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

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Safety in a Synthetic Laboratory
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

Compliant

Non-compliant

Good Culture

Bad Culture
Safety in a Synthetic Laboratory

Compliant  Non-compliant

Good Culture

Bad Culture
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

Compliant Non-compliant
Good Culture Bad Culture
Fostering a grassroots safety culture

At the Laboratory Level
- Safety Minutes
- Safety Field Day

At the Departmental Level
- Joint Safety Teams
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.
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
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?
Safety Training

What additional training do you feel is missing?

- 93% of respondents agreed/strongly agreed in receiving adequate training.
- >80% of respondents have received hands-on lab training, safety walkthroughs, and fire extinguisher training.
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?

- Major Injury: 30% of respondents feel unprepared
- Chemical Exposure: 25%
- Chemical Spill: 20%
- I feel well prepared: 15%
- Lab Fire: 10%
- Minor Injury: 5%
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?

- Seniority
- Personal Differences
- Not severe enough
- Tell a colleague
- I would always intervene
- Do not want to disrupt

Bar chart showing the percentage of respondents for each reason.
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.
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![Image of the research team]