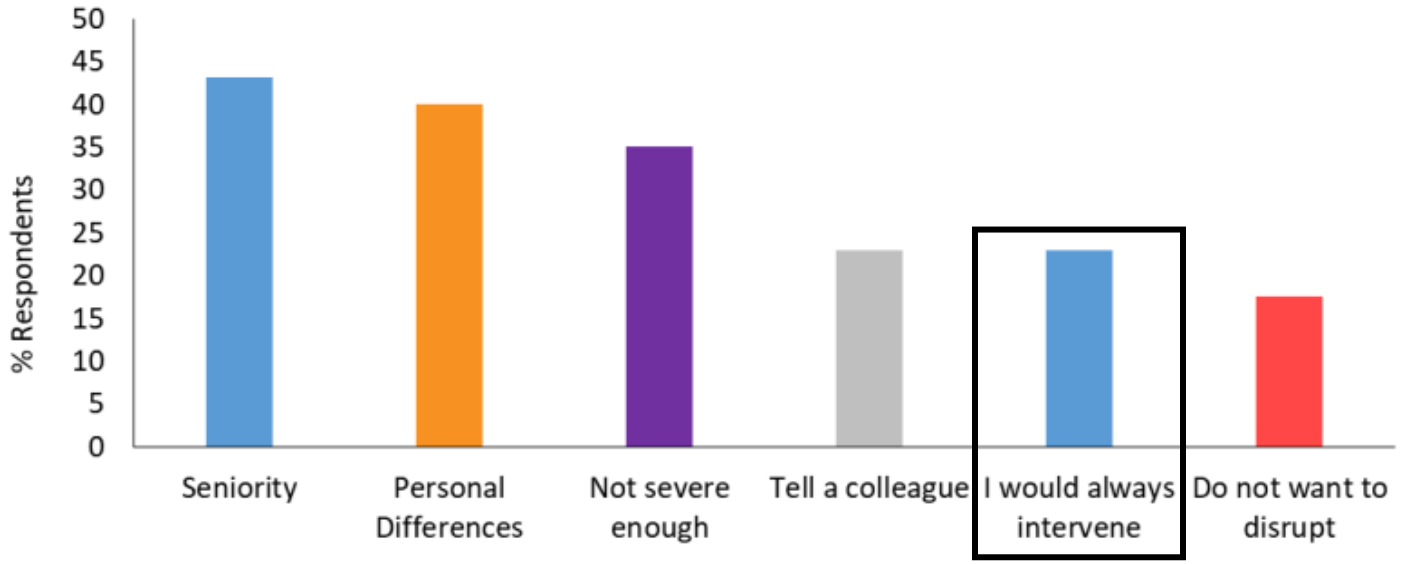
Why would you not say something to a lab mate being unsafe?



Results of a Departmental Climate Survey

Safety Interventions

Why would you not say something to a lab mate being unsafe?



- 66% of people would (or have already) participated in conflict resolution training that would help with interventions

Acknowledgements

People

Alexander Miller
Ian Tonks
Ralph House
Cathy Brennan
Jim Potts
UNC EHS

JST Leadership

Hannah Starr
Hanne Henriksen
Carolyn Hartley
Ann Marie May
Rachel Cooke
Steve Terenaik
Kathleen Nevins

NSF

GRFP
NSF GRADUATE RESEARCH FELLOWSHIP PROGRAM

NATIONAL INSTITUTES OF HEALTH