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Use of Assessment Tools within Ergonomic Programs

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Objectives

- Objectives
  - Students will understand the approach and assumptions of each type of decision-making system.
  - Students will understand the relative benefits of each type of system.
  - Students will understand the limitations and practical applications of each approach.

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Statistics 101

- Types of validity and why we care.
  - Face validity
    - (DOES IT SEEM TO MAKE SENSE)
  - Content Validity
    - (ARE WE LOOKING AT THE BIG PICTURE)
  - Construct Validity (Are the scores meaningful)
  - Internal Validity (Is there a cause and effect)
  - External Validity (Are results transferable)
  - Statistical Conclusion Validity (Is the data set big enough?)
  - Criterion Related Validity (Are results predictive?)

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Statistics 101

- Types of Reliability and why we care.
  - Test-retest (The same test over time)
  - Interrater (Between different raters)
  - Parallel forms (Results between related tests)
  - Internal consistency (Items within the test.)

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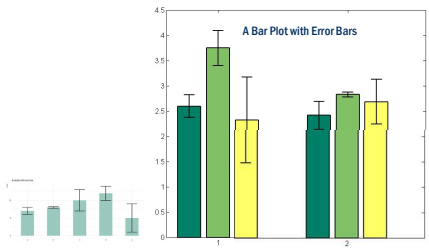
Error measurements



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Significant Figures

- 1.234 × 2 = 2.468 ≈ 2
- 1.234 × 2.0 = 2.468 ≈ 2.5
- 0.01234 × 2 = 0.02468 ≈ 0.02

Error multiply with each additional measurement.

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Primary Risk factors and Secondary

- Force
- Repetition
- Contract pressure
- Vibration
- Heat/cold
- Posture
- Acceleration
- Static contraction vs recovery
- Overtime
- Sense of control
- Turn over
- General health of workers
- Work and general stress
- Chemical exposure
- Demograghics

Reduce Injuries, Reduce Costs, Increase Worker Safety

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Noise vs Signal

This slide shows the number of injuries due to a batch of slightly faulty parts received from a subcontractor every other Monday.

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Total Trend

Composite including increased reports on Mondays, Biweekly on boarding, Periodic overtime and random occurances.

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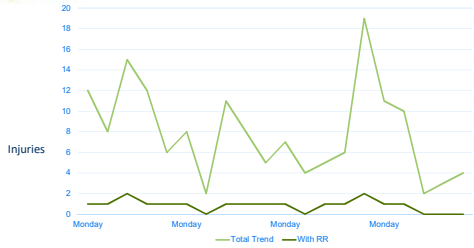

This slide shows the number of injuries due to all the factors discussed, compared to a 90% reduction in injuries due to an Ergonomics first aide program being implemented.

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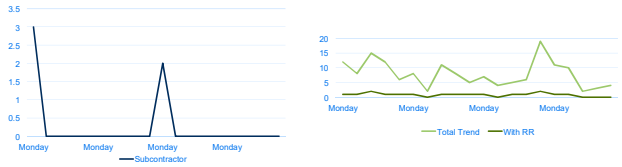
Comparison



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Ergonomic Tools

- Historical
- Use of Experts
- Expert tools
- Surveillance tools
- AI
- Visual or sensing device tracking
- Squeaky wheel

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Historical Analysis

- Should be part of any program
- By nature is reactive
- Discounts natural variation
- Easy to confuse causation with symptomatic response.
- Requires a high level of data for good decision making.

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Expert Opinion

- Validity is based on the strength of the opinion.
- Reliability is dependent on experience
- Can include all primary and secondary factors.
- Has high legal defensibility.

TX IS EASY DX IS HARD

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Ergonomic Expert Tools

- Modeling and simulation require expert knowledge to use tools and interpret results
- Provide more clarity in understanding risk or worker capabilities
- Need to have some sense of risk type in order to justify the assessment method
- Used in the design of work and injury management

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Expert System

- NIOSH WPG
- 3 Dimension Static Strength Models
- Strain Index
- Snooks Data Tables
- Pick the correct tool
- Understand the limitations
- Thoughtful interpretation

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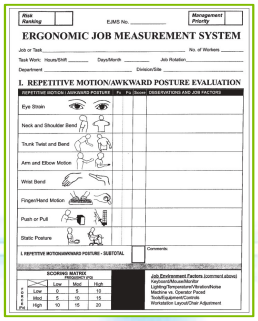
Surveillance Tools

- Get you in the ballpark
  - Introduces general ergonomic principles
  - Creates a consistent methodology
  - Limits dependency on expert knowledge
  - Provide a score and threshold
- Where they fall flat
  - Tend to be overly dependent upon posture
  - Specious linking of risk factors
  - Tend to be unfocused
  - Tend to lack inter-rater reliability
  - Tend to lack predictive validity



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Surveillance Tools

- Simple to use with limited input choices.
- Ask the important questions
- Score body parts individually
- Be upward compatible.
- Be part of a decision making hierarchy.
- To the extend possible based on peer review science.

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ErgoFocus Simplicity

- Accessible via the Ergonomic Corollary feature of ErgoFactor®
- Simple Yes/No question framework
  - Limited to a mere **20 questions!**
  - Answering "Yes" poses a mere **1 to 5 inputs!**
- Uses simple to understand language, fields, and graphics to set input values
  - Forces or weights estimates entered as simple integer values
  - Busyness/repetitiveness is selectable in 5 discrete values
  - Frequency is selectable in 4 discrete values
  - Postures typically defined in graphical buttons
- Additional assistance is provided in hover-over help

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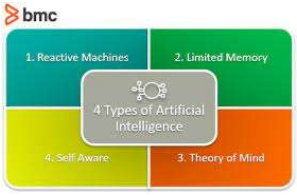
Artificial Intelligence



Active Learning Cycle has six steps

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Active Learning Cycle has six steps

1. **Training Data**. An ML model must have data to train on.
2. **Build ML Model**. The model is created.
3. **Model Predictions**. The model makes predictions,
4. **Feedback**. The model gets feedback on its prediction from human or environmental stimuli.
5. **Feedback becomes data**. Feedback is submitted back to a data repository.
6. **Repeat Step 1**. Continue to iterate on this cycle.

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Limitations to Artificial Intelligence

- Requires a large and consistent data set.
- Often has built is biases based on data structure.
- Difficult to impossible to track the logic.
- Limited by the data sets.

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Take Aways

Facility Need	Recommend Approach
Minimal Good Faith Program	Surveillance
Areas of rapid change	Surveillance
International	Surveillance Expert Tool
Injury optimization	Expert/ Expert Tool with integrated demand analysis.
High risk/cost	Expert/ Expert Tools
System integration	Expert
Administrative Ergonomics	Full JA plus Surveillance and expert
Large company with good data management	Consider AI solutions.

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Tiered Approach to Ergonomics

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ErgoFactor Mission Statement

Our mission is to -

REDUCE Injuries

REDUCE Costs

INCREASE Worker Safety

Reduce Injuries, Reduce Costs, Increase Worker Safety

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Questions?
Thank you!

www.ergofactor.com

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