

KINNECT GUIDES

Understanding Noise-Induced Hearing Loss: Insights from an Occupational Health Provider

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Noise-Induced Hearing Loss (NIHL) is a prevalent occupational hazard that, despite being preventable, continues to affect workers across many industries. A 2024 Hearing Australia survey found that **11% of Australians have workplace-related hearing loss.**

NIHL is both a significant health issue and a substantial economic concern in Australia, so it is vital that workers and employers understand how occupational hearing loss occurs, how it can be prevented and monitored.



Drawing from a segment of a joint webinar with KINNECT and Carelever, [***"Noise-Induced Hearing Loss: An Occupational Health Provider's Opinion"***](#), featuring Dr. Matthew Brandt, this guide delves into the mechanisms, implications, and preventive strategies related to NIHL.

What is Noise-Induced Hearing Loss (NIHL)?

NIHL refers to the gradual loss of hearing resulting from prolonged or repeated exposure to excessive noise.

It typically develops slowly over time and may go unnoticed until permanent damage has occurred. The condition primarily affects sensory hair cells in the inner ear. Once these cells are damaged or destroyed, they do not regenerate, resulting in permanent hearing loss.

Hearing is a critical sense for communication, situational awareness and safety in many workplace settings.

The Mechanisms Behind NIHL

Summary: The human ear contains delicate structures that make hearing possible. When exposed to loud sounds or excessive noise, especially over long periods, these structures can be permanently damaged. In particular, the hair cells in the cochlea, which convert sound vibrations into electrical signals for the brain, can be harmed or destroyed by too much noise.

This damage reduces the ability to hear certain frequencies, especially high-pitched sounds, which is a common feature of NIHL.



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How we Perceive Sound

Sound is a pressure wave captured by the eardrum.

Our perception of loudness is directly related to the mechanical pressure of the sound wave that's transmitted through the outer ear and focused onto the eardrum.

The eardrum vibrates in response to this pressure and passes the vibrations through the small bones of the middle ear to the oval window of the inner ear. A fluid inside the cochlea is then displaced in a way that depends on the intensity and frequency of the sound.

These fluid movements stimulate sensory cells, known as hair cells, located within the cochlea, which convert the vibrations into nerve impulses. These impulses travel along a nerve pathway to the brain for processing. Complex areas in the brain help link sound to memory, smell, and other cognitive functions.

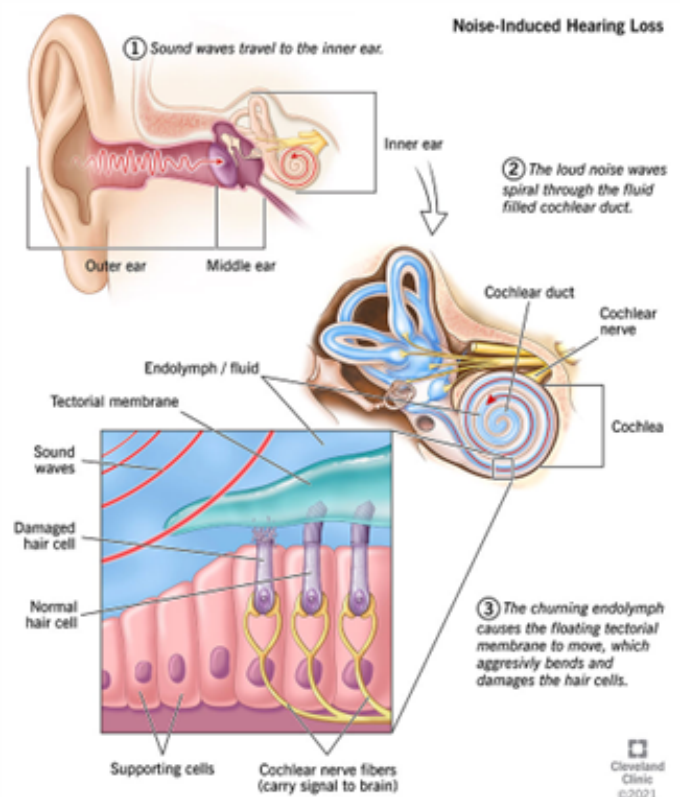
[Learn more here](#)

How NIHL Occurs

When a person is first exposed to excessive noise, the metabolic processes within the hair cells of the inner ear — those responsible for converting sound vibrations into nerve impulses for the brain — **can become temporarily disrupted**. This reduces their ability to function effectively, resulting in what is known as a **temporary threshold shift**.

If you've ever attended a loud event, such as a music concert or sporting match, and noticed muffled hearing or a ringing sound afterward, that's an example of this temporary shift. In such cases, the inner hair cells have been temporarily overstimulated and metabolically exhausted but hearing usually returns to normal within a few hours.

However, repeated exposure to excessive noise — especially without sufficient recovery time — or cumulative exposure over time, can lead to permanent damage to the hair cells and associated nerve pathways. This results in permanent hearing loss.





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How NIHL Occurs Cont.



Many individuals with noise-induced hearing loss also report **tinnitus** — the perception of abnormal sounds such as ringing, whistling, clicking, or blowing in the ears, without any external source. Tinnitus may affect one or both ears and can interfere with communication.

This is why workers undergoing audiometric screening are asked: “Do you experience tinnitus, and does it impact communication for you?”

Increased exposure over time = Increased risk of NIHL

The risk of developing noise-induced hearing loss (NIHL) is cumulative: the longer or more frequently someone is exposed to excessive noise, the less opportunity the inner hair cells have to recover. Even brief, repeated periods of very high noise exposure throughout the day can increase the risk of permanent hearing damage, even if average noise levels over the rest of the day remain well below the exposure standard.

Furthermore, **the risk of developing hearing loss from excessive noise is greatest during the first 10 to 15 years of exposure** — often early in a worker’s career.

There is also considerable individual variability in susceptibility to noise-related hearing damage. Factors such as genetics, certain medical conditions, and some medications can increase vulnerability. The occupational exposure standards are designed with this variability in mind to help protect the majority of workers.

Other Workplace-Induced Causes of Hearing Loss

An ototoxic agent is a substance — such as a heavy metal, chemical, or certain medication — that can be harmful to the inner ear and the nerves involved in hearing. Exposure to these agents can cause hearing loss by damaging the inner ear cells and the nerves that carry sound signals to the brain.

When someone is exposed to both ototoxic agents and loud noise simultaneously, the risk of hearing loss is greater than from either agent alone. This is known as a multiplicative effect. Some medications, such as certain antibiotics, can also be ototoxic, especially when taken over a long period.



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Industries Most at Risk

Certain industries inherently expose workers to high noise levels, increasing the risk of NIHL. These include:

- **Construction:** Use of heavy machinery and power tools.
- **Manufacturing:** Operations involving loud equipment and assembly lines.
- **Mining and Energy:** Drilling and extraction processes generate sustained high noise levels.
- **Transportation:** Airports and railways expose workers to constant high-decibel environments.

In these settings, without adequate noise control measures, workers are at a heightened risk of developing NIHL.

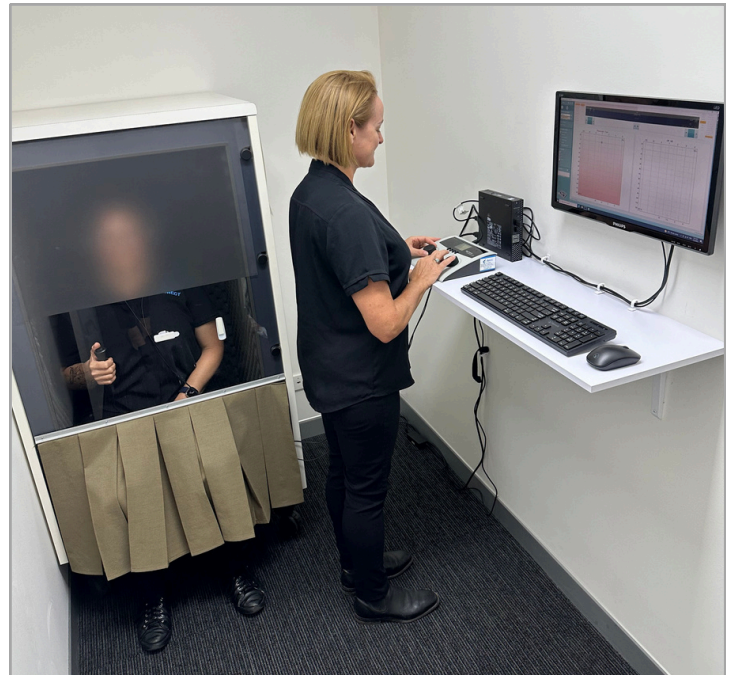
Symptoms & Detection

Early signs of NIHL can be subtle and often go unnoticed until significant damage has occurred.

Common symptoms include:

- **Difficulty Understanding Speech:** Especially in noisy environments or when multiple people are speaking.
- **Tinnitus:** A ringing, buzzing, or hissing sound in one or both ears with no external source.
- **Muffled Hearing:** Sounds may seem distant, unclear or less sharp than usual.

NIHL is detected via an audiometric test, which measures a person's ability to hear different frequencies, pitches, and sounds. The test is conducted using specialised equipment in a soundproof room.



The worker sits in a quiet booth with headphones and presses a button when they hear a sound.

Regular audiometric testing is crucial for early detection, enabling timely intervention to help prevent further hearing loss.



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Prevention Strategies

Preventing NIHL should follow the hierarchy of control, starting with the most effective measures. Key strategies include:



- **Elimination:** Removing the source of excessive noise altogether — for example, by designing out noisy processes or avoiding high-noise equipment where possible.
- **Substitution:** Replacing noisy equipment or tasks with quieter alternatives, such as using electric tools instead of pneumatic ones.
- **Engineering Controls:** Modifying machinery or the work environment to reduce noise at the source or along its path — for example, using sound barriers or acoustic enclosures.
- **Administrative Controls:** Reducing workers' noise exposure through job rotation, shift scheduling, or restricting access to high-noise areas.
- **Personal Protective Equipment (PPE):** Providing suitable hearing protection — such as earplugs or earmuffs — and ensuring they are used correctly and consistently.

Education and training are also vital to help workers understand the risks of noise exposure and how to correctly use protective measures to prevent hearing loss.

The Role of Occupational Health Providers

Occupational health providers play a pivotal role in managing and preventing Noise-Induced Hearing Loss (NIHL). Their responsibilities include:

- **Conducting regular hearing assessments:** Monitoring employees' hearing thresholds through health surveillance programs to detect early signs of NIHL.
- **Assisting in the development of hearing conservation programs:** Tailoring strategies to suit specific workplace environments and noise risks.
- **Training and education:** Informing both employers and employees about the importance of hearing protection and the correct use of personal protective equipment (PPE).
- **Policy support and implementation:** Contributing to the development and application of workplace policies aimed at reducing noise exposure and promoting a culture of hearing health.



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Legal and Ethical Considerations

Employers have a legal duty to provide a safe working environment, which includes managing the risks associated with noise exposure.

Failure to implement appropriate hearing conservation measures can lead to regulatory action by the Work Health and Safety regulator, fines or legal proceedings, increased workers' compensation claims, and reputational harm to the organisation.

Ethically, maintaining a safe workplace reflects a genuine commitment to employee well-being. It builds trust, supports a positive safety culture, and helps maintain workforce morale.

Apportionment during insurance claims

Insurers may apportion liability for hearing loss claims based on the duration of a worker's employment with each employer. However, this approach may not fully reflect differences in noise intensity, frequency, or cumulative exposure between workplaces.

It also may not account for the fact that hearing loss from noise exposure often develops early in a worker's career, particularly during the first 10 to 15 years.

Example:

A worker may have been employed for 20 years by Employer A and 10 years by Employer B.

If noise levels and exposure duration were significantly higher at Employer B, the contribution to hearing loss risk during that period could have been greater, despite a shorter duration of employment.

It's also important to understand how sensitive the ear is to changes in sound pressure. **Even a 3-decibel increase in exposure represents a doubling of noise intensity, which significantly increases the risk of hearing damage, particularly if exposure is prolonged or protective measures are inadequate.**

This highlights the importance of maintaining accurate noise exposure records and ensuring a robust system of entry, periodic, and exit audiometric testing to support both prevention and claim management.



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Now is the Time to Protect Your Workers' Hearing

Noise-induced hearing loss remains a significant occupational health concern - one that demands immediate proactive prevention and effective management to prevent future harm.

Employers have a responsibility to implement comprehensive noise control plans, including engineering and administrative controls, to reduce exposure at the source.

By combining effective noise reduction strategies with regular monitoring, the correct use of hearing protection, and targeted education, organisations can help safeguard their workers' hearing health. Occupational health providers play a vital role in supporting these efforts, offering expert guidance to ensure workplaces are both safe and compliant.

For organisations looking to strengthen their hearing conservation programs, **KINNECT provides specialised health monitoring services, including audiometric testing and hearing protection fit testing**, tailored to the needs of diverse industries.

[Contact us](#) to discuss how KINNECT can help you protect your workforce's hearing health

Resources

KINNECT: [Audiometric Testing Services](#)

KINNECT: [Hearing Fit Testing Services](#)

KINNECT: [Health Surveillance Services](#)

Hearing Australia:
[Audiometric Testing Fact Sheet](#)

Safe Work Australia -
[Model Code of Practice: Managing noise and preventing hearing loss at work](#)

Safe Work Australia - [Safety Topic Page: Noise](#)

