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Measuring Safety Climate +

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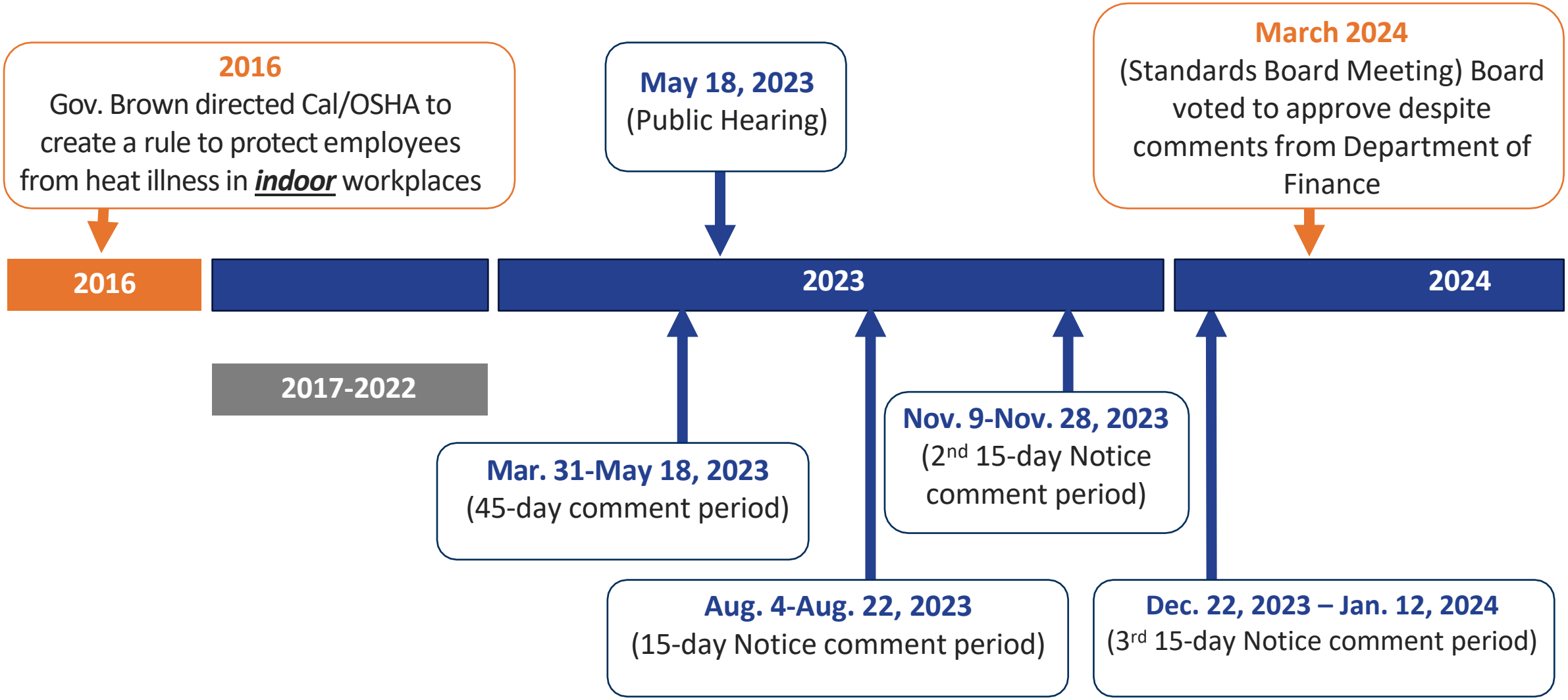
Past and Upcoming Webinars

- Oct 3, ‘23 – Realities of an Aging Workforce
- Nov 7, ‘23 – Indoor Heat Illness Standards
- Dec 5, ‘23 – This Might Hurt: An Introduction to Back Pain
- Jan 10, ‘24 – Wearables: What to Watch and Watch Out For
- Feb 6, ‘24 – Workplace Violence Prevention: Essential Elements & New Regulations
- Apr 10, ‘24 – Sleep Smart – Work Safe: Unraveling the Impact of Tough Schedules
- May 28, ‘24 – Ergonomics for Mental Health
- Jun 18, ‘24 - Measuring Safety Climate (& Indoor Climate)
- Jul 10, ‘24 – Psychosocial Factors – Impact on Disability (and Claims Costs)
- Aug 6, ’24 – You’ve been taught the WRONG way to lift!

Session Overview

- Update on CA Indoor Heat Standard (*credit: Robyn Demchak, EPIC*)
- "Safety Culture" vs "Safety Climate"?
- Brief History
- Do measures of safety climate reflect injury risk?
- What's the best *survey* to measure safety climate?
- What's the best *way* to measure safety climate?

Cal/OSHA Indoor Heat Illness: Rulemaking



Indoor Heat Illness Prevention

- January 30, 2024 webinar covered the regulation in detail
- Updates following March 21, 2024 Standards Board meeting:
  - May 8, 2024 Office of Administrative Law (OAL) disapproves the regulatory action
    - Board may resubmit the standard to OAL w/in 120 days
  - May 10, 2024 Fourth Notice of Proposed Modification
    - 4th 15-day Notice comment period: 5/10/24-5/30/24
  - Anticipated vote by Standards Board during June 20, 2024 meeting

Indoor Heat Illness Prevention

Key Changes in 4th Modification

- Adds new exception to **exempt certain correctional facilities** operated by the state or a local government from the scope of the regulation
- Some internal references to the National Weather heat index chart (2019) in Appendix A (for example, definition of “heat index” and section regarding instruments to measure). Modification to (b)(9)
- Reference to National Weather Service heat index equation in (e)(1)(C) removed and replaced with a reference to the heat index chart in Appendix A

“Safety Culture” vs “Safety Climate”?

- Both terms are category of “organizational culture”
- Both terms reflect the VALUE an organization places on safety.
- Safety Culture:
  - Long Term, enduring
  - Difficult to Measure
- Safety Climate:
  - Snapshot, dependent on temporal factors
  - Several measurement tools (surveys)

Safety Climate Definition & Elements
Huang, et al., 2017

"workers' shared perceptions regarding their organization's policies, procedures, and practices in relation to the value and importance of safety within that organization"

- Major Factors:
  - Management Commitment to Safety
  - Safety Communication from Top Mgt & Supervisors
- Organizational Levels:
  - Workers' perception of Top Management
  - Workers' perception of Direct Supervisor

Brief History

- Zohar (1980) credited with “Safety Climate” as a specific aspect of “Organizational Climate”.
- Healthcare Industry was an early adopter.
  - The Safety Attitudes Questionnaire (SAQ) developed in late 1990’s (Sexton, 2006).
  - Hospital Survey on Patient Safety Culture (HSOPSC) by the Agency for Healthcare Research and Quality (AHRQ) in 2004.
- National Safety Council Safety Barometer – Early 2000’s
- Nordic Safety Climate Questionnaire (NOSACQ-50) one of the more popular surveys. (Kines, 2011)
- The Liberty Mutual Safety Climate Short Scales (Huang, 2017)

Do measures of safety climate reflect injury risk?

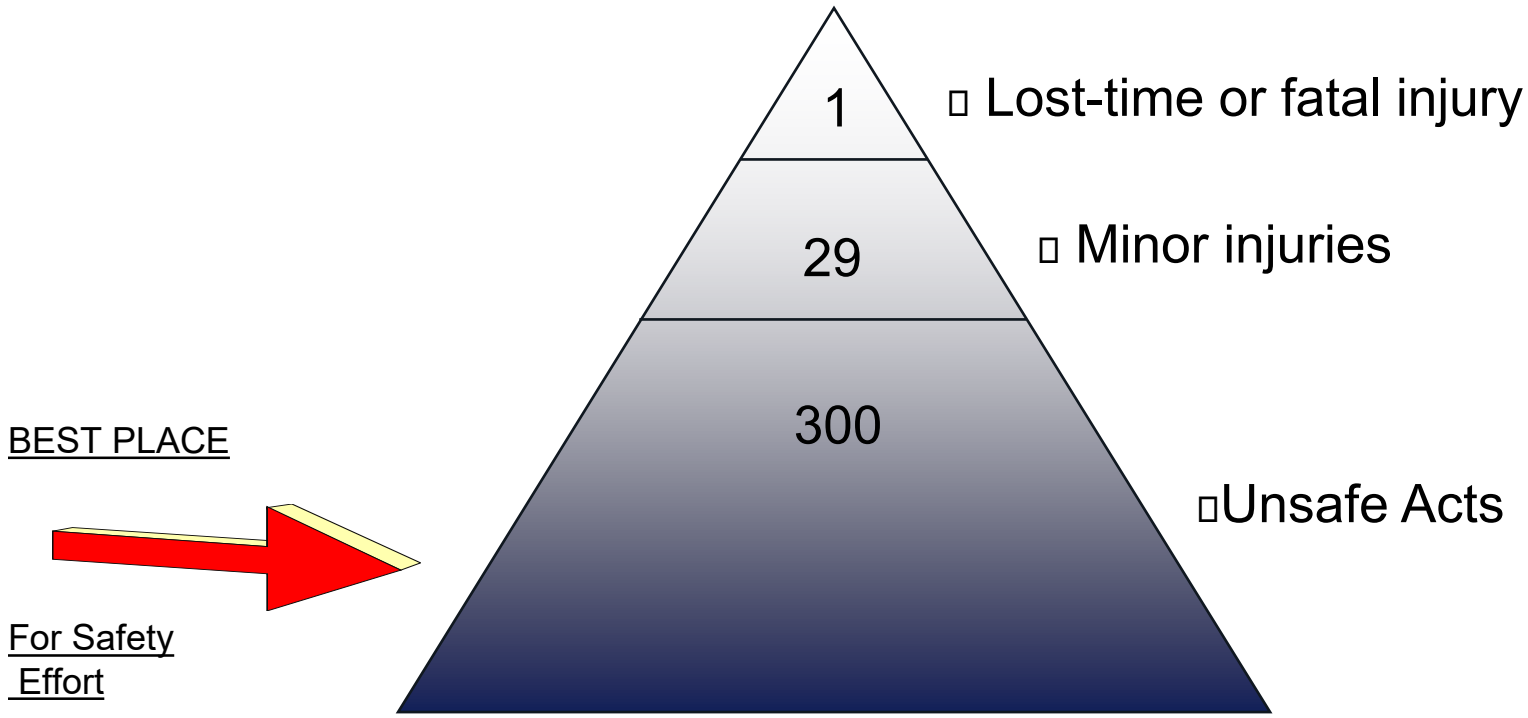
Assumption: Most injuries occur because of wrong behaviors.

- "Heinrich's domino models explained that 88% of accidents occur due to unsafe acts" (Kalteh, et al., 2019)
- "Research shows that human behavior plays a greater role than workplace physical conditions, 60 to 90% of accidents are directly caused by human behavior" (Khoshakhlagh, et al., 2023, ***citing Kletz, 2018 out of context, who actually argues that such human error must be understood in the context of the underlying causes, which are nearly always poor job design!)***

The Safety Climate Assumption

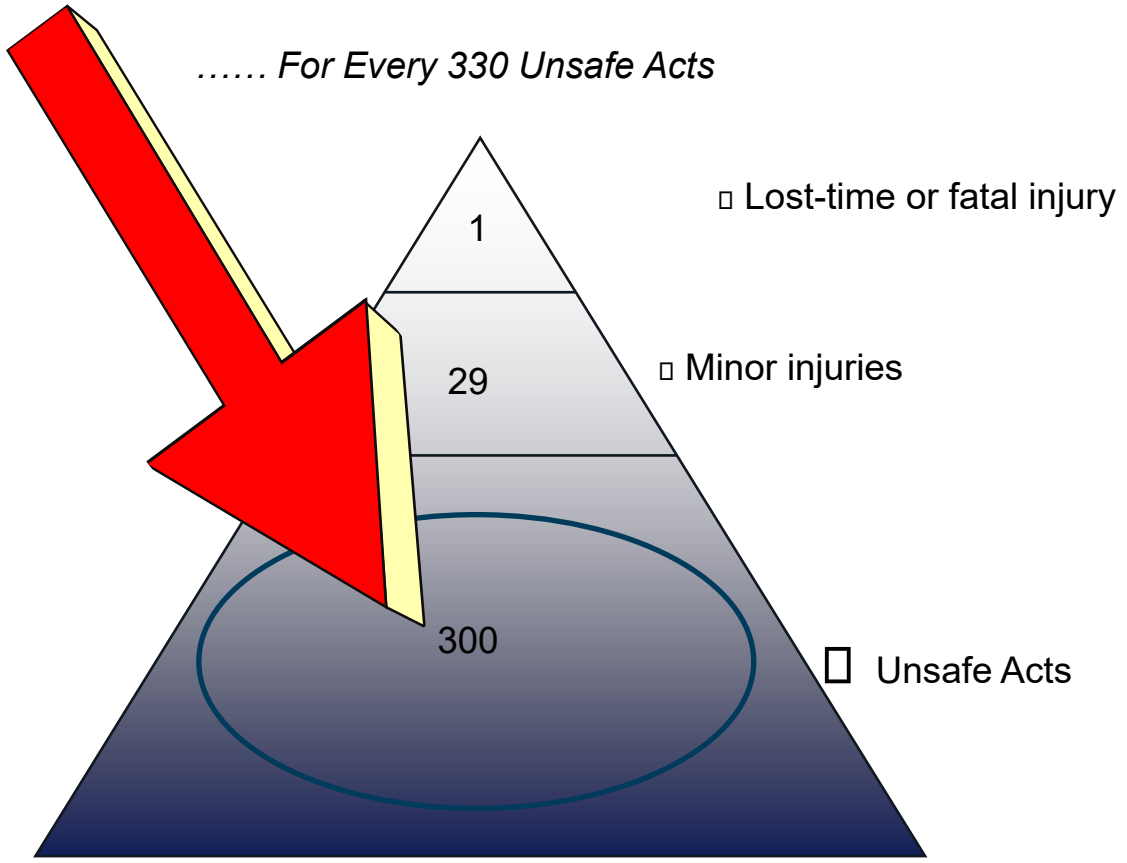
The (Heinrich) theory says…

…… For Every 330 Unsafe Acts

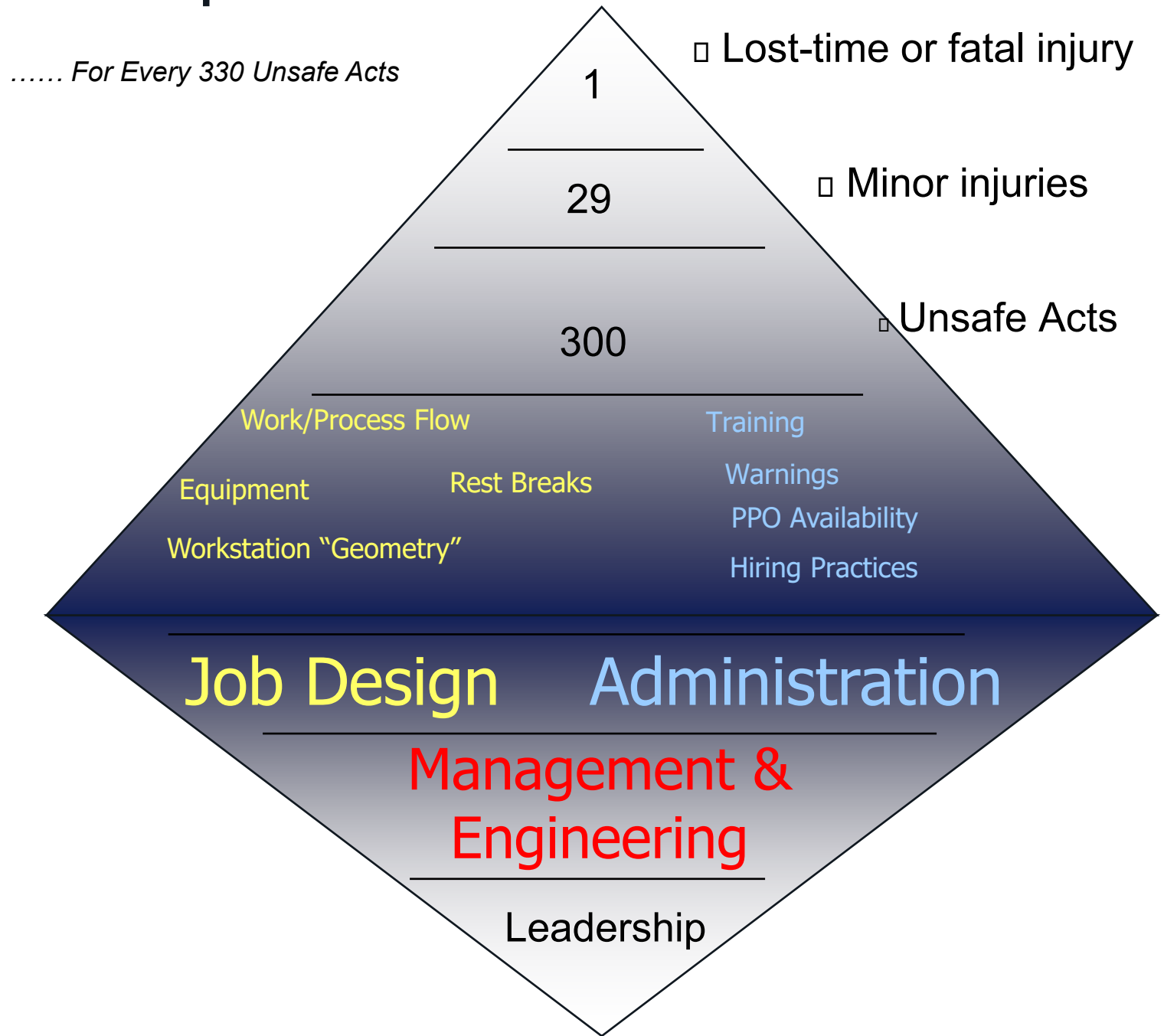


Is this Theory Practical?

It is HARD to change behaviors and it is hard to manage an effective behavior modification program



A More Complete Model of the Foundation of Unsafe Acts:



The "logic" of focusing on "safety" behaviors

- Outcome measures (e.g., injury rates, days lost, etc.) are not always "accurate" because of under-reporting or differences in reporting criteria.
  - So we abandon them.
- We replace them with "safety" behaviors, often arguing that behaviors are "upstream"…
  - But are behaviors really more "accurate" or important than outcome measures?
- **Question: If my safety behaviors are not consistent with my outcome measures, what use is looking at behaviors!**

Do measures of safety climate reflect injury risk?

- Survey tools usually talk about being "validated" when they really mean "reliable":
  - RELIABILITY
    - Get the same answer if different people use it (Inter-rater Reliability)
    - Get the same answer if you use it at different times (Test-retest Reliability, Intra-rater Reliability)
  - VALIDITY
    - How well the measure predicts injuries (***SENSITIVITY***)
    - How well the measure predicts non-injury (***SPECIFICITY***)
- Both reliability and validity have importance, but it's the validity that connects the tool with actual injury risk

Safety Climate Validity Questions

Is a high safety climate score associated with low injury rates? “Injury Rates”:

- Frequency (e.g., # claims/workhours, #OSHA cases/wh, # Cases with DAW/wh)
- Severity (e.g., claim costs/wh, DAW/wh)

Intermediate question: are there actions that will change the safety climate score?

Follow-up (critical) question: if safety climate score goes up, do injury rates improve?

The relationship between safety climate and injury rates across industries: The need to adjust for injury hazards

Smith, et al., 2006

- 33 companies
- Claims/100 workers, Claims/100,000h, Claims/$1M payroll
- "In the unadjusted model, company level safety climate were negatively and significantly associated with injury rates."
- **"However, all of the above associations were no longer apparent when controlling for the hazardousness of the specific industry."**

The predictive validity of safety climate. Johnson, 2007

- Zohar's 16-element survey (Group level – Immediate Supervisor)
- 188 Employes in 17 groups
- Safety Behaviors (observed over the 5 months *AFTER* the survey)
- Injury Rates
  - OSHA Recordables/100 Employees (TCIR)
  - # Lost Workday Cases/100 Employees (LWDCR)
  - # Lost Work Days/100 Employees (LWDR)
- Results (statistically significant):
  - Correlation (r) = **0.78 for safe behaviors**
  - Correlation (r) = **-0.50 for LWDR**

Some issues with Johnson, 2007

188 workers divided into 17 groups

Safe behaviors collected over the 5 months AFTER the survey

Only the Lost Workday Rate was statistically significant

It is very likely that Injury Experience DRIVES Safety Climate measures (Beus, et al., 2010)!

"...injuries are more predictive of safety climate than safety climate is of injuries."

Some issues with Johnson, 2007 (continued)

The Correlation Coefficient is **NOT** the portion of the outcome that can be "explained" by the measurement.

- r = Coefficient of Correlation
- r^2 = Coefficient of Determination - roughly the proportion that the measurement (predictor variable) explains/predicts or accounts for the outcome
- So,
  - The survey explains ***61% of safe behaviors*** (r^2 = r X r = 0.78 X 0.78 = 0.608)
  - The survey explains ***25% of the number of lost workdays per 100 workers*** (r2 = r X r = 0.5 X 0.5 = 0.25)

Evaluation of safety climate and employee injury rates in healthcare

Cook, et al., 2016

- 27,368 Veterans Health Administration (VHA) employees
- NSC's Safety Barometer survey (50 elements) measured in a percentile score.
- *Every one percentile NSC score INCREASE, is associated with a decrease in injury rate of 14 injuries per 10,000 full time workers.*
- **"Positive employee perceptions of safety climate in VHA facilities are associated with lower work-related injury and illness rates."**

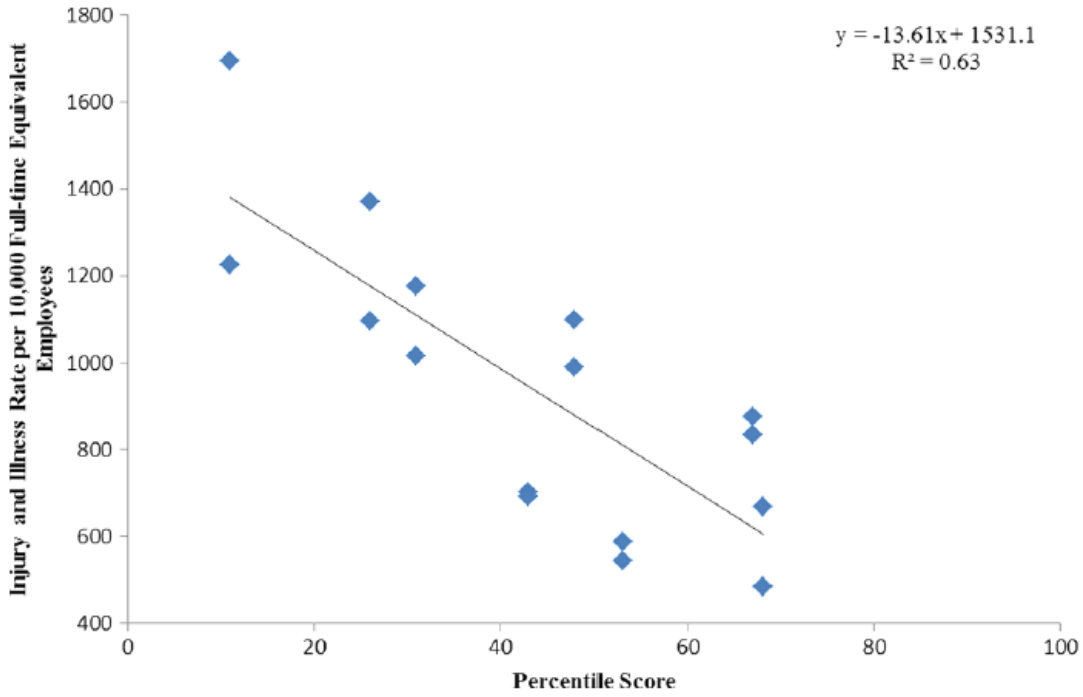


Figure 1 Work-related injury and illness rates and overall percentile score among all Veterans Health Administration (VHA) facilities in Veterans Integrated Service Network (VISN)1 (n=8 VHA facilities).

The relationship between safety culture and safety climate and safety performance: a systematic review

Kalteh, et al., 2019

- 31 studies selected
- "Safety Performance"
  - Reactive (post-incident) – Accident Rate, Incident Rate, EMR
  - Proactive (pre-incident) – Safety behaviors
- Assessed each study with only categorical (+ or -) associations between Culture/Climate measures and Safety Performance
- Positive safety climate is associated with decreased injuries and improved safety behaviors

The relationship between safety culture and safety climate and safety performance: a systematic review

Kalteh, et al., 2019

Authors' Conclusions:

- "A review of statistical results showed that reactive and proactive measures have a negative and positive relationship with safety climate and safety culture, respectively…The results showed that the impact of climate safety and safety culture on reactive criteria might be mediated through variables such as safety behavior or safety attitudes."
- **"Finally, in the reviewed articles, there was no study evaluating the effect of safety interventions on safety performance changes."**

Perceptions of safety climate across construction personnel: Associations with injury rates

Marin, et al., 2019

- Nordic safety climate questionnaire (NOSACQ-50)
- 55 supervisors and 32 site managers from 26 Colombian construction companies
- "There were no statistically significant relationships between each group's perceptions of safety climate and the company's 3-year injury rate."
- **"However, worker-manager discrepancies in perceptions of safety were positively correlated with the 3-year injury rate of construction companies."**

Examining the effect of safety climate on accident risk through job stress: a path analysis

Khoshakhlagh, et al., 2023

- Hypothesis: Job Stress mediates the impact of safety climate on "accident" risk.
- 1,530 male Petrochemical workers, Iran
- Nordic safety climate questionnaire (NOSACQ-50)
- NIOSH Generic Job Stress Questionnaire (GJSQ) (Over 200 questions) – [replaced by Quality of Worklife Questionnaire?]
- "Accident" data (apparently individual ratings):
  - "Frequency" – scale of 1-5
  - "Intensity" – scale of 1-6
  - "Risk Score" – Frequency X Intensity = scale of 1 to 30

Examining the effect of safety climate on accident risk through job stress: a path analysis

Khoshakhlagh, et al., 2023

- Tough to discern the meaning of the numbers given the method of measuring "accident" risk.
- Some findings:
  - The role of **Job Stress** has **direct** and indirect impact on accident risk
  - The role of **Safety Climate** has **little direct impact** on accident risk, and some indirect impact on accident risk as Safety Climate impacts Job Stress
- **Authors' Conclusions:**
  - **"safety climate does not directly impact accident risk, but indirectly does so through job stress as a mediator."**

What's the Best *Survey* to Measure Safety Climate?

Zohar's original – 32 questions (16 about Top mgt; 16 about direct supervisor)

NSC's Safety Barometer survey – 50 Statements

Nordic safety climate questionnaire (NOSACQ-50) – 50 Statements

Liberty Mutual Safety Climate Short Scales (Huang, et al., 2017)

An item-response theory approach to safety climate measurement: The Liberty Mutual Safety Climate Short Scales (Huang, et al., 2017)

- 29,179 workers
- Zohar (and Luria, 2005) 16 organization-level statements; 16 group-level statements (32 total items)
- Retained items with greatest discriminating value.
- Retained high correlation with original score.
- Reduced to 8 statements (four for corporate-level climate and four for supervisor-[group-]level climate) that would still produce scores within 5% of the original scores.

Ask yourself these questions:

If your favorite “splurge” food was 80% off at one store but full-price at another, where would you buy it?

If you could lose all the weight you wanted by exercising one day a week versus 5 days a week, would you still exercise 5 days a week?

If you could take one route to your destination that takes 12 minutes and one that takes an hour, which route would you take?

If you could take the exact same dream vacation for 80% less from one travel agent then from another, which agent would you use?

An item-response theory approach to safety climate measurement: The Liberty Mutual Safety Climate Short Scales (Huang, et al., 2017)

Top management at this company:

Statement	Strongly Agree (5 Points)	Agree (4 Points)	Neutral (3 Points)	Disagree (2 Points)	Strongly Disagree (1 Point)
Tries to continually improve safety levels in each department.					
Requires each manager to help improve safety in his or her department.					
Uses any available information to improve existing safety rules.					
Provides workers with a lot of information on safety issues.					

My direct supervisor:

Statement	Strongly Agree (5 Points)	Agree (4 Points)	Neutral (3 Points)	Disagree (2 Points)	Strongly Disagree (1 Point)
Discusses how to improve safety with us.					
Uses explanations (not just compliance) to get us to act safely.					
Reminds workers who need reminders to work safely.					
Makes sure we follow all the safety rules (not just the most important ones).					

What's the Best *way* to Measure Safety Climate?

- DEFINITLEY differentiate between management and workers
- DEFINITLEY analyze the differences in scores between management and workers
- DEFINITELY keep track of departments/regions/etc.
- Make sure confidentiality is ensured
- Make it as easy as possible for everyone to complete the survey (incentive?)
- Make sure you share the results and RESPOND
- What else?

Recap

- Indoor Heat Illness Protection Program – coming!
- Safety Climate and Safety Culture focus on the perception of value that top mgt and direct supervision place on safety; Climate being a snapshot & Culture being long-term.
- Be cautious about assuming injuries are caused by unsafe behaviors; recognize the role of job design that gives rise to those unsafe behaviors.
- There has been some strong evidence that measures of safety climate reflect injury outcomes (Cook, et al., 2016).
- BUT, it may be that injury outcomes drive safety climate measures rather than climate driving injury outcomes.
- We don't know for sure what actions can change climate scores, and we don't know that changing the scores will result in injury rate reductions.
- The most recent research suggests that job STRESS may be a better direct indicator of injury risk outcomes.
- If you want to get a pulse on your safety climate, save your time and your workers' time by using the Liberty Mutual short scales.

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