Healthy Workplaces Campaign 2018-19

Manage dangerous substances in the workplace
HWC Summit 2019 Bilbao
Looking but not seeing

How can we improve visual inspections of the workplace

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The Problem

Not seeing observable hazards during inspections conducted for OSH purposes
So What; Evidence for the Problem & Consequences

- Rosepark Nursing Home, 14 Deaths 2011
- US, 2 No. Nursing Homes 2004, 40 Deaths*
- Macondo Oil Well Explosion 2010, 11 Deaths
- Industrial Engineering Sector 15-85% accuracy**


What is an Inspection; Go to a location and conduct:

hazard identification, risk assessments, risk audits, risk reviews, risk surveys, safety inspections, safety reviews, safety checks, safety tours, safety visits, safety surveys, safety walkthroughs, health and safety walks, health and safety audits, due diligence visits, accident investigations, inspections, surveys, scoping visits, familiarisation exercises, management safety walkabouts, Gemba walks and forensic investigations.

\[
25! = 1.55 \times 10^{25}
\]
Common to all types of Inspection

The use of the visual senses
So how good are your visual senses during inspections?
The Importance of Visual Inspection Cannot Be Understated

Vision is our dominant sense. It provides us with most of the information about our world in terms of location, motion and object recognition.*

Its importance can be gauged if you consider how good this inspector would be!

I don’t miss hazards;

I’m too professional and experienced
Missing observable hazards is a human condition

Waterfall; M.C. Escher 1961
Causes of Visual Inspection Error

- Sensory Perceptual
- Cognitive Bias
- Organisational
Sensory Perceptual Causes of VI Error (selected list)

- We don’t know what, where or how many hazards to expect
- Random v consistent visual search behaviours
- Human variability
- Speed accuracy trade off
- In-attentional blindness
Cognitive Bias Causes of VI Error

- High level of trust in our personal intuition but;
- Normalising the abnormal (outcome)
- Seeing what you expect to see (confirmation)
- Prior experience (availability & anchoring)
Organisational Causes of VI Error

- No standardised visual inspection guidance*
- Visual inspection procedures vary greatly
- Little oversight
- Time and cost constraints

* some exceptions eg aircraft maintenance, UK chartered surveyors method
Summarising Visual Inspection

An error prone task that is difficult to do well

Biggs & Mitroff, 2013; Cain et al, 2011; Drury & Watson, 2002; Gallwey, 2006a; Rao et al, 2006; See, 2012; Wolfe, 2005
(email victor.hrymak@tudublin for full references)
So how many hazards in here?
I don’t miss hazards; I’m far too professional and experienced

- 211 OSH professionals took part in a controlled experiment into visual inspection accuracy
- Five industrial quality kitchens used with a known number of hazards
- OSH pro’s asked to inspect and write down the hazards they saw
Typical Kitchen Used
Evaluating Visual Inspection Accuracy

- Industry standard kitchens with circa 34 observable hazards
- 211 participants randomly allocated into 2 groups
- Both groups conducted 30 minute visual inspections
- Control group; visually inspected as per usual
- Experimental group; used a set eye scanning pattern; SVS
Ten chemical & fire related hazards were “planted”

- 2No. 330ml bottles with flammable pictogram
- Flammable aerosol on a window cill
- Smoke detector covered with lunch box
- Smokers materials in an ash tray
- Bare wires
- Tea candles
- Overloaded sockets
- Extinguisher moved from its bracket
- Fire door wedged open
## Summary of Results

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<thead>
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<th></th>
<th>N</th>
<th>Mean % hazards observed</th>
<th>SD</th>
<th>95% CI's</th>
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<tbody>
<tr>
<td>Control</td>
<td>107</td>
<td>32.96</td>
<td>9.02</td>
<td>[31.24-34.70]</td>
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<tr>
<td>Experimental</td>
<td>104</td>
<td>49.64</td>
<td>10.88</td>
<td>[47.53-51.76]</td>
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Mean Percentage Fire & Chemical Hazards Observed

Red = Control,      Blue = Experimental

- Flammable liquid 1
- Smoking
- Bare wires
- Detector Covered
- Flammable Liquid 2
- Aerosol can
- Tea candles
- Sockets overloaded
- Extinguisher moved
- Door wedged
- Total

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Summary of Results

- Visual inspection accuracy below expectation
- Can be improved through SVS
- Research ongoing with promising results
- Collaboration welcome
Systematic Visual Search

- Select the room element in a strict order

- Observe using a set eye scanning pattern reading a book
Systematic Visual Search
“Reading a book” eye scanning pattern for each room element
Best Practice 1 hour & 100m²

- Select the highest risk area or room
- Use a consistent & exhaustive search pattern
- Tell yourself there are 30+ hazards to find
- Infer from what you see
Critically Analyse Your Report

- State the conditions under which you worked
- Reflect and use scenario analysis
- Play devil’s advocate with yourself
- Think through a “pre-mortem”
- Check your accuracy
Changing Visual Inspection Conduct

“I don’t need your method, I can smell hazards a mile away”

“your approach is caveman, auditing and checking paperwork is the modern way”

“there’s no way I’ll spend more time doing inspections, clients won’t pay for it”

“I can get five risk assessment done in a day, your telling me I need to cut that down to one, there’s no chance of that”

GRENFELL TOWER
Thank You!

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