Lab Self-Inspection, Validation & Follow-Up: A Cyclic Process for Continuous Improvement in Laboratory Safety

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EMORY UNIVERSITY | Environmental Health and Safety Office

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Emory University in a Nutshell

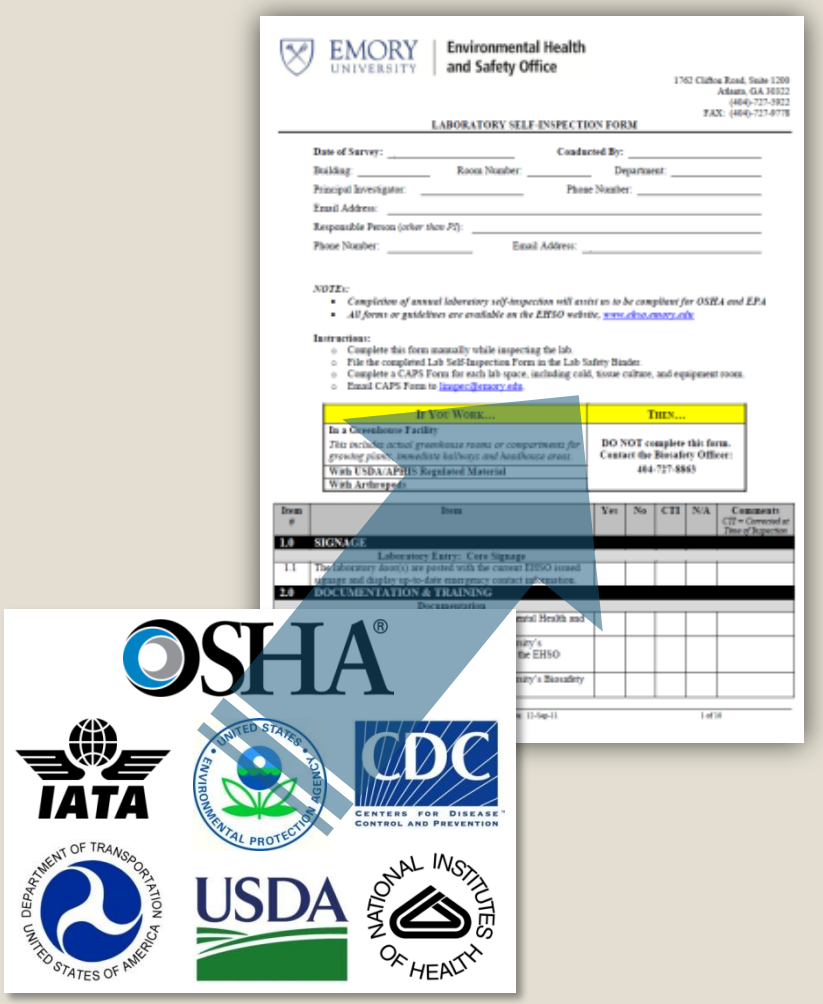
- Located in Atlanta, GA
- 13,381 enrolled students (2010)
- Main campus spans over 600 acres
- Multiple satellite campuses
- 16 research buildings
- Approximately 500 PIs and 1400 laboratory spaces
- Research Safety/Biosafety Team is comprised of 6 people:
  - 1 Biosafety Officer
  - 4 EHS Professionals
  - 1 Administrative Assistant

Emory's Lab Inspection Program

- Three components to our Lab Inspection Program:
  - PI completed Lab Self-Inspection
  - EHSO completed Lab Validation
  - EHSO completed Follow-Up Inspection
- Lab Self Inspection is required annually and is tied to biosafety protocol approval and other EHSO sign-off
- Lab Validation's are completed for approximately 30% of the labs on campus
- 1-2 weeks after the validation, EHSO completes a follow-up inspection to see what gaps have been closed

Lab Inspection Form Components

- The same questions are used for the self-inspection, validation and follow up inspection
- The form is comprehensive and all items on the form are compliance based
- 14 sections include topics such as training, waste management, engineering controls, etc.
- Items also work as a check and balance for other EHSO programs
  - Respiratory Protection Program
  - Laboratory Safety Program



Importance of Lab Self-Inspection

- Ultimately, the PI is responsible for their lab and the safety of their lab personnel
- Making the PI and lab go through the questions helps educate them in terms of lab safety
- Since the questions are the same for the self-inspection, validation, and follow-up inspections:
  - All players learn to speak the same safety language
  - Everyone knows what is expected of them
- Many of the questions are phrased to signal the PI to perform other processes within EHSO. Examples include:
  - Submitting a laser registration form for their lasers
  - Submitting a Biosafety Notice of Intent for their recombinant DNA or infectious material work

Structure of Self-Inspection Reporting

Lab Self-Inspection Form

Item #	Item	Yes	No	CTI	N/A	Comments *CTI = Corrected at Time of Inspection*
1.0	**SIGNAGE**					
	Laboratory Entry: Core Signage					
1.1	The laboratory door(s) are posted with the current EHSO issued signage and display up-to-date emergency contact information.		✓			
2.0	**DOCUMENTATION & TRAINING**					
	Documentation					
2.1	All personnel know how to access the Environmental Health and Safety Office (EHSO) website.	✓				
2.2	All personnel know how to access Emory University's Bloodborne Pathogen Exposure Control Plan on the EHSO website.	✓				
2.3	All personnel know how to access Emory University's Biosafety Manual on the EHSO website.	✓				

Corrective Action Plan Form

Item # on Self-Inspection Form - *List each item with a checkmark in the 'No' column on the Self-Inspection Form*	**Proposed Corrective Action(s)** - *Must be completed for each listed item*
1.1	We will email our new emergency contact info to linspec@emory.edu to update our lab signage.

The Program's Evolution into a Cyclic Program

2008

2008-2009:
- Initiated the first round of the lab self-inspection program building by building

2009

2009:
- EHSO Validations in preparation for the EPA Peer Audit

2010

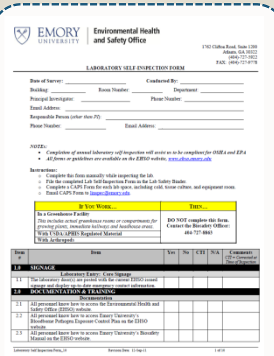
2010:
- PI Self-Inspections
- EHSO Validations

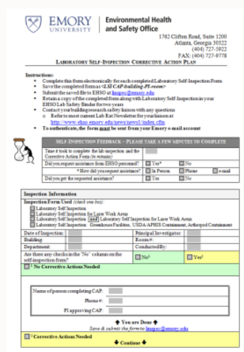
2011

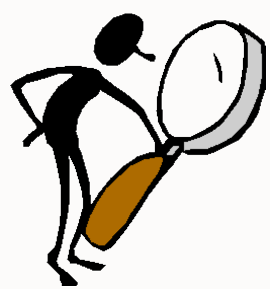
2011:
- PI Self-Inspections
- EHSO Validations
- EHSO Follow-Up Inspections

Emory's Lab Inspection Program (as of 2011)

1. PI completes Lab Self Inspection
2. PI submits Corrective Action Plan to EHSO
3. EHSO completes Lab Validation
4. EHSO emails Validation Report to PI
5. EHSO completes Follow-Up Inspection

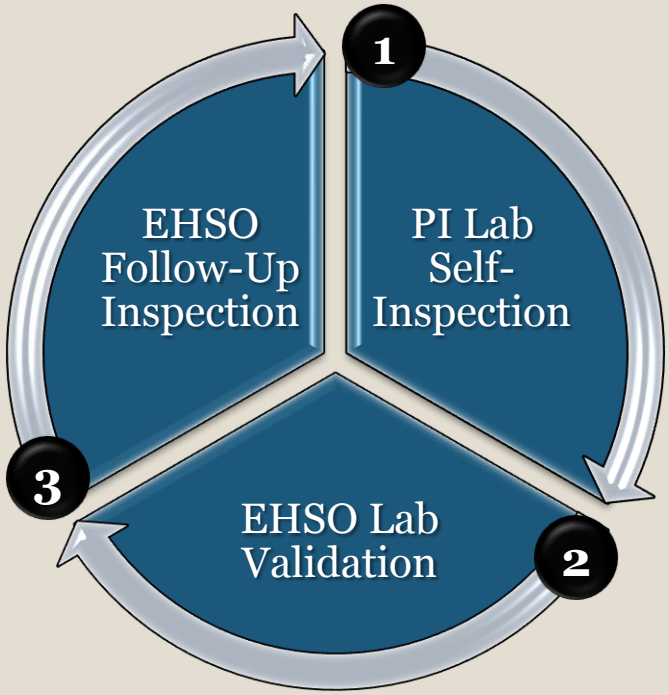






Objective of Laboratory Inspection Program

- To use a lab self-inspection program in conjunction with EHSO conducted validation and post-validation follow-up inspections to decrease items of non-compliance and continuously improve laboratory safety



Methods

- Lab self-inspections, validations and follow-up inspections are tracked for each year either on excel sheets or an online database
- Analyzed 2011 EHSO validation data to determine what were the items in our inspection program with the highest levels of non-compliance
- Selected all items with over a 20% non-compliance rate (12 items)

Top 12 Non-Compliant Items (from 2011 Validations)

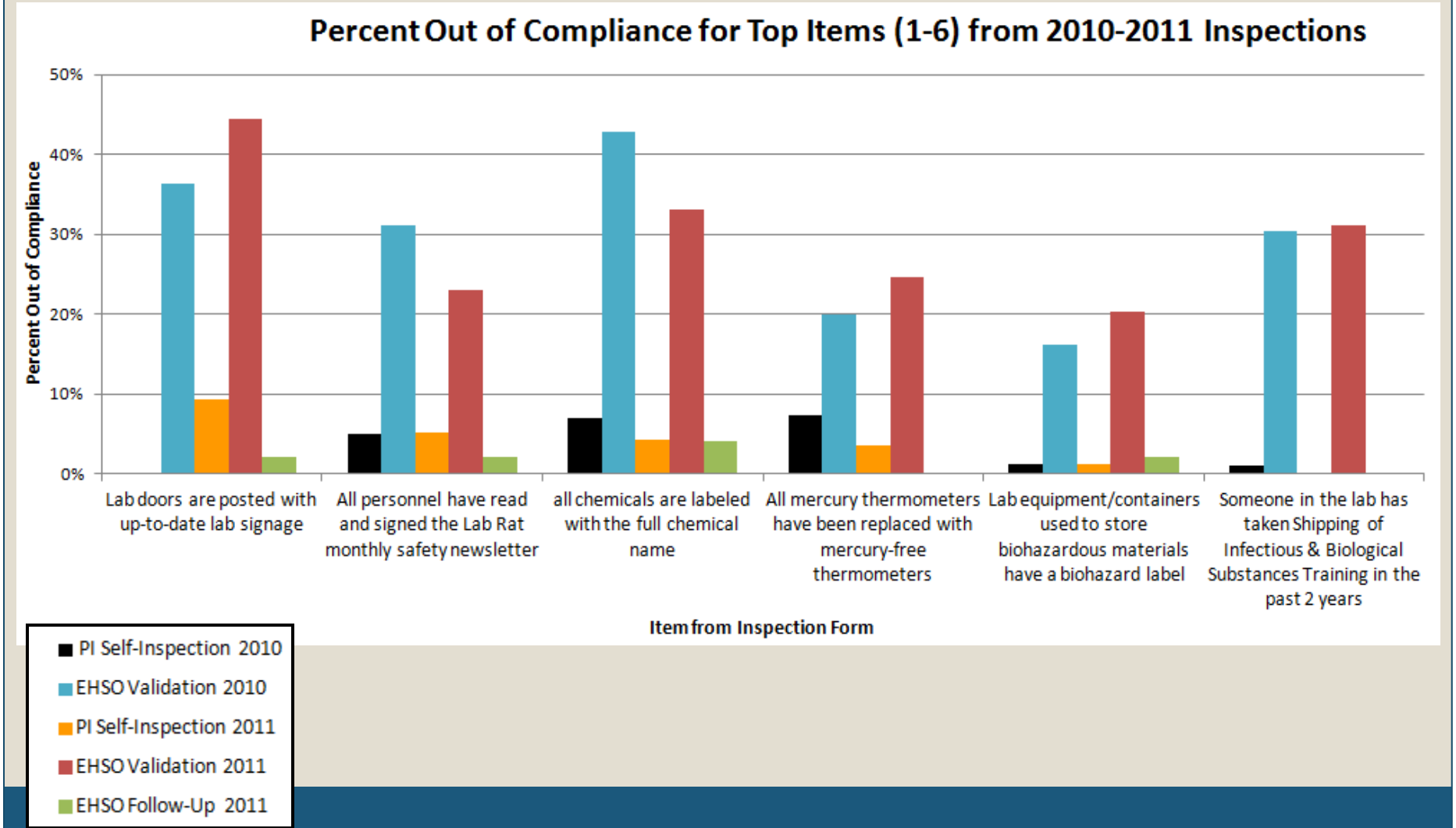
These items were marked "NO" for over 20% of the 2011 EHSO Validations

1	Lab doors are posted with up-to-date laboratory signage
2	All personnel have read and signed the Lab Rat monthly safety newsletter
3	All chemicals are labeled with the full chemical name
4	All mercury thermometers have been replaced with mercury-free thermometers
5	Lab equipment/containers used to store biohazard materials have a biohazard label
6	Someone in the lab has taken Shipping of Infectious & Biological Substances training in the past 2 years
7	Biohazard waste containers are closed except when adding waste
8	Sink is equipped with soap and paper towels for handwashing
9	Airflow is negative to the corridor when appropriate
10	The chemical fume hood is free of material and equipment stored long term
11	The lab eyewash station is tested and documented monthly by lab personnel
12	A visual inspection of the fire extinguisher is conducted and documented monthly

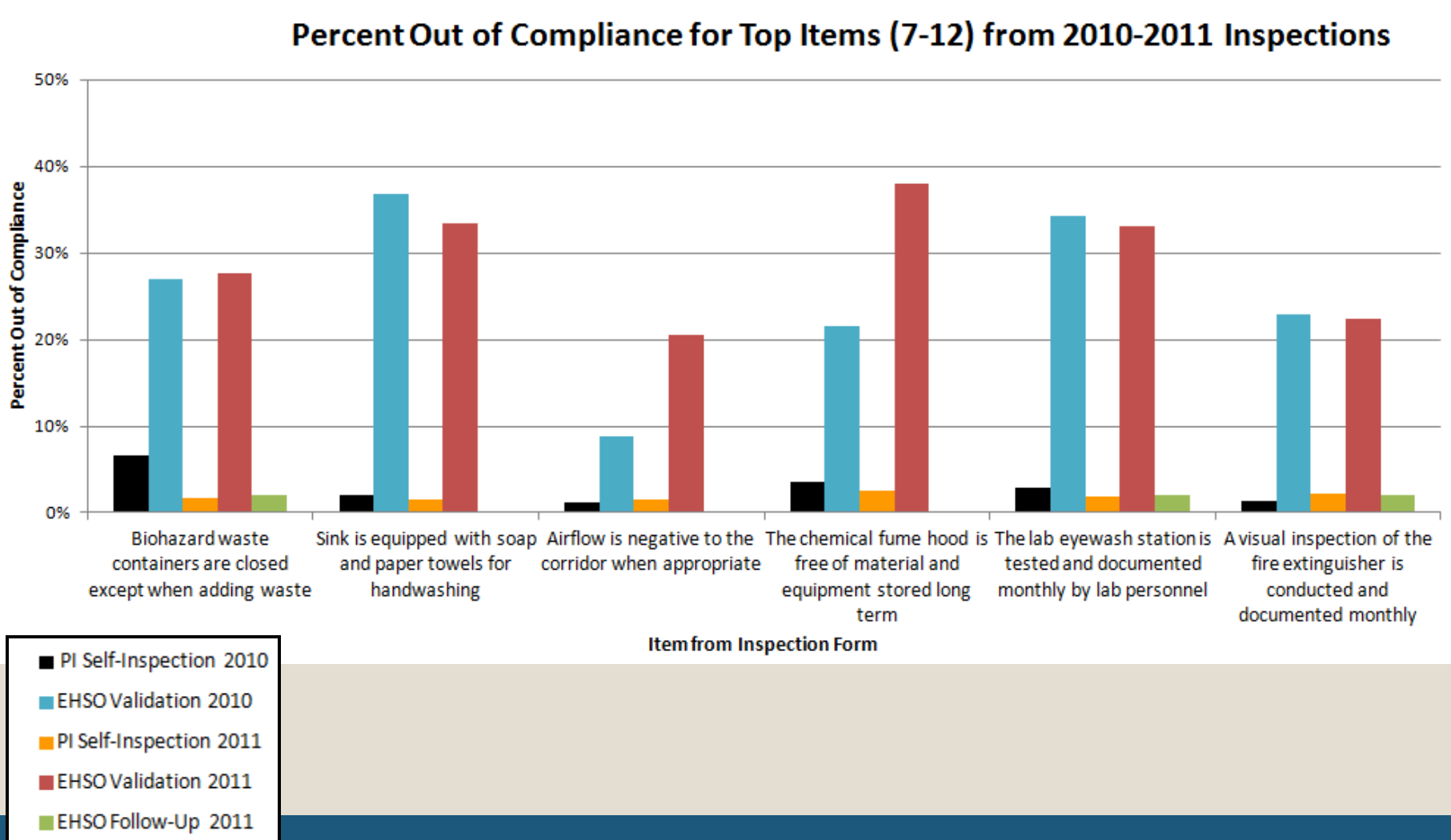
Data Analysis

- Determined the overall compliance rates for the 12 items from the following sets of data:
  - 2010 PI Self-Inspection
  - 2010 EHSO Validation
  - 2011 PI Self-Inspection
  - 2011 EHSO Validation
  - 2011 EHSO Follow-Up

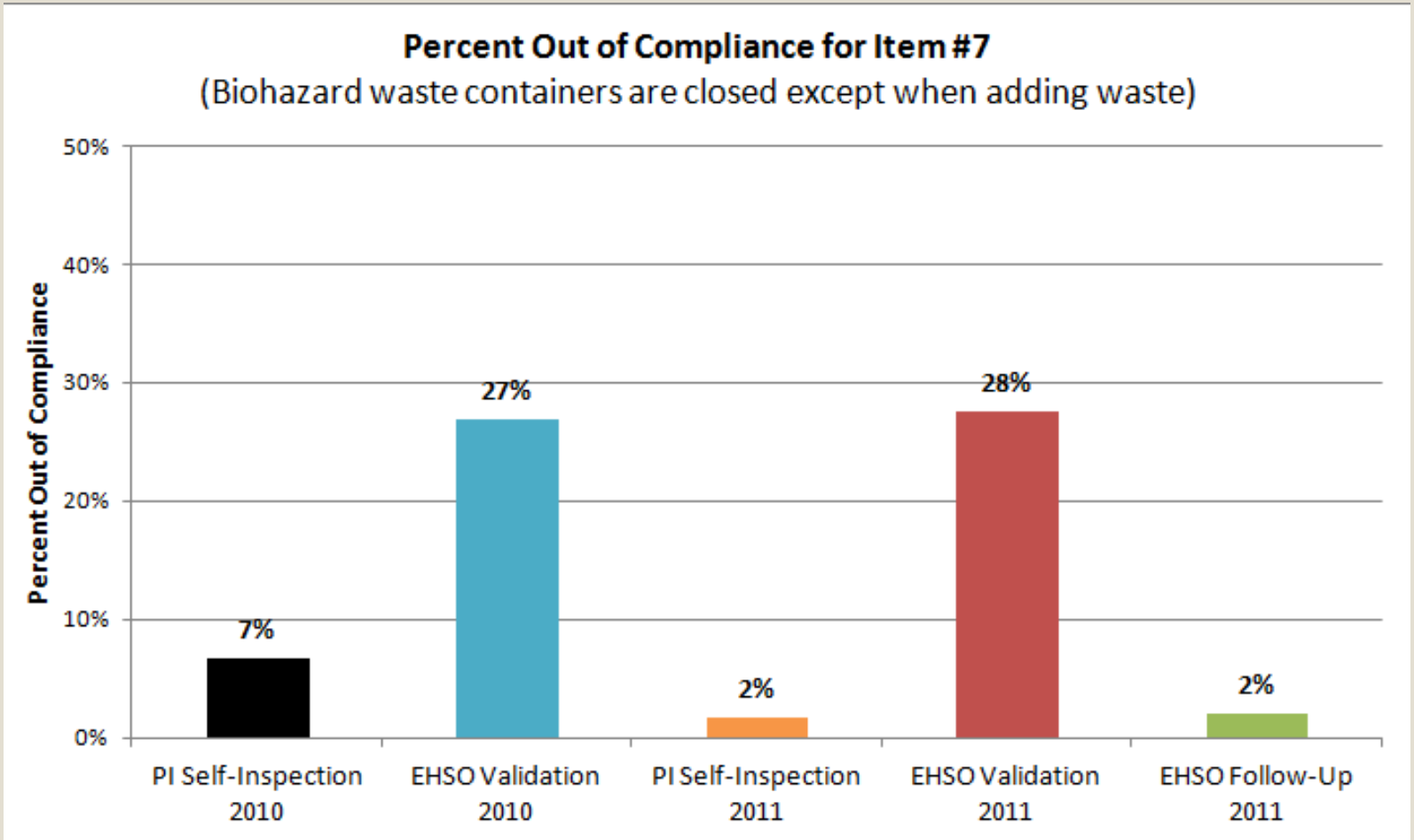
Results


Percent Out of Compliance for Top Items (1-6) from 2010-2011 Inspections
50%
40%
30%
20%
10%
0%
Percent Out of Compliance
Lab doors are posted with up-to-date lab signage
All personnel have read and signed the Lab Rat monthly safety newsletter
all chemicals are labeled with the full chemical name
All mercury thermometers have been replaced with mercury-free thermometers
Lab equipment/containers used to store biohazardous materials have a biohazard label
Someone in the lab has taken Shipping of Infectious & Biological Substances Training in the past 2 years
Item from Inspection Form
PI Self-Inspection 2010
EHSO Validation 2010
PI Self-Inspection 2011
EHSO Validation 2011
EHSO Follow-Up 2011

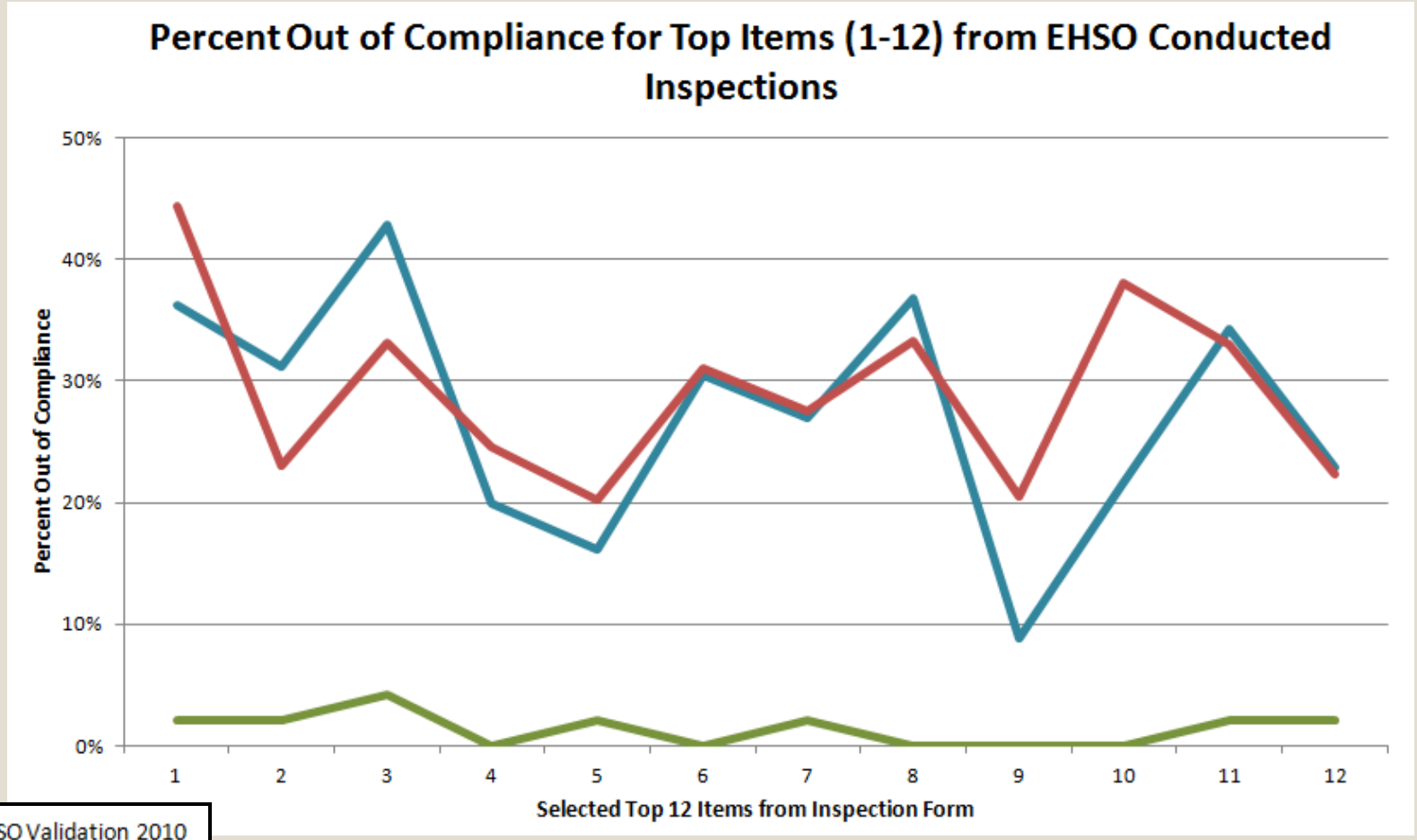
Results


Percent Out of Compliance for Top Items (7-12) from 2010-2011 Inspections
50%
40%
30%
20%
10%
0%
Percent Out of Compliance
Biohazard waste containers are closed except when adding waste
Sink is equipped with soap and paper towels for handwashing
Airflow is negative to the corridor when appropriate
The chemical fume hood is free of material and equipment stored long term
The lab eyewash station is tested and documented monthly by lab personnel
A visual inspection of the fire extinguisher is conducted and documented monthly
Item from Inspection Form
PI Self-Inspection 2010
EHSO Validation 2010
PI Self-Inspection 2011
EHSO Validation 2011
EHSO Follow-Up 2011

Results


Percent Out of Compliance for Item #7
(Biohazard waste containers are closed except when adding waste)
Percent Out of Compliance
50%
40%
30%
20%
10%
0%
7%
27%
2%
28%
2%
PI Self-Inspection 2010
EHSO Validation 2010
PI Self-Inspection 2011
EHSO Validation 2011
EHSO Follow-Up 2011

Results


Percent Out of Compliance for Top Items (1-12) from EHSO Conducted Inspections
50%
40%
30%
20%
10%
0%
Percent Out of Compliance
1
2
3
4
5
6
7
8
9
10
11
12
Selected Top 12 Items from Inspection Form
EHSO Validation 2010
EHSO Validation 2011
EHSO Follow-Up 2011

Discussion

- In 2010 and 2011, researchers reported very low rates of non-compliance. However, EHSO reported higher rates of non-compliance for 2010 and 2011 validations
  - Researchers are under reporting safety issues in their spaces.
  - This may be due to:
    - Not fully completing the inspection
    - A desire to not report issues in their labs
    - Not knowing what to look for
    - High turn-over in lab staff

Discussion

- EHSO follow-up inspections showed a large increase in lab compliance
- We hope to see 2012 EHSO validation compliance rates to improve following our first round of follow-up inspections
- Follow-up inspections seem to be the lynchpin in our inspection system and provide more incentive for researchers to fill the gaps discovered in lab validations

Lessons Learned

- Currently, we do not validate every single lab
  - Approximately 30%
- PIs move throughout campus from year to year and we don't validate the same labs every year so our data represents a sample, not the entire lab population
- Shared areas (i.e. cold rooms, equipment rooms) pose unique challenges in terms of ownership
- Although the validation program is electronic, the self-inspection program is still paper based
  - We are examining online alternatives for PI submission of the corrective action plan form

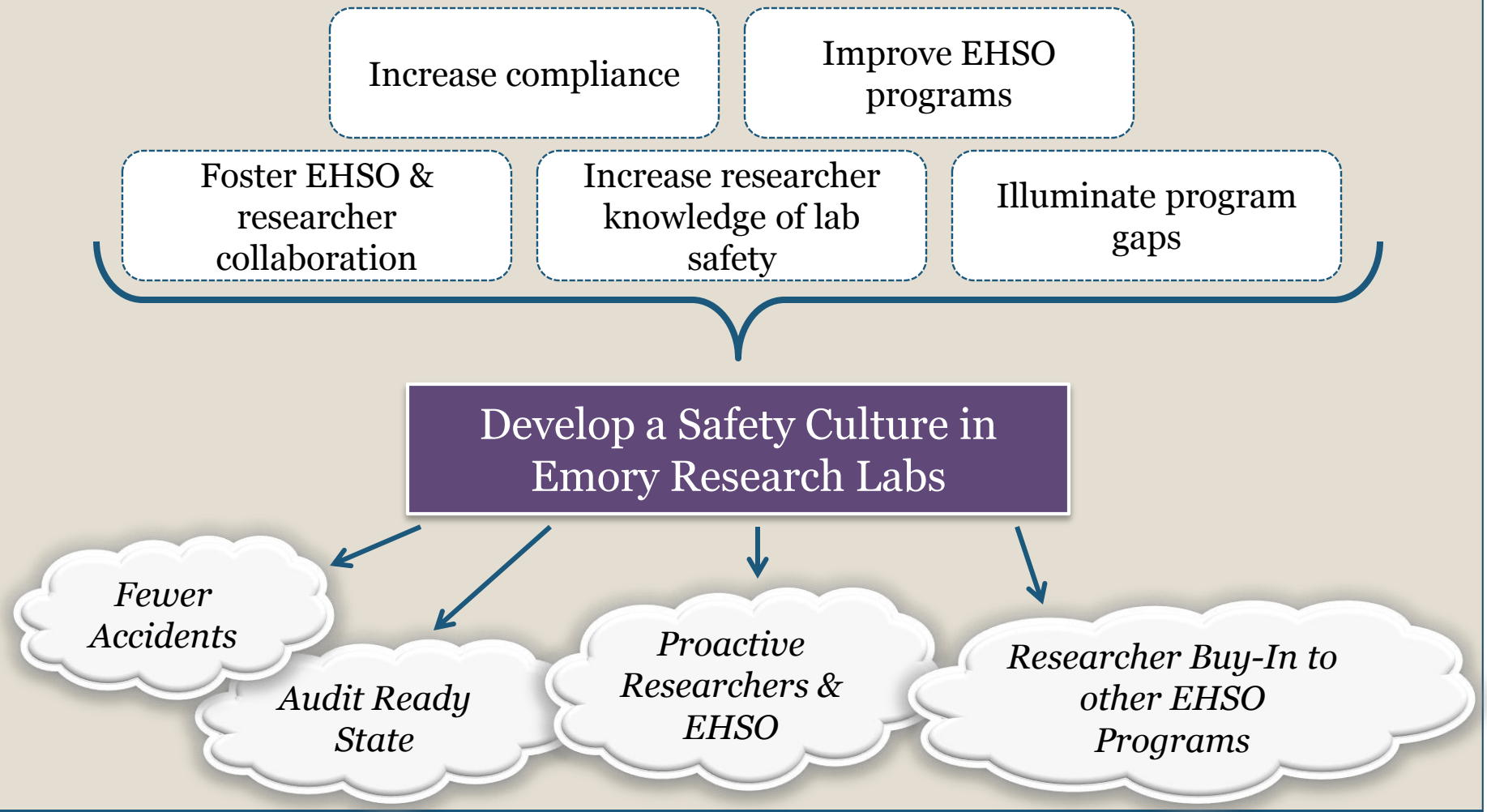
Program Strengths / Benefits

- The illumination of program gaps drives program improvement
  - Creation of an online Lab Rat blog
  - Monthly reminder emails for eyewash and fire extinguisher testing
- Follow-up inspections allow EHSO to close the loop with researchers
- The program serves as a method of checks and balances for EHSO programs and other department with whom we collaborate:
  - Biosafety protocol submission
  - Volunteer and Minor Registration
  - USDA permit verification
  - Laser equipment registration
  - Campus services
  - IACUC

Moving Forward

- In 2012, we will continue to use the 3-step inspection process. We hope that 2012 validations will show a increase in compliance after one year of follow-ups.
- We are working with Campus Services to develop a system for closing facility related loops.
- We are developing a score card system to provide faculty and department chairs with a snapshot on how their labs are performing in terms of safety.

Ultimate Goals of the Inspection Program



Thank you!

- The Lab Self-Inspection and Corrective Action Plan forms are available on our website:
  - www.ehso.emory.edu
- Feel free to email questions to:
  - meparro@emory.edu
- Special thanks to the members of the Research Safety / Biosafety Team:
  - Dr. Kalpana Rengarajan
  - Rodrick Esaw
  - Dionna Thomas
  - Steve Arehart
  - Patty Olinger

EHSO Motto
Teamwork … Our Path to Excellence