Implementing Prevention through Design in Hospitals: Alternatives Assessment

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Pollution Prevention (P2)-Occupational Safety & Health (OSH) in Hospitals
Scope of Healthcare Design for Occupational and Environmental Health & Safety

- **Material or chemical**
  - Mercury
  - Formaldehyde

- **Product**
  - Syringes, sharp medical devices
  - Cleaning & disinfecting products

- **Production Process**
  - Histopathology

- **Built Environment**
  - Patient rooms
  - Emergency rooms
Environmental AND Occupational Health must be fully integrated for effective Pollution Prevention.

Toxic Material or Product:
- Formaldehyde
- Glutaraldehyde
- Xylene
- Triclosan
- PVC Products
- Cleaning products
- Mercury Containing Products

Mercury, Organic Chemicals in Air, H₂O, Soil, Solid waste

Environmental Pollution
Minimum: Prevent Risk Shifting

Patient

Worker

Environment
Ideally:
Design and promote more comprehensive, successful solutions
Overview

– Intro Prevention through Design (PtD) in Healthcare

– Alternatives Assessment approach in hospitals

– Examples

– Lessons Learned & Conclusions
Pollution Prevention—Occupational Safety and Health in Hospitals: Alternatives and Interventions

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P2-OSH alternatives assessment/intervention model

1. Establish P² OSH team
2. Identify materials/processes to be replaced (P² OSH intervention target)
3. Conduct pre-intervention worksite assessment
4. Research and screen alternatives (Potential interventions)
5. Pilot one alternative (Intervention)
6. Conduct post-intervention worksite assessment
7. Evaluate alternative
   - Acceptable
     - Implement alternative full scale
   - Unacceptable
     - No process change
       - Continuous improvement
     - Process change
<table>
<thead>
<tr>
<th>Design Intervention</th>
<th>Why?</th>
<th>P² impacts</th>
<th>OSH impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xylene → aliphatic fixative</td>
<td>worker irritant symptoms</td>
<td>↓ chemical waste</td>
<td>↓ odor, headaches, ↓ skin irritation, ↓ toxicity</td>
</tr>
<tr>
<td>Mercury reduction</td>
<td>water pollution</td>
<td>↓ water pollution</td>
<td>↓ spill hazards, ↓ toxicity</td>
</tr>
<tr>
<td>Wet chemical film → digital imaging</td>
<td>new technology</td>
<td>↓ chemical waste, ↓ water use, ↓ plastic waste</td>
<td>↓ chemicals, ↓ repetitive motions, ↓ awkward postures, ↓ lifting, ↑ VDT hazards, ↑ job loss</td>
</tr>
<tr>
<td>Formaldehyde → glyoxal</td>
<td>water pollution</td>
<td>↓ water pollution</td>
<td>↓ toxicity, ↓ odor, ↓ skin irritation</td>
</tr>
<tr>
<td>Conventional → microfiber mopping</td>
<td>water conservation/mus-skkel strain</td>
<td>↓ water use, ↓ chemical use</td>
<td>↓ mus-skkel. strain, ↓ infection potential</td>
</tr>
</tbody>
</table>
International Partners

ECUADOR

• University of Science & Technology, Quito – Dr. Raul Harari
  – Ministry of Environment
  – Ministry of Health
  – 4 hospitals

MEXICO

• University of Sonora, Hermosillo – Dr. Clara Alvarez Chavez
  – Ministry of Environment (SEMARNAT)
  – Ministry of Health
  – 3 hospitals

In collaboration with WHO/PAHO
Example

Substituting mercury fever thermometers in pediatrics
**Alternative Assessment and Implementation**

1. Conduct Hg OSH and Environmental training
2. Establish Hg reduction team
3. Identify departments with Hg, conduct interviews
Alternative Assessment and Implementation

4. Conduct Hg inventory
5. Analyze purchasing information
Alternative Assessment and Implementation

6. Identify, implement & evaluate alternatives/interventions

7. Identify product or processes for re-design
Example

Substituting mercury in dental amalgam
Example

Substituting a conventional mopping system with alternative microfiber design
Conventional Cleaning:
string mop & bucket

Alternative Design:
Microfiber Mop
Removable pad: improved infection prevention
But OSH Evaluation indentified hazard from wringing Ergo re-design needed
Example from Kaiser Permanente: Elimination of Anti-Bacterial Ingredient in Clinical Soap & Lotions

The design challenge:
Triclosan common in many personal care products has harmful health & env potential:

- Advisory Committee to FDA: no benefit from regular use of anti-bacterial over soap and water
- AMA: regular use of anti-bacterial agents may lead to antibiotic resistance
- Potential human health risk to thyroid function
- Harmful to aquatic systems when washed down the drain

Alternative implementation via KP team: triclosan free soaps and lotions

Impacts
- Work Environment: reduced potential for antibiotic resistant bacteria
- Ambient Environment: aquatic life protection
- Human Health: reduced potential for adverse endocrine effects
- Business: *No negative cost impact to over $3.5 million spent annually*
Conclusions: Alternatives Assessment

• No alternatives are perfect.

• Focus should be on the process by which an alternative is evaluated and implemented rather than on a particular alternative.

• Whenever a new alternative becomes available, the process to evaluate it should be repeated.
Conclusions: Alternatives Assessment

• An alternative cannot be introduced successfully without understanding:
  – its function,
  – associated job requirements and work practices, and
  – its final product or service.

• Long-term success depends on the participation of the people affected because they understand the functions and work practices best and ultimately, maintain the change.
Conclusions: Products & Materials

• Info about alternative designs is:
  – scarce
  – unavailable in a form that HC Workers can use

• HC workers & OSH Professionals not viewed as having a role in design

• OSH professionals well-positioned to participate in design teams, but need expanded training
Conclusions: Work org & policies

• Successful design & implementation is a social as well as technical process

  – Work org effects the type of design & how it will be implemented

  – Commitment needed at all levels of the HC organization

  – Easier for managers to engage in innovation & solutions, than control only
Conclusion: Innovation

Occupational Safety & Health and Environmental Protection can be drivers for innovation
Thank you!

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