

Noise Pollution and Health

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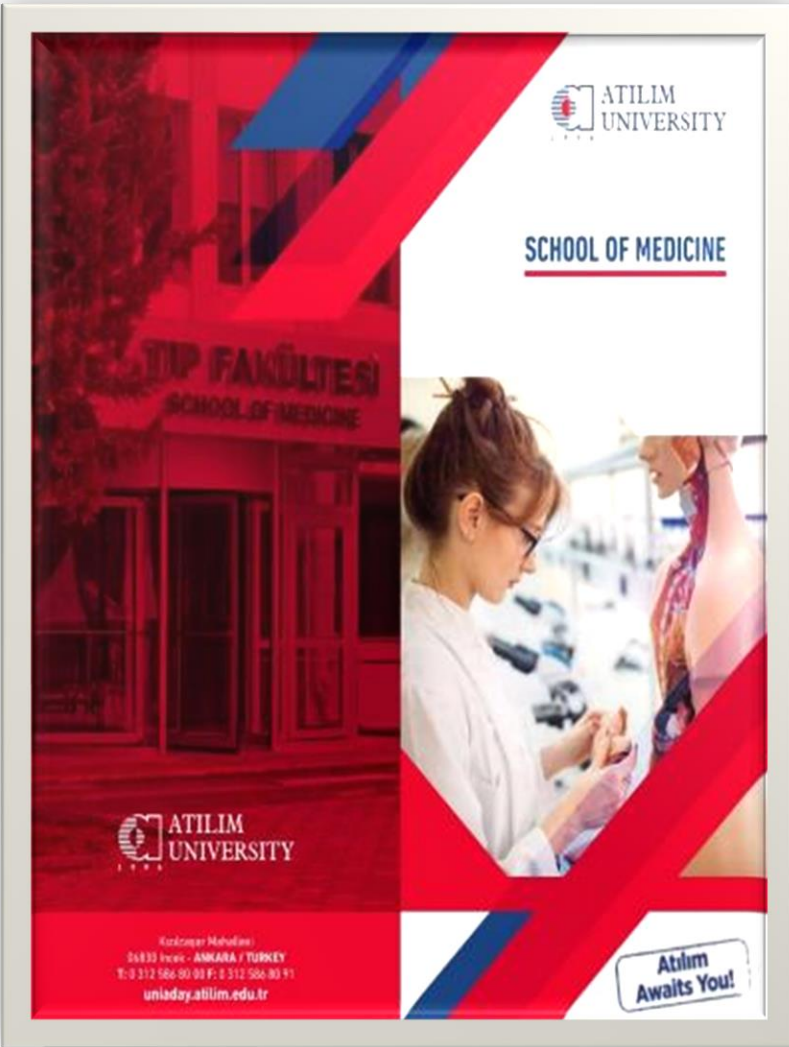
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“Listening is the most dangerous thing of all, listening means knowing, finding out about something and knowing what's going on, our ears don't have lids that ...



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Learning objectives....

At the end of this lecture, students are expected to :

- **Have** basic knowledge on the **Noise** and harmful effects on human health
- **Describe** the potential noise sources and take preventive measures
- **Define** the importance of perodical exam for making early diagnosis
- ***Conceive*** the crucial moment of **reducing the noise hazard to levels of 85 or 80 dBA**
- **Understand** **absence of noise control and hearing conservation programme (HCP)**
- **Realise** the nature of the progress of **noise-induced hearing loss** was insidious
- **Construct** emphaty on impairments or the risk for **fear of being stigmatized**
- **Orient** the people truely facing with hearing impairment to the related health facilities



The Nature and Effects of Noise

❑ Pervasive Nature of Occupational Noise

- **Noise** is one of the most common of all the **occupational hazards**.
- *In the US, for example, more than **9 million** workers are exposed to daily average A-weighted noise levels of **85 decibels (dBA)**.*
- These noise levels are potentially **hazardous** to their hearing and can produce other adverse effects as well.
- *There are approximately 5.2 million workers exposed to noise above these levels in manufacturing and utilities, which represents about 35% of the total number of workers in US manufacturing industries.*

The Next Public Health Epidemic : *City Noise Pollution!*



Noise pollution is one of the **environmental pollutions** affecting humans.

When air molecules surrounding our ears vibrate, parts inside the ear sense the changes in pressure. These parts amplify the vibrations and ultimately cause tiny hairs in the inner ear to bend. Bending those hairs creates nerve impulses that the brain perceives as sound.

We are hurting our planet and it is hurting us back. This informed the **World Health Day** theme: “**Our Planet, Our Health**”. The environmental pollutants we release through different human activities are coming to haunt us.

<https://pharmanewsonline.com/noise-pollution-and-health/> 8.3.24

Hearing loss/disorders

A sudden loud noise can cause severe damage to the eardrum.

Almost everyone has had one experience of being temporarily “deafened” by loud noise.

This “**deafness**” is not permanent though.

However, **exposure to loud noises**, either in a single traumatic experience or over time can damage the auditory system, resulting in **hearing loss**.

Inadequate **hearing protection** or prolonged exposure to noise can result in either temporary or permanent **hearing loss**.

Hazardous noise levels

- ❑ Hazardous noise levels are easily identified and it is technologically feasible to control excessive noise in the vast majority of cases by applying *off-the-shelf technology*, by redesigning the equipment or process or by retrofitting noisy machines.
- ❑ *But all too often nothing is done. There're several reasons for this.*
- ❑ *First, although many noise control solutions are remarkably inexpensive, others can be costly, especially when the aim is to reduce the noise hazard to levels of 85 or 80 dBA.*

Noise-induced hearing impairment is very common

- ✓ The first sign is usually that other people don't seem to speak as clearly as they used to.
- ✓ *The hearing-impaired person will have to ask others to repeat themselves, and he or she often becomes annoyed with their apparent lack of consideration.*
- ✓ Family and friends will often be told,
- ✓ ***“Don't shout at me. I can hear you, but I just can't understand what you're saying.”***

<https://www.iloencyclopaedia.org/part-vi-16255/noise>



Noise-induced hearing impairment is **very common**

- ✓ **Noise-induced hearing impairment** is very common, but it is often underrated because there are no visible effects and, in most cases, no pain.
- ✓ *There is only a **gradual, progressive loss of communication** with family and friends, and a loss of sensitivity to sounds in the environment, such as birdsong and music.*
- ✓ Unfortunately, good hearing is usually taken for granted until it is lost.
- ✓ *These losses may be **so gradual** that individuals do not realize what has happened until the impairment becomes handicapping.*

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Noise-induced hearing loss

- ❑ But what has most likely happened is that they have started to incur a **temporary hearing loss** which dulls their hearing sensitivity during the work day and often subsides during the night.
- ❑ Thus, the progress of **noise-induced hearing loss** is insidious in that it creeps up gradually over the months and years, largely unnoticed until it reaches handicapping proportions.

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**SONOMETER,
Sound Level Meter**

The Scope of Noise Exposure

- ❑ The levels are likely to be somewhat higher in less developed nations, where **engineering controls** are not used as widely, and somewhat lower in nations with stronger **noise control programmes**, such as the Scandinavian countries and Germany.
- ❑ *Many workers throughout the world experience some very hazardous exposures, well above 85 or 90 dBA.*
- ❑ For example, *the US Labor Department* has estimated that nearly half a million workers are exposed to daily average noise levels of 100 dBA and above, and more than 800,000 to levels between 95 and 100 dBA in the manufacturing industries alone.

Absence of noise control

- ❑ One very important reason for the ***absence of noise control & hearing conservation programme*** is that, unfortunately, noise is often accepted as a “*necessary evil*”, a part of doing business, an inevitable part of an industrial job.
- ❑ ***Hazardous noise*** causes no bloodshed, breaks no bones, produces no strange-looking tissue, and, if workers can manage to get through the first few days or weeks of exposure, they often feel as though they have “got used” to the noise.



SONOMETER

Occupational hearing impairment : *Acoustic trauma*

- Noise-induced hearing impairment is usually considered an **occupational disease** or illness, rather than an injury, because its progression is gradual.
- *On rare occasions, an employee may sustain immediate, permanent hearing loss from a very loud event such as an explosion or a very noisy process, such as riveting on steel.*
- In these circumstances the **hearing loss** is sometimes referred to as an acute injury and is called “**acoustic trauma**”.



<https://www.iloencyclopaedia.org/part-vi-16255/noise>

Occupational hearing impairment

- *The usual circumstance, however, is a slow decrease in **hearing ability** over many years.*
- The **amount of impairment** will depend on the level of the noise, the duration of the exposure and the susceptibility of the individual worker.
- *Unfortunately,*
there is no medical treatment for occupational hearing impairment;
- **there is only prevention...**

<https://www.iloencyclopaedia.org/part-vi-16255/noise>

Hearing Conservation Program Requirements

1. Baseline and annual audiometric testing
2. Providing hearing protection & attenuation of the hearing protection
3. Training
4. Posting of the OSHA Noise Standard
5. Recordkeeping
6. Re-sampling noise levels if conditions change

Occupational hearing impairment

- **Hearing loss due to noise** is often temporary at first.
- During the course of a noisy day, the ear becomes fatigued and the worker will experience a reduction in hearing known as **temporary threshold shift** (TTS).
- Between the end of one workshift and the beginning of the next, the ear usually recovers from much of the TTS, but often, some of the loss remains.
- After days, months and years of exposure, the **TTS leads to permanent effects** and new amounts of TTS begin to build onto the now permanent losses.
- A good **audiometric testing** programme will attempt to identify these **temporary hearing losses** and provide for preventive measures before the losses become permanent. <https://www.iloencyclopaedia.org/part-vi-16255/noise>

NA on-Occupational hearing impairment

- ❑ It is important to understand that **occupational noise** is not the only cause of **noise-induced hearing loss** among workers, but **hearing loss** can also be caused by sources outside the workplace.
- ❑ *These sources of noise produce what is sometimes called “**sociocusis**”, and their effects on hearing are impossible to differentiate from **occupational hearing loss**.*
- ❑ They can only be surmised by asking detailed questions about the worker’s recreational and other noisy activities.
- ❑ *Examples of **sociocusic** sources could be woodworking tools, chain saws, unmuffled motorcycles, loud music in discotheque, and firearms..*

<https://www.iloencyclopaedia.org/part-vi-16255/noise>

Non-Occupational hearing impairment

- ✓ Frequent shooting with large-calibre guns (without **hearing protection**) may be a significant contributor to **noise-induced hearing loss**, whereas occasional hunting with smaller-calibre weapons is more likely to be harmless.
- ✓ The importance of non-occupational noise exposure and the resulting **sociocosis** is that this **hearing loss** adds to the exposure that an individual might receive from occupational sources.
- ✓ For the sake of workers' overall hearing health, they should be counselled to wear **adequate earing protection** when they engage in noisy recreational activities. <https://www.iloencyclopaedia.org/part-vi-16255/noise>



Presbycusis, hearing handicap, hearing aid

- ❑ As the hearing loss becomes worse, the individual will begin to withdraw from social situations.
- ❑ *Church, civic meetings, social occasions and theatre begin to lose their attraction and the individual will choose to stay at home.*
- ❑ The volume of the TV becomes a source of contention within the family, and other family members are sometimes driven out of the room because the hearing-impaired person wants it so loud.
- ❑ **Presbycusis**, the hearing loss that naturally accompanies the ageing process, adds to the **hearing handicap** when the person with noise-induced hearing loss becomes older.

<https://www.iloencyclopaedia.org/part-vi-16255/noise>



Presbycusis, hearing handicap, hearing aid

- ❑ **Presbycusis**, the hearing loss that naturally accompanies the ageing process, adds to the **hearing handicap** when the person with noise-induced hearing loss becomes older.
- ❑ *Eventually, the loss may progress to such a severe stage that the individual **can no longer communicate** with family or friends without great difficulty, and then he/she is indeed isolated.*
- ❑ A **hearing aid** may help in some cases, but the clarity of natural hearing will never be restored, as the clarity of vision is with eyeglasses.

<https://www.iloencyclopaedia.org/part-vi-16255/noise>



Stigma attached to the hearing impairments

- ❑ Another important reason why the hazards of noise are not always recognized is that there is a **stigma** attached to the resulting **hearing impairment**.
- ❑ On rehabilitation from **noise-induced hearing loss** elsewhere in this Encyclopaedia, people with **hearing impairments** are often thought of as elderly, mentally slow and generally incompetent, and those at risk of incurring impairments are reluctant to acknowledge either their impairments or the risk for **fear of being stigmatized**.

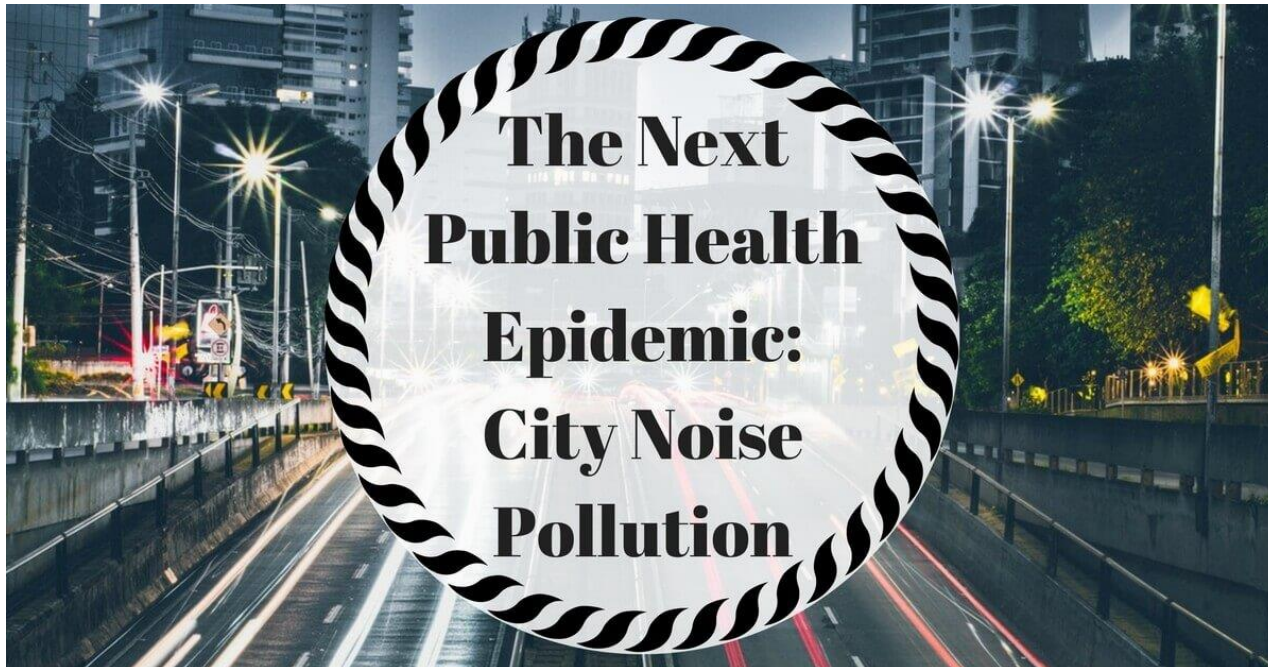
Communication interference and safety

- The fact that noise can interfere with or **“mask” speech communication** and warning signals is only common sense.
- *Many industrial processes can be carried out very well with a minimum of communication among workers.*
- Other jobs, however, such as those performed by airline pilots, railroad engineers, tank commanders and many others rely heavily on speech communication.



Communication interference and safety

- Some of these workers use electronic systems that suppress (filters) the noise and amplify the speech.
- Nowadays, sophisticated communication systems are available, some with devices that cancel *unwanted acoustic signals* so that communication can take place more clearly.



<https://www.iloencyclopaedia.org/part-vi-16255/noise>

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Loss of hearing

- **Loss of hearing** is certainly the most well-known ***adverse effect of noise***, and probably the most serious, but it is not the only one.
- *Other detrimental effects include **tinnitus** (ringing in the ears), interference with speech communication and with the perception of warning signals, disruption of job performance, annoyance and extra-auditory effects.*
- Under most circumstances, protecting workers' hearing should protect against most other effects.
- *This consideration provides additional support for companies to implement **good noise control** and «**hearing conservation programmes**» (HCP).*

<https://www.iloencyclopaedia.org/part-vi-16255/noise>



Hearing loss can be impactful in many areas

- An estimated 25.4 million US residents aged 12 years or older have mild **hearing loss**.
- **Hearing loss** directly affects 23% of Americans 12 years or older.
- **Hearing loss** can be impactful in many areas of an individual's life including: *Communication with others, thinking ability, diminished psychological health, etc.*
- Some **risk factors** identified for **hearing loss** include:
 - *Family history,*
 - *Maternal infections during pregnancy*
 - *Exposure to damaging noise levels*
 - *Recurrent **middle ear infections** or episode lasting < 3 months*



DANGERS OF HIGH NOISE LEVELS

INFOGRAPHIC



90DB SOUND
LONG TIME

HEADPHONES
LONG TIME



NOISE LEVELS



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Preventive steps before the hearing loss

- ❑ This is an unfortunate situation because ***noise-induced hearing losses*** become permanent, and, when added to the hearing loss that naturally occurs with ageing, can lead to depression and isolation in one's middle and old age.
- ❑ *The time to take preventive steps is before the hearing losses begin.*
- ❑ **Noise** is especially prevalent in the manufacturing industries.





8 STEPS

for healthy ears



**DO NOT USE
COTTON BUDS**



**DO NOT LISTEN
TO LOUD MUSIC
WITH HEADPHONES**



**WEAR A HAT
IN THE COLD**



**IMPROPERLY DONE
EAR PIERCINGS**



**TREAT A
RUNNY NOSE**



**HEALTHY
DIET**



VACCINATION



VITAMINS

Methods of noise control..

How can noise be controlled?

Workplace noise can be controlled:

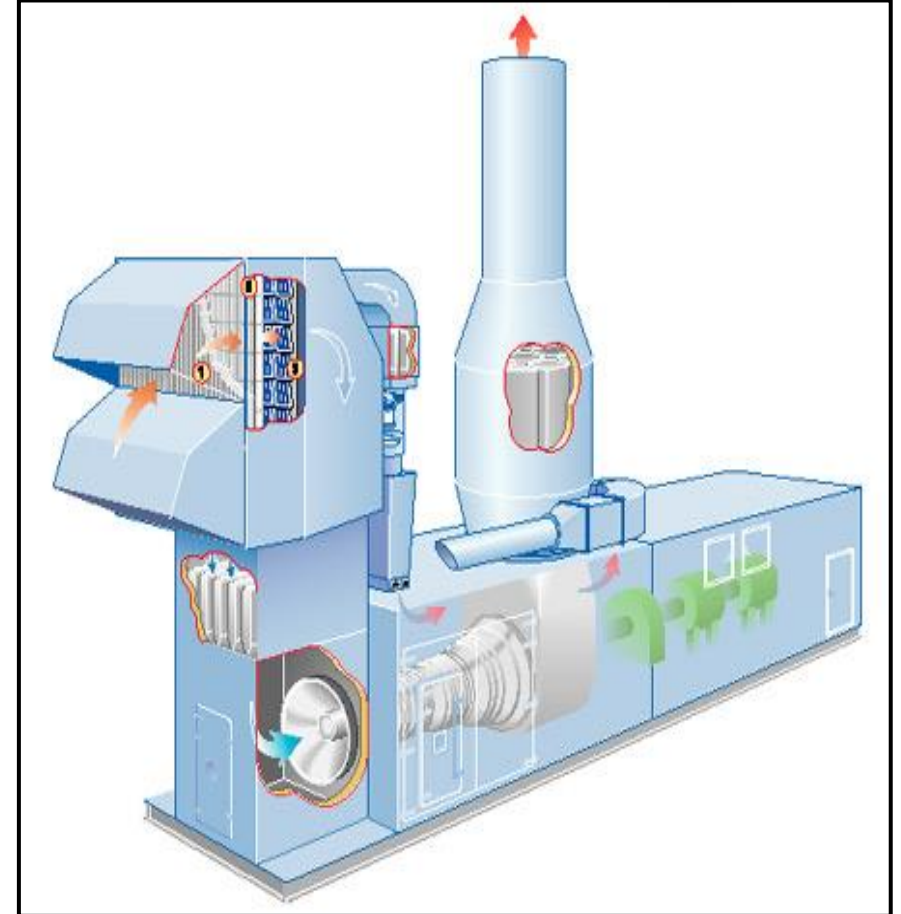
- (1) **at the source;**
- (2) through the use of **barriers,**
- (3) **at the worker.**

(All 3, Primary prevention)

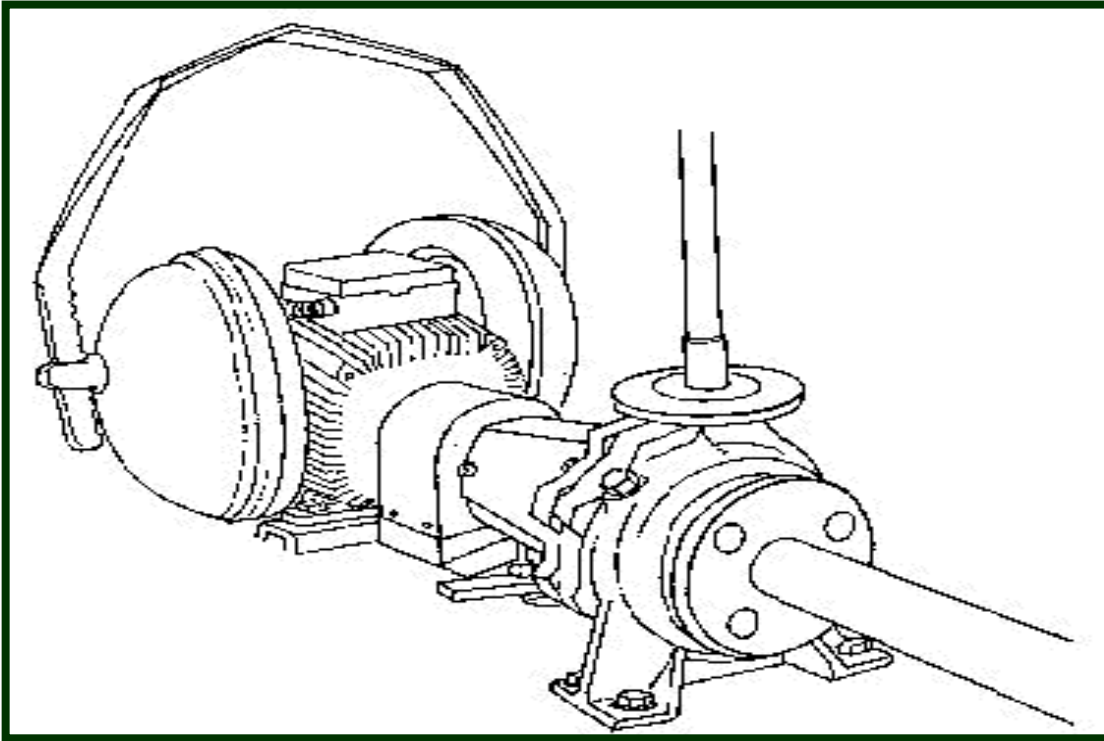
Periodic audiometry :

(Secondary prevention for early diagnosis)

Hearing aid : Tertiary prevention.. *(Rehabilitation)*



Put a silencer on the machine instead of ear protectors on the workers..



Reducing noise at source (*left*) and ambient (*right*) is a primary protection measure superior to personal protection.

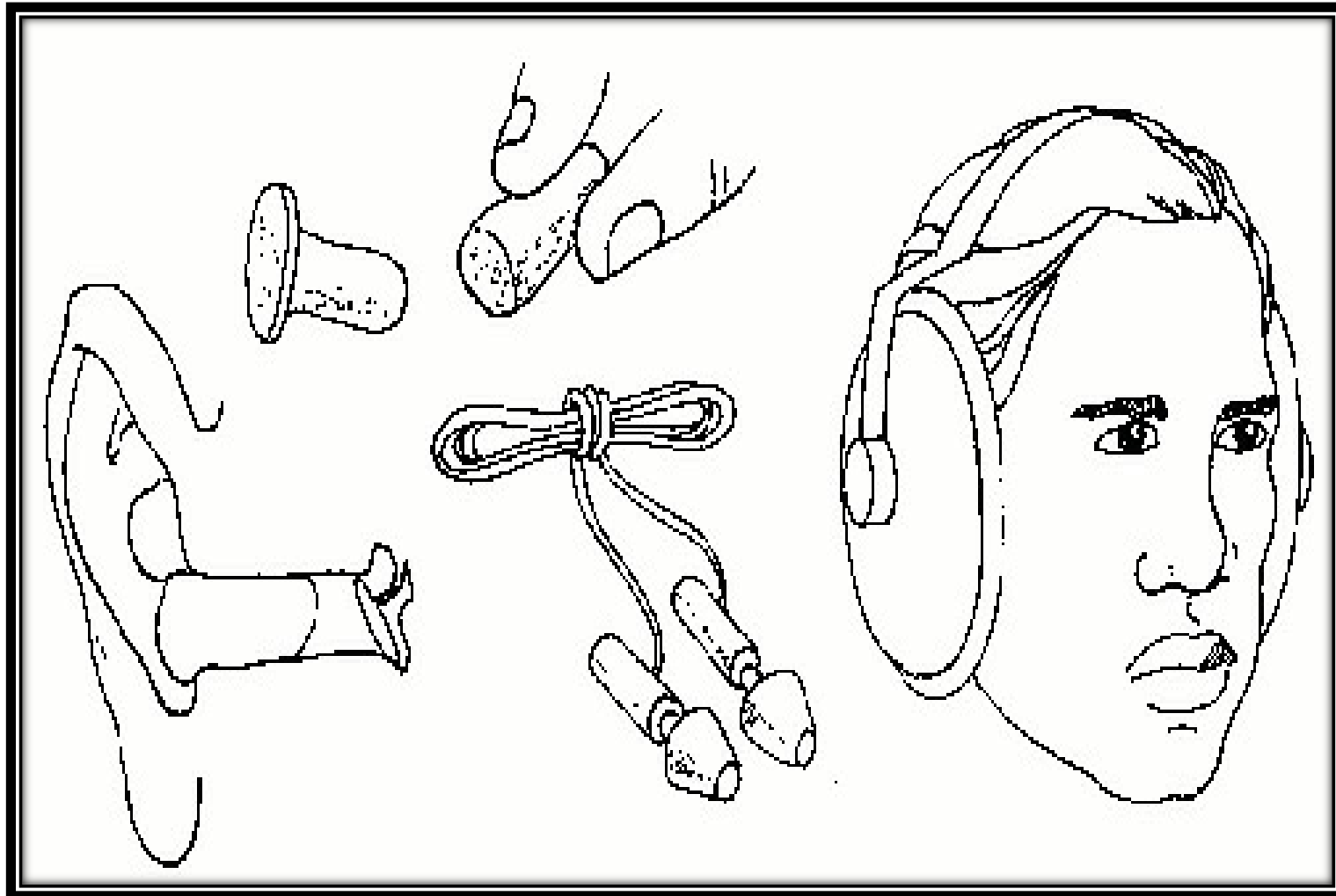
If noise is blocking communication, it's a problem!
*The worker on the right hears the loud warning
but is unable to make sense of it;
The result is a work accident!*



Hearing protection tools..

Silicone external ear canal plugs prevent 20-25 dBA noise.

Covering the mastoid (bone path) provides a reduction of up to 35 dBA.



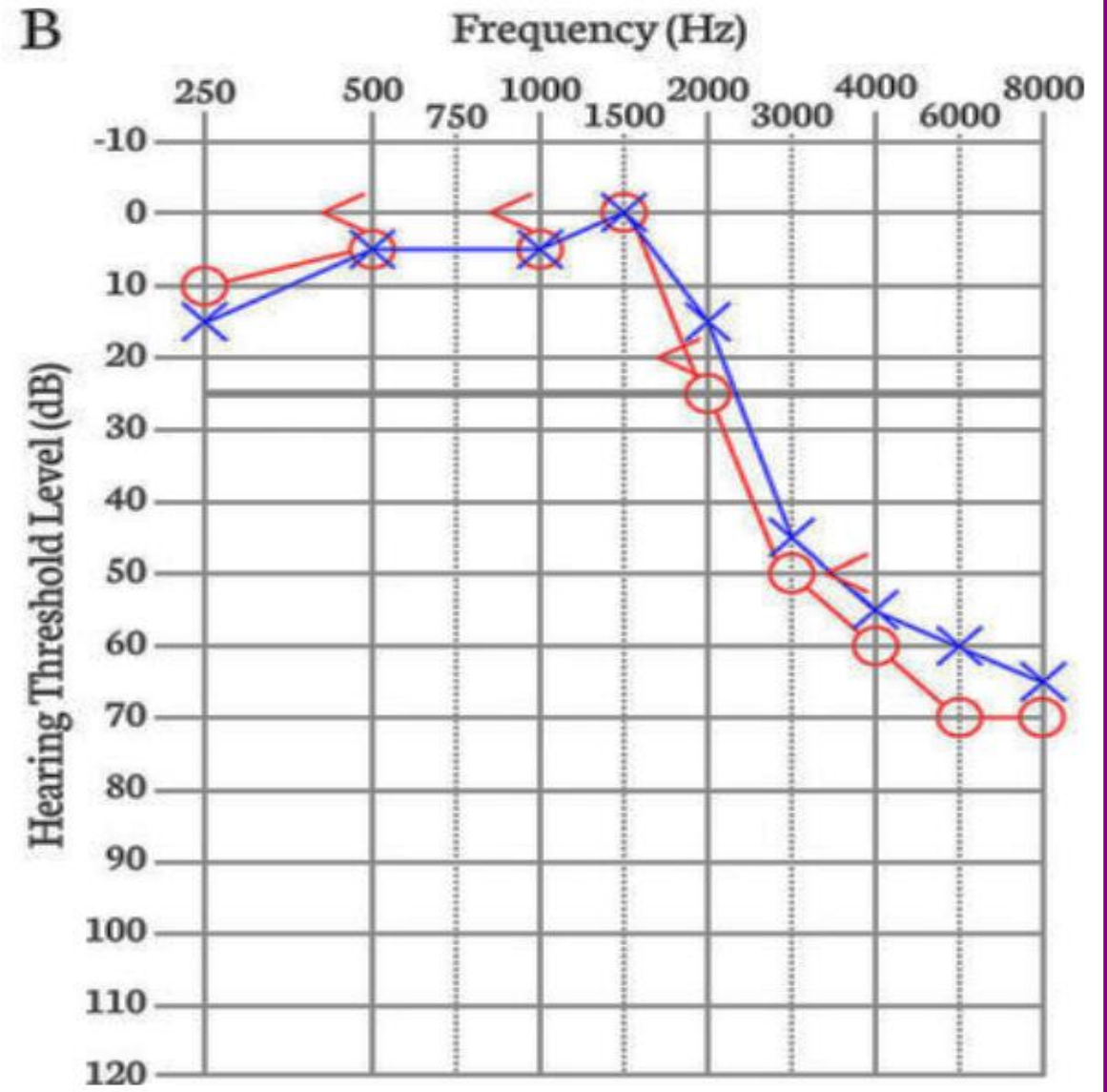
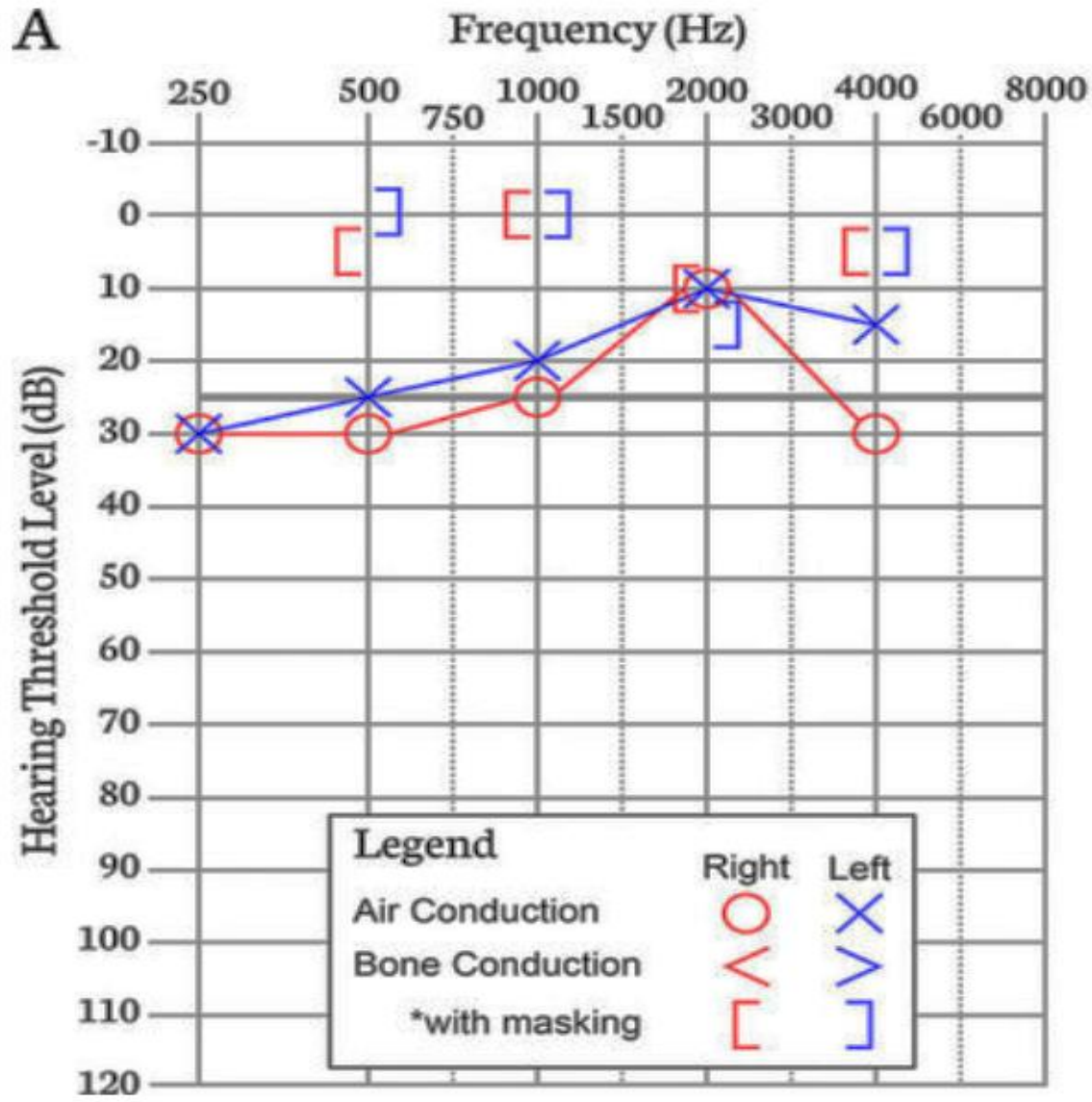
Industrial Hearing Testing :

Audiometric Testing, periodically every year



<https://www.examinetics.com/industrial-hearing-testing-questions-to-ask-your-audiometric-testing-company/>

Audiogram illustrating a bilateral conductive hearing loss



World DEAF Day

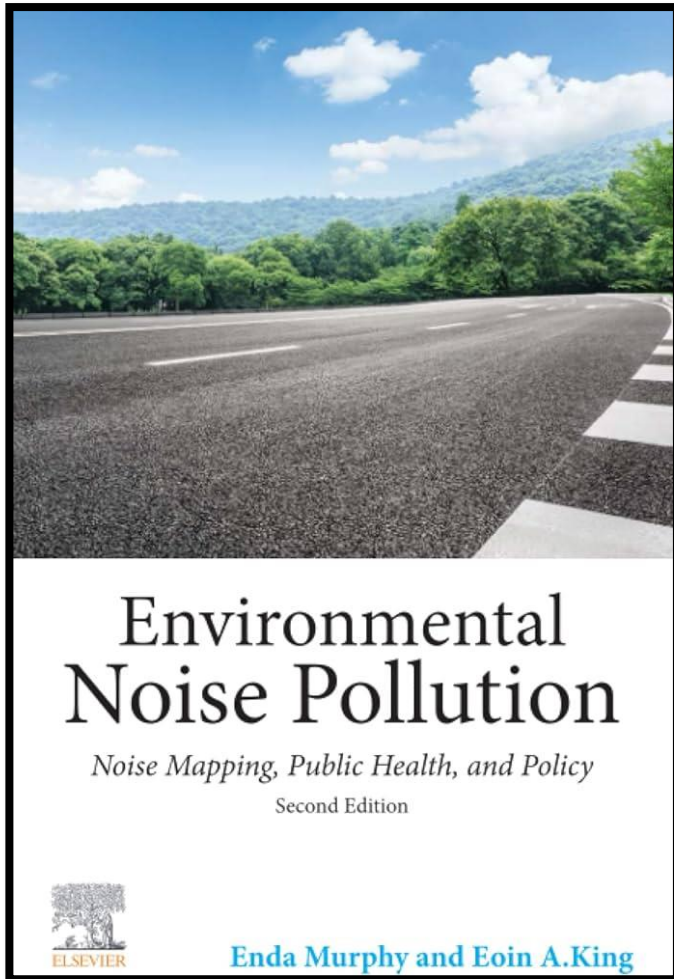
—•29th September•—

What Can Cause Deafness

- Trauma & Ear disease
- Certain medicines, Aging
- Ear infection, Meningitis
- Earwax build-up
- Occupational hazards/noisy workplace
- Long-term exposure to loud noise



“Noise Pollution: A Silent Threat to Health”



- 1. Hearing Damage :** Noise pollution drives hearing loss, tinnitus, and hypersensitivity to sound. Protect your ears and advocate for noise reduction.
- 2. Cardiovascular Risks :** Noise can exacerbate cardiovascular diseases. It's not just about what you see on an ECG; consider the noise around your patients.
- 3. Sleep Disturbances :** Noise disrupts sleep patterns, affecting overall health. Prioritize quiet environments for healing.
- 4. Stress and Mental Health :** Chronic noise exposure leads to stress, cognitive impairments, and memory deficits. Recognize noise as a mental health factor.
- 5. Childhood Development :** Chronic noise exposure leads to stress, cognitive impairments, and memory deficits. Recognize noise as a mental health factor.
- 6. Low Birth Weight: :** Noise during pregnancy correlates with low birth weight. Educate expectant mothers about noise exposure.

[Environmental noise exposure and health outcomes: an umbrella review of systematic reviews and meta-analysis | European Journal of Public Health | Oxford Academic \(oup.com\) 8.3.24](#)

Hierarchy of Controls

Most effective



Least effective

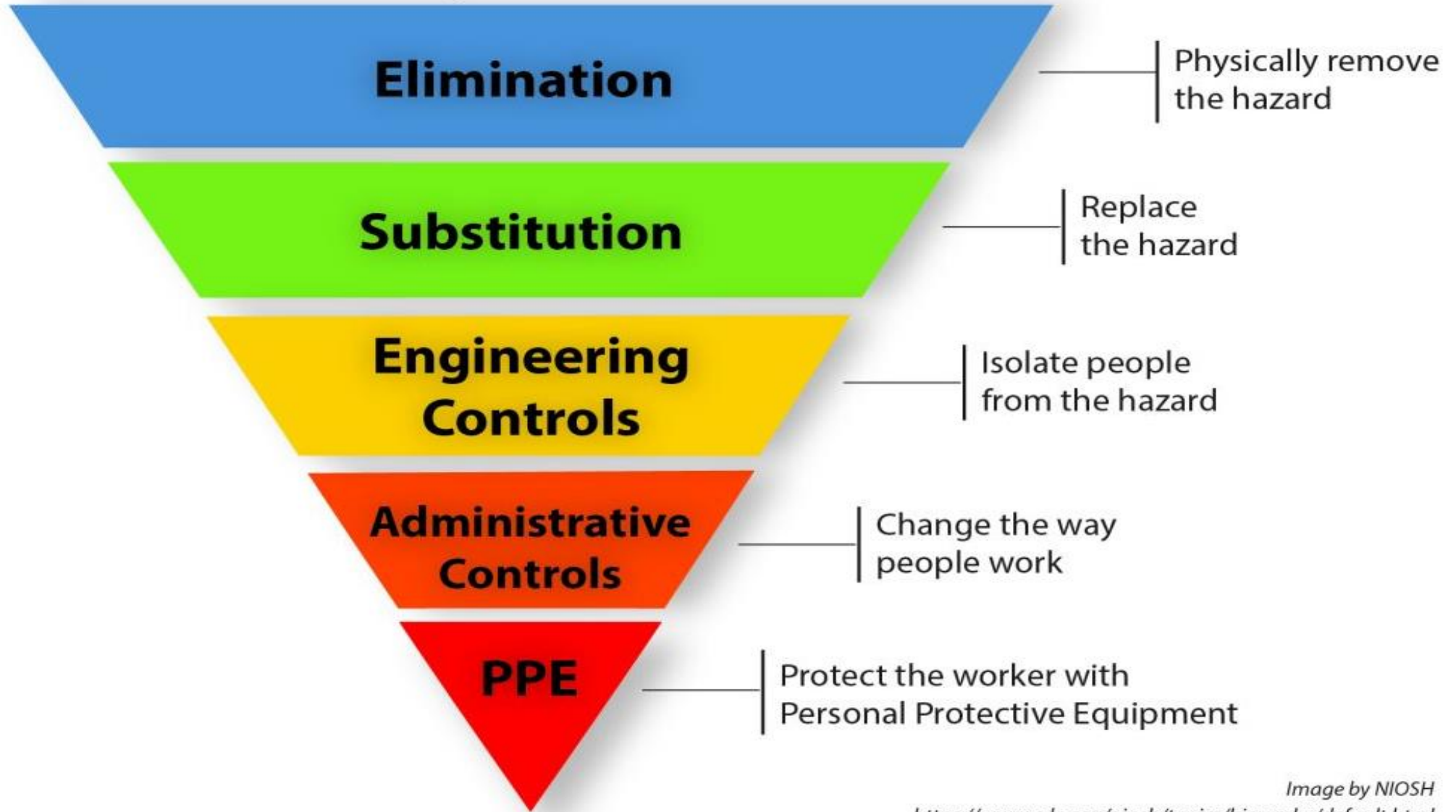
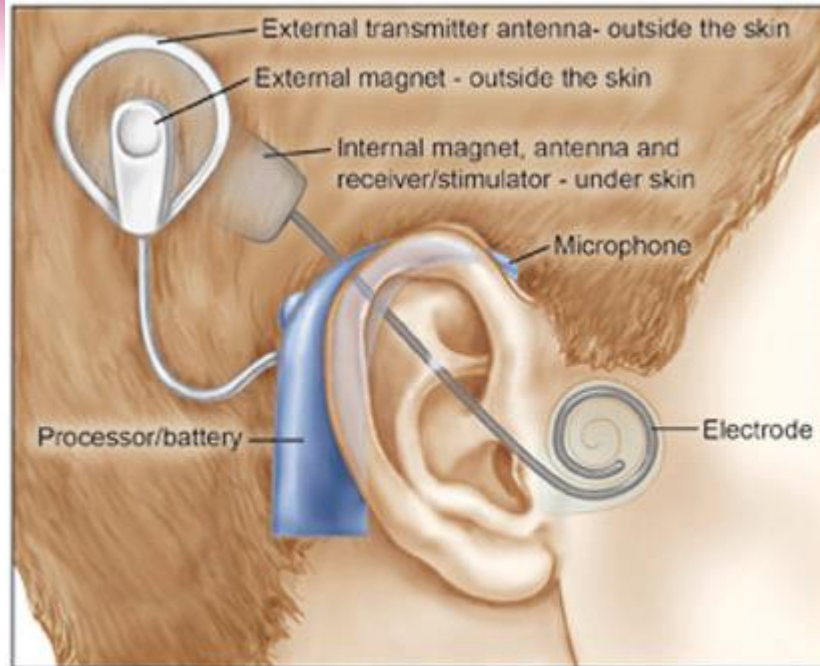


Image by NIOSH
<https://www.cdc.gov/niosh/topics/hierarchy/default.html>



Thank You

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Thank you for valuable participation...



Never forget; HEALTH is a Basic Human RIGHT!