New Developments and Old Habits in Hearing Protector Use

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Hierarchy on Its Head: Reversal of Priorities

Effectiveness Increases

Risk Increases

Effectiveness Decreases

Risk Increases

The Bad News

Average 23

Average 8

Laboratory

Field

Berger, FAWP 20, 1993
Why?
- Comfort
- Sufficiency/Overprotection
- Validation

HPD Comfort
- Most critical aspect of consistent use
  - No way to measure
- Ergonomic Issues
  - Aging workforce
- Short periods of non-use compromise overall effectiveness

Effect of Hearing Protector Wearing Time
Overprotection

- “The result of over-attenuation may be that the protector is worn only in the supervisor’s presence, and the majority of time is not worn at all.”
- “Hearing loss is more likely to occur in this situation than when a comfortable protector is used that provides only a modest amount of attenuation.”


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**Overprotection**

<table>
<thead>
<tr>
<th>Sound level resulting from the use of the protector (dBA)</th>
<th>Protection outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>85 +</td>
<td>Insufficient</td>
</tr>
<tr>
<td>80–85</td>
<td>Acceptable</td>
</tr>
<tr>
<td>75–80</td>
<td>Optimal or Ideal</td>
</tr>
<tr>
<td>70–75</td>
<td>Acceptable</td>
</tr>
<tr>
<td>Less than 70</td>
<td>Overprotection</td>
</tr>
</tbody>
</table>

*European Union Guideline EN458, CSA Z94.2-02 Table 5*

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**Validation**

- How do individual HPD work for individual people in their noise environment?
- Today’s answer
  - Laboratory testing
  - Statistical corrections
- NIOSH
  - Mfr. overestimate performance by up to 2000%
  - Better testing and validation methods necessary
HPD Makers Answer the Call!

- Foam
  - In color
  - Or color
  - Or more color
  - Cords
  - Or shapes
  - But still foam
- Dispensing
- Have not addressed key issues

Branding

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Appeal to Demographics
These approaches may help, but …

- Improved attention to effect of attenuation
  - Communication
  - Overprotection
- Ergonomics
- Individual fit testing
- Concern for EARS and HEARING
  - Less focus on gross attenuation values
- Disclaimer

Low Attenuation/Flat Response

![Comparison of Normal and Low Attenuating HPD](image)

Passive Level Dependent

- Impact/impulse noise sources
  - Weapons fire
- Sonic Filter
- Muff
- Combat Arms
Ergonomics
-
- Lots of options: offer
  - Handles
  - No-roll
  - No pinna pull
- Moldex-Metric
  - Rockets
- Howard Leight
  - Matrix
  - No roll foam
  - SmartFit
  - Memory elastomer
- AEARO
  - Express Pods
  - PushIns
  - UltraFit 27

Electronics
-
- Sound Restoration
  - Compressor/limiter
  - External mic to introduce outside sound
  - Some integrate PED and communication
  - Limited to “safe” level

Communication
-
- Peltor PTL
- Bilsom
- David Clark
- Sonomax/HearPlug
Active Cancellation

- Noise + Antinoise = Silence?
- Not quite ...
  - OK up to 700 – 1000 Hz
  - Most industrial noise 2K & up

Bose Sanctuary
Sennheiser Active Cancellation Headset
Targus Active Cancellation Headset

Systems-based Solutions

- Custom HPD
  - Sonomax/customE-A-R
  - Custom Protect Ear
  - Westone
- Some offer
  - Filtration
  - Other options

Field Assessment

- E-A-Rfit
- FitCheck
- VeriPro

...
Hands-On Fitting Practicum

- Visual Inspection
- Roll-down product
- Pre-molded product
- Fitting tips

Fitting Conditions

- Clear view of subject ear canal
  - Inspection
  - Earlight
  - Otoscope
- Common sense questions
  - Any pain?
  - Any discharge?
  - What do you use now?
  - Do you like it?
  - What job do you have?
- Noise exposure
- Fitting noise?

Earmuffs

- Pinna fully enclosed
  - Cups equally compressed
- Band adjustment and location
- Check for leaks
- Lift test
- Glasses?
- Sizing can be issue
Premolded Product

- Pinna Pull
- Tug Test
- Cup Test

Practice!
Roll-down Product

- Roll down
  - Tight
  - Crease-free
  - Cylinder
- Pinna Pull
- Deep insertion
  - Hold while expanding?
  - Behind tragus
- Tug Test
- Cup Test

Practice!

Thank You Kindly

- HPD can work
- Attention is required
- Select properly
  - Demographics
  - Noise exposure
- Monitor use
  - Fit testing

As research continues …

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