Audiometric screening and occupational NIHL

A review of current practice & a need for new ideas to solve an old problem

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Introduction

- Review of the diagnosis of NIHL
- Audiometric screening & legal triggers for action
- Case study: performance of PLH as a screening marker of NIHL
- A review of digital algorithms for identifying NIHL
- Case study: performance of a locally modified digital algorithm
- Discussion
DIAGNOSING NIHL
Pathophysiology of NIHL (1)

Middle and Inner Ear

2) The auditory ossicles vibrate and the footplate of the stapes moves at the oval window.

3) Movement of the oval window causes the fluid inside the scala vestibuli and scala tympani to move.

4) Fluid movement against the cochlear duct sets off nerve impulses, which are carried to the brain via the cochlear nerve.

1) Sound vibrations strike the eardrum.

Hearing occurs when:

- High frequencies
- Low frequencies

Organ of Corti

- Inner hair cells
- Outer hair cells

Stereocilia

- Basilar membrane
- Tectorial membrane
- Hair bundle
- Reticular lamina
- Inner hair cell
- Outer hair cells
Pathophysiology of NIHL (2)

▲ Inner hair cells (IHC)
- Single row.
- General hearing
- Best tested bmo audiometry

▲ Outer Hair Cells (OHC)
- Three rows
- Frequency analysis, differentiate sounds ("I can hear you, but I can’t understand you")
- Speech intelligibility
- Best tested bmo oto-acoustic emissions
A few minutes after exposure to impulse noise, edema of the stria vascularis appears and may persist for several days.

Progresses to distortion of the stereocilia of the inner and outer hair cells to complete absence of the organ of Corti and rupture of Reissner’s (vestibular) membrane.
Criteria for diagnosing NIHL – ACOEM (1)

- Always sensorineural
- Typically bilateral
- First sign is “notching” at 3000, 4000 or 6000Hz, with recovery at 8000Hz;
- The notch typically develops at one of these frequencies and, with continued exposure, affects adjacent frequencies. This, together with age-related hearing loss, may reduce the prominence of the notch (look at previous audio’s to confirm).
  - The exact location (3kHz-6kHz) of the notch depends on multiple factors including the freq of the damaging noise and the size of the ear canal
  - In early NIHL, average thresholds at 0.5-3kHz > 3-6kHz, and threshold at 8kHz is better than the deepest part of the notch (no recovery at 8kHz in presbycusis)
Criteria for diagnosing NIHL – ACOEM (2)

- Noise alone does not cause loss of >70kdB in the high frequencies and 40dB in the low frequencies (presbycusis can go beyond 70dB)
- Hearing loss from noise is rapid in the first 10-15 years of exposure, then slows (presbycusis the other way around)
- Previously noise-exposed ears are not more sensitive to future noise exposure
- Hearing loss does not continue after noise exposure has stopped
- Risk of NIHL is low below an exposure of 85dB(A)(TWA), but increases rapidly above that level
- Continuous exposure more is damaging than interrupted exposure (no recovery time)
- Temporary Threshold Shift (TTS) is a risk indicator of permanent NIHL if exposure is left unattenuated, and it always precedes permanent NIHL.
Criteria for diagnosing NIHL -

- NIHL is sensorineural (affecting the hair cells in the inner ear);
- Bilateral and symmetrical;
- It develops gradually, but most rapidly in the first 10 years of exposure;
- It starts in the higher frequencies (3000 -6000 Hz), i.e. greater loss at these frequencies than at 500 - 2000 Hz. Given stable exposure conditions, losses at 3000, 4000, and 6000 Hz will usually reach a maximal point in 10 to 15 years.
- The greatest loss usually occurs at 4000 Hz. The audiogram has a characteristic “ski-slope” appearance. This “notch” at 4000 Hz deepens with additional years of exposure, but reaches a plateau after about 15 to 20 years of exposure. The high frequency hearing loss usually averages 50 - 70 dB. With additional years of exposure, there is some spread of hearing loss to the lower frequencies, but the maximum loss at low frequencies is much less (usually not more than 20 dB). Presbycusis can eliminate this “notch” since it affects the higher frequencies.
- After many years (> 10 yrs) of high energy noise exposure the frequencies above and below 4000 Hz show threshold changes and eventually may become a virtually straight line, or be somewhat erratic.
- Continuous noise exposure is more damaging than interrupted noise exposure which allows the ear a rest period.
- Previous noise exposure does not make the ear more sensitive to future noise exposure. As hearing threshold increases, the rate of loss decreases.
- Speech discrimination is usually good (this is one of the reasons to test for Speech Reception Threshold in cases suspected of pseudohypoacusis);
- The loss stabilises when exposure is discontinued.
- It almost never produces a profound hearing loss. Usually low frequency limits are about 40 dB and high frequency limits about 75 dB.
To determine whether or not the configuration and progression of the hearing loss are consistent with ONIHL, the WCB considers the following characteristics typical of ONIHL:

- The hearing loss is sensorineural.
- The hearing loss occurs in both ears.
- The hearing loss is similar in both ears.
- The hearing loss is characterized by a notch from 3000-6000 Hz with normal hearing at 250-1000 Hz.
  - The first sign of ONIHL is a “notching” of the audiogram at 3000, 4000 or 6000 Hz with recovery of at least 15 dB in the higher frequencies.
  - As exposure continues, the notch gradually deepens and widens.
  - In the early stages of NIHL, the hearing loss has recovery (i.e. less hearing loss) in the higher frequencies, in contrast to presbycusis, which produces a high-frequency hearing loss in a down-sloping pattern without recovery at the higher frequencies.
- Noise exposure does not produce a loss greater than 40 dBHL in the lower frequencies.
- Noise exposure does not produce a loss greater than 75 dBHL at high frequencies.
- Hearing loss due to noise exposure increases most rapidly during the first 10-15 years of exposure. The rate of hearing loss decelerates as the hearing thresholds increase.
- Noise induced hearing loss does not progress after noise exposure is discontinued.
- Word recognition is fairly good (greater than 75 per cent).
Pattern of NIHL

“Acoustic notch”

Fig. 21-34. This represents the results of many employees who worked in the hazardous noise of sawmills for a period of 25 to 30 years. The drop or notch at 4000 Hz deepens after 10 years of exposure. As time passes, and without hearing protection, the notch grows wider and the hearing impairment greater, finally interfering with the employee’s ability to understand speech sounds.
Examples - NIHL

PLH: 1.7%
CAT: 2

PLH Shift from Baseline: ?%

Deterioration: ?dBHL Ear: Freq:
RTS: 30 Ear: Lt Freq: 6K ABHL: 10.63
Examples - NIHL

PLH: 1.8%
CAT: 3A
PBI: 0.0%

Deterioration: ?dBHL Ear: Freq:
RTS: 5 Ear: Lt Freq:.5K ABHL: 12.50

Company: ALLENS MESKO
Department: BL
Examples - NIHL

PLH: 5.9%  PLH Shift from Baseline:  ?%
CAT: 2

PBI: 0.3%


Company: ALLENS MESHCO

Department: CC
Steps to Diagnosis

1. Try to limit doing audiograms to just those who are noise-exposed (simplifies interpretation)
2. Audiogram normal / not?
3. Abnormality work-related / “mixed” / not sure / not work-related?
4. Confirm work-relatedness:
   – Careful exposure assessment (at work / elsewhere)
   – Exclude other causes (may require diagnostic audiogram, or ENT opinion)
5. If plausibly work-related:
   – How severe? (how deep is the notch?)
   – Getting worse? (deepening notch)
   – Reportable to Dept of Labour / DMR? (various criteria)
   – Meets criteria for compensation? (PLH shift)
LEGAL TRIGGERS FOR ACTION
Overview of the legal triggers for action

**OH&SA s24* & 25; (prevention) – (1993)**
- Action based on the diagnosis of (or suspicion of) an occupational disease
- Report to Chief Inspector - details spelled out in GAR (8)(4)

**General Admin Regs (8)(1)(b)* & (8)(4); (prevention) – (2003)**
- Action based on the diagnosis of an occupational disease as contemplated in section 25 of the OH&SA
- Report to Chief Inspector within 14 days of diagnosis

**COIDA II171; (compensation) – (Nov 2001)**
- The presence of “disablement” (determined by PLH, calculated from losses at 0.5, 1, 2, 3 & 4kHz)
- Action based on PLH shift >10% from Baseline

**NIHL Regs (8)(3); (prevention) – (2003)**
- Action based on PLH shift >10% from Baseline (disablement)
- Employer reports to the Provincial Director

- Actions based on the contributions of the hearing thresholds at 2, 3 and 4kHz to the PLH value (not on a PLH shift)
- Action based on PLH shift values of 3.2, 6.4 and 10%.

**MH&SA (prevention) - (1996)**
- Action based on PLH shift of ≥ 5%
- Action based on Standard Threshold Shifts (STS) (2,3 & 4kHz) against audiometric zero (milestone baseline)

* Refers to additional duties for the employer to report an occupational disease if employee (“becomes ill to such a degree that he or she is likely either to die or to suffer a permanent physical defect”)
Periodic screening audiograms assessed for their absolute values and compared with baseline (2 measurements)

- The **absolute** contributions of the values at 2000, 3000 and 4000 Hz to the PLH – determines frequency of testing (annual vs biennial)

- The **PLH-shift**:
  - Shifts of 3.2% - 6.4% = **Intervention**
  - Shift of 6.4% - 10% = **Advanced Intervention**
  - Shift of > 10% = **Possible compensation**
18.5 Conduct periodic screening audiometry annually for a period of three years following baseline testing. Following these tests, the frequency of testing should be determined as follows:

a) When any of the respective contributions to the PLH at any of the specified frequencies (see table 1) are equalled or exceeded, annual routine screening audiometry should be conducted and the possible reason for the loss should be investigated and recorded.

b) When, following the initial testing in (a), during two consecutive routine annual screening audiometric tests, the contribution to the PLH at all of the relevant frequencies, was below that specified in table 1, biennial routine audiometry may be conducted. The biennial routine audiometry may be conducted until such time when the contribution to the PLH at any of the specified frequencies is equalled or exceeded. In such event the annual testing in (a) should be reinstated.

Table 1 — Contribution to the PLH at specified frequencies

<table>
<thead>
<tr>
<th>Frequency (Hz)</th>
<th>Contribution to PLH</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 000</td>
<td>0,8</td>
</tr>
<tr>
<td>3 000</td>
<td>0,3</td>
</tr>
<tr>
<td>4 000</td>
<td>0,1</td>
</tr>
</tbody>
</table>
Fig. 21-34. This represents the results of many employees who worked in the hazardous noise of sawmills for a period of 25 to 30 years. The drop or notch at 4000 Hz deepens after 10 years of exposure. As time passes, and without hearing protection, the notch grows wider and the hearing impairment greater, finally interfering with the employee’s ability to understand speech sounds.
Implications of using PLH for identifying NIHL and a trigger for action

AUDIOMETRY CASE STUDY 1
Standard periodic audiograms by registered audiometrists were obtained for 2240 noise-exposed employees at a company. Each audio was interpreted by an Occupational Medicine Specialist, and reviewed by at least one of the company’s OHP’s. Outcomes were classified as follows:

- **Normal**
- **NIHL**
  - borderline (notch <25)
  - mild (notch 25-40)
  - moderate (notch 40-60)
  - severe (notch >60)
- **Pre-existing NIHL** (borderline – severe)
- **Non-NIHL**
### Results (1)

#### PRIMARY CATEGORY (CAUSE & SEVERITY)

<table>
<thead>
<tr>
<th>DIVISIONS</th>
<th>Employees</th>
<th>Norm</th>
<th>Bord</th>
<th>Mild</th>
<th>Mod</th>
<th>Sev</th>
<th>Pre-Ex</th>
<th>Non-NIHL</th>
<th>Totals</th>
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<tbody>
<tr>
<td>Dept 1</td>
<td>975</td>
<td>269</td>
<td>173</td>
<td>150</td>
<td>48</td>
<td>12</td>
<td>10</td>
<td>175</td>
<td>837</td>
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<td>Dept 2</td>
<td>463</td>
<td>126</td>
<td>69</td>
<td>77</td>
<td>34</td>
<td>9</td>
<td>2</td>
<td>80</td>
<td>397</td>
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<td>74</td>
<td>44</td>
<td>49</td>
<td>27</td>
<td>6</td>
<td>5</td>
<td>54</td>
<td>259</td>
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<td>Dept 4</td>
<td>41</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>Dept 5</td>
<td>44</td>
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<td>Dept 6</td>
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<td>89</td>
<td>18</td>
<td>18</td>
<td>4</td>
<td>9</td>
<td>23</td>
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<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
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<tr>
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<td>61</td>
<td>6</td>
<td>1</td>
<td>0</td>
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<td>0</td>
<td>3</td>
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<td>Dept 9</td>
<td>362</td>
<td>102</td>
<td>55</td>
<td>69</td>
<td>23</td>
<td>4</td>
<td>1</td>
<td>62</td>
<td>316</td>
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<tr>
<td>Dept 10</td>
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<td>2</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>25</td>
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<tr>
<td>Dept 11</td>
<td>47</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Dept 12</td>
<td>90</td>
<td>19</td>
<td>9</td>
<td>11</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>7</td>
<td>55</td>
</tr>
<tr>
<td>Dept 13</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Dept 14</td>
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<td>5</td>
<td>2</td>
<td>4</td>
<td>1</td>
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<td>14</td>
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<td>22</td>
<td>21</td>
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<td>2</td>
<td>23</td>
<td>129</td>
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<tr>
<td>Dept 16</td>
<td>39</td>
<td>14</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>30</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td><strong>3089</strong></td>
<td><strong>763</strong></td>
<td><strong>397</strong></td>
<td><strong>403</strong></td>
<td><strong>156</strong></td>
<td><strong>40</strong></td>
<td><strong>41</strong></td>
<td><strong>440</strong></td>
<td><strong>2240</strong></td>
</tr>
<tr>
<td><strong>Prevalence</strong></td>
<td></td>
<td></td>
<td><strong>34.1%</strong></td>
<td><strong>17.7%</strong></td>
<td><strong>18.0%</strong></td>
<td><strong>7.0%</strong></td>
<td><strong>1.8%</strong></td>
<td><strong>1.8%</strong></td>
<td><strong>19.6%</strong></td>
</tr>
</tbody>
</table>

#### Summary:
- Normal = 34.1%
- NIHL = 44.5%
- Pre-NIHL = 1.8%
- Non-NIHL = 19.6%

- borderline (notch <25)
- mild (notch 25-40)
- moderate (notch 40-60)
- severe (notch >60)
### Summary:

94.6% of cases of NIHL were in the <3.2% (shift from baseline) group, which are below the threshold for action under SANS 1008.

82% of cases of NIHL were in the <1% (shift from baseline) group.
Prevalence of NIHL (including pre-existing group) in the categories of **PLH value** (not PLH shift)

<table>
<thead>
<tr>
<th>CATEGORIES</th>
<th>PLH&lt;2%</th>
<th>PLH&lt;3.2%</th>
<th>PLH 3.2-6.4%</th>
<th>PLH&gt;6.4%</th>
<th>PLH&gt;10%</th>
<th>Total*</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIHL- Borderline</td>
<td>383</td>
<td>398</td>
<td>2</td>
<td></td>
<td></td>
<td>400</td>
</tr>
<tr>
<td>NIHL- Mild</td>
<td>269</td>
<td>360</td>
<td>39</td>
<td>4</td>
<td></td>
<td>406</td>
</tr>
<tr>
<td>NIHL- Moderate</td>
<td>60</td>
<td>92</td>
<td>35</td>
<td>28</td>
<td>10</td>
<td>157</td>
</tr>
<tr>
<td>NIHL- Severe</td>
<td>7</td>
<td>13</td>
<td>11</td>
<td>14</td>
<td>10</td>
<td>40</td>
</tr>
<tr>
<td>TOTALS</td>
<td>719</td>
<td>863</td>
<td>87</td>
<td>46</td>
<td>20</td>
<td>1003</td>
</tr>
</tbody>
</table>

| Percentage          | 72% | 86% | 9%  | 5%  | 2%    |

Less dramatic than the PLH shift group, but still a clear message.
Concluding Comments

▲ PLH misses early NIHL

▲ Hearing conservation programmes that use PLH cut-offs as triggers for action will miss NIHL until it is moderate to severe; furthermore, they will pursue non-occupational hearing loss and neglect occupational hearing loss.

▲ The best mechanism for identifying early NIHL, currently, remains interpretation by a trained professional (OHP, OMP, audiometrist, etc.).

▲ Our national standards & “preventive” regulations are using PLH compensatory cut-offs as triggers for action.

▲ This has been recognised by the SANS technical committee – plans to use threshold shifts instead.

▲ There is no (nationally) agreed cut-off for what constitutes “reportable” NIHL into OH&SA s25.
Alternatives to using PLH for identifying NIHL

DIGITAL ALGORITHMS FOR IDENTIFYING NIHL
Are there ways to screen for the acoustic notch of NIHL using digital algorithms?

**Advantages**

▲ Will flag cases of “interest” for referral to the OMP – optimum use of time
▲ More objective than the human eye
▲ Can screen large numbers very rapidly
▲ Can be adjusted to increase / decrease sensitivity & specificity
Studies suggesting algorithms are more objective than human assessment


Dobie RA, Rabinowitz PM. Change in audiometric configuration helps to determine whether a standard threshold shift is work-related. Spectrum 2002;19:17.


Is a digital screen for the acoustic notch reliable?

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Author Manuscript

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Notched Audiograms and Noise Exposure History in Older Adults

DM Nondahl, MS¹, X Shi, MS¹, KJ Cruickshanks, PhD¹,², DS Dalton, MS¹, TS Tweed, MS¹,³, TL Wiley, PhD⁴, and LL Carmichael, MS²

DESIGN—Four algorithms: 1) Coles, Lutman & Buffin (2000), 2) McBride & Williams (2001), 3) Dobie & Rabinowitz (2002), and 4) Hoffman et al. (2006) were used to identify notched audiograms. Audiometric evaluations were collected as part of the Epidemiology of Hearing Loss Study 10-year follow-up examinations, in Beaver Dam, WI (2003–2005, n=2395). Detailed noise exposure histories were collected by interview at the baseline examination (1993–95) and updated at subsequent visits. An extensive history of occupational noise exposure, participation in noisy hobbies, and firearm usage were used to evaluate consistency of the notch classifications with history of noise exposure.
CONCLUSIONS—These results suggest that there is poor agreement across existing algorithms for audiometric notches. In addition, notches can occur in the absence of a positive noise history. In the absence of an objective consensus definition of a notched audiogram, and in light of the degree of discordance in women between noise history and notches by each of these algorithms, researchers should be cautious about classifying noise-induced hearing loss by notched audiograms.

Problems: Memory bias (noise exposure happened long ago), age factor (presbycusis masks the notch), poor agreement as to what constitutes a “notch”
The Prevalence of Notched Audiograms in a Cross-Sectional Study of 12,055 Railway Workers

Arve Lie,¹,² Marit Skogstad,¹ Torstein Seip Johnsen,² Bo Engdahl,³ and Kristian Tambs³

(Ear & Hearing 2015;36:e86–e92)

Design: The most recent audiogram from 1994 to 2011 of a total of 12,055 railway workers, age 20 to 65 years, was obtained from the medical records of the occupational health service of the Norwegian State Railways (NSB). The prevalences of three types of notched audiograms, Coles notch, notch index, and 4 kHz notch, were computed, in relation to age, sex, and occupational noise exposure.

Notches occurred in both noise-exposed as well as non-noise exposed – concluded that screening for a notch had limited value as a tool for population based prevalence testing.

Arve Lie, MD; Bo Engdahl, PhD; Howard J. Hoffman, MA; Chuan-Ming Li, PhD; Kristian Tambs, PhD

Objectives/Hypothesis: To study the prevalence and usefulness of audiometric notches in the diagnosis of noise-induced hearing loss (NIHL).


Methods: The prevalence of four types of audiometric notches (Coles, Hoffman, Wilson) and 4 kHz notch were computed in relation to occupational noise exposure, age, sex, and report of recurrent ear infections.

Results: The prevalence of notches in the 3 to 6 kHz range (Wilson, Hoffman, and Coles) ranged from 50% to 60% in subjects without occupational noise exposure, and 60% to 70% in the most occupationally noise-exposed men. The differences were statistically significant only for bilateral notches. For 4 kHz notches, the prevalence varied from 25% in occupationally nonexposed to 35% in the most occupationally exposed men, and the differences were statistically significant for both bilateral and unilateral notches. For women, the prevalence of notches was lower than in men, especially for 4 kHz notches, and the differences between occupationally noise exposed and nonexposed were smaller. Recreational exposure to high music was not associated with notched audiograms.

Conclusions: The detection of bilateral notches and unilateral 4 kHz notches is of some value in diagnosing NIHL, especially in men.

Key Words: Noise, notched audiograms, occupation, noise-induced hearing loss.

Level of Evidence: 4

The predictive value of the acoustic notch was better
Using the digital algorithms in population based settings to identify people with NIHL is only modestly successful (poor sensitivity & specificity for identifying NIHL)

This does put a question on whether the acoustic notch is indeed synonymous with NIHL, but…

If we stick with the case definition as per the ACOEM, which is significantly influenced by the presence of an acoustic notch, and test the digital tool in an occupational setting, how will it perform relative to a human?
Audiometric screening results from a company were exported to an Excel spreadsheet with only demography (age, gender, place of work), the measured thresholds & the PLH values (n=2014)

A mechanism was built into the spreadsheet that enabled graphical representation of the audio thresholds, for purposes of interpretation

Audiograms were assessed for NIHL by an Occupational Medicine Specialist (“reference test”)

A formulae was used to identify an acoustic notch digitally (based on the Coles formula);

\[
\text{[AVG thresholds at 1,2,3kHz and 6,8kHz]} - \text{[AVG at 6,8kHz]} > "x"
\]

(“x” = the “notch”; for x we substituted various notch depths, to see how they perform, eg 5kHz, 10kHz, 15kHz, etc)
## Results

<table>
<thead>
<tr>
<th>Criterion</th>
<th>0dB</th>
<th>8dB</th>
<th>10dB</th>
<th>15dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variations in depth of notch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensitivity</td>
<td>98%</td>
<td>85%</td>
<td>52%</td>
<td>27%</td>
</tr>
<tr>
<td>Specificity</td>
<td>45%</td>
<td>84%</td>
<td>93%</td>
<td>99%</td>
</tr>
<tr>
<td>Positive Predictive Value</td>
<td>31%</td>
<td>65%</td>
<td>66%</td>
<td>88%</td>
</tr>
<tr>
<td>Negative Predictive Value</td>
<td>99%</td>
<td>94%</td>
<td>88%</td>
<td>84%</td>
</tr>
</tbody>
</table>

▲ The sensitivity increases as the depth of the required notch is reduced and the specificity is the other way round

▲ High levels of sensitivity & specificity can be obtained

▲ The formula can be adjusted to the needs of the user (sensitivity vs specificity)

### Glossary:
- **Sensitivity**: the ability of a test to correctly identify those **with the disease**
- **Specificity**: the ability of the test to correctly identify those **without the disease**
- **Positive Predictive Value**: proportions of **positive results** are **true positive**
- **Negative Predictive Value**: proportions of **negative results** are **true negative**
More testing needed to establish validity (comparisons with audio interpretations of other OH professionals)

The digital tool will not replace the skilled occupational health professional – it is intended to be an adjunct and prompt to case finding (especially in large worker populations)

Is a useful tool to further test the performance of PLH & STS against diagnosed NIHL
THANK YOU!
EXTRA SLIDES
Reporting NIHL

  – (Focus is on incident & disease prevention)
  – Requirement placed on the professional, not the company

25. Report to chief inspector regarding occupational disease. — Any medical practitioner who examines or treats a person for a disease described in the to the Workmen’s Compensation Act, 1941 ( ), or any other disease which he believes arose out of that person’s employment, shall within the prescribed period and in the prescribed manner report the case to the person’s employer and to the chief inspector, and inform that person accordingly.

[S. 25 substituted by s. 7 of Act No. 181 of 1993.]
Reporting NIHL (1)


- Still consistent with the OH&SA
- But onus to report is now on the company


(1) An employer or user, as the case may be, shall—

(a) within seven days of any incident referred to in section 24 (1) (a) of the Act, give notice thereof to the provincial director in the form of WCL1 or WCL 2; and

(b) where a person, in consequence of such an incident, dies, becomes unconscious, suffers the loss of a limb or part of a limb, or is otherwise injured or becomes ill to such a degree that he or she is likely either to die or to suffer a permanent physical defect, such incident, including any other incident contemplated in section 24 (1) (b) and (c) of the Act, shall forthwith also be reported to the provincial director by telephone, facsimile or similar means of communication.

(4) Any registered medical practitioner shall, within 14 days of the examination or treatment of a person for a disease contemplated in section 25 of the Act, give notice thereof to the chief inspector and the employer in the form of WCL 22.

(5) Any other person not contemplated in this regulation may in writing give notice of any disease contemplated in section 25 of the Act, to the employer and chief inspector.
Noise Induced Hearing Loss Regs (2003)

– The regulations only prescribe reporting the compensatable cases !!!!!

(3) An employer shall ensure that—

(d) in the case of an employee whose percentage loss of hearing has deteriorated by 10% or more since the baseline audiogram was recorded or an employee for whom no baseline audiogram is available but who has a 10% or more loss of hearing that is not obviously due to medical causes, and that has been confirmed by a repeat audiogram—

(iv) such hearing loss is reported to the provincial director, on form WCL1/2, as contemplated in regulation 6 of the General Administrative Regulations.
THE DETERMINATION OF PERMANENT DISABLEMENT RESULTING FROM HEARING LOSS CAUSED BY EXPOSURE TO EXCESSIVE NOISE AND TRAUMA

COMPENSATION FOR OCCUPATIONAL INJURIES AND DISEASES ACT,
No. 130 of 1993

The following instructions are issued to clarify the position in regard to claims for impairment of hearing:

1.7 Persons to be submitted for compensation consideration would be:

- Employees whose PLH has deteriorated by more than 10% PLH from the baseline audiogram; or
- Employees who have more than 10% PLH and for whom no baseline is available (see section 5).
Intervention at PLH shifts of $> 3.2\% < 6.4\%$

1. Employer to investigate & determine cause
2. Inspect & check PPE for adequacy
3. Inspect fit & use of PPE by employee
4. Retrain employee in Regulation 3
5. Document intervention & archive for 40 years
Intervention at PLH shifts of $\geq 5\%$

1. Same as Intervention SANS (as loss $> 3.2\%$)
   1. Employer to investigate & determine cause
   2. Inspect & check PPE for adequacy
   3. Inspect fit & use of PPE by employee
   4. Retrain employee in Regulation 3
   5. Document intervention & archive for 40 years

2. Reporting
   1. Complete DMR 90
Intervention at PLH shifts of $> 6.4\% < 10\%$

1. Employer to investigate & determine cause- must include re-test and otoscopy
2. Diagnostic test by audiologist to be considered
3. Inspect & check PPE for adequacy
4. Inspect fit & use of PPE by employee
5. Retrain employee in Regulation 3
6. Document intervention & archive for 40 years
Intervention at PLH shifts of >10%

▲ Re-test employee
▲ If > 10 PLH shift: remove employee from noise
▲ Refer to audiologist for diagnostic audiometry
▲ If > 10 PLH confirmed: refer to ENT or OMP
▲ It is recommended that employee is removed from any noise zone
▲ Employer to investigate & determine cause
▲ Inspect & check PPE for adequacy
▲ Inspect fit & use of PPE by employee
Intervention at PLH shifts of >10%

- If re-entry in noise zone: retrain Regulation 3
- If continued loss: remove employee permanently from noise
- Report to COIDA
- Report to DME
- Document intervention & archive for 40 years