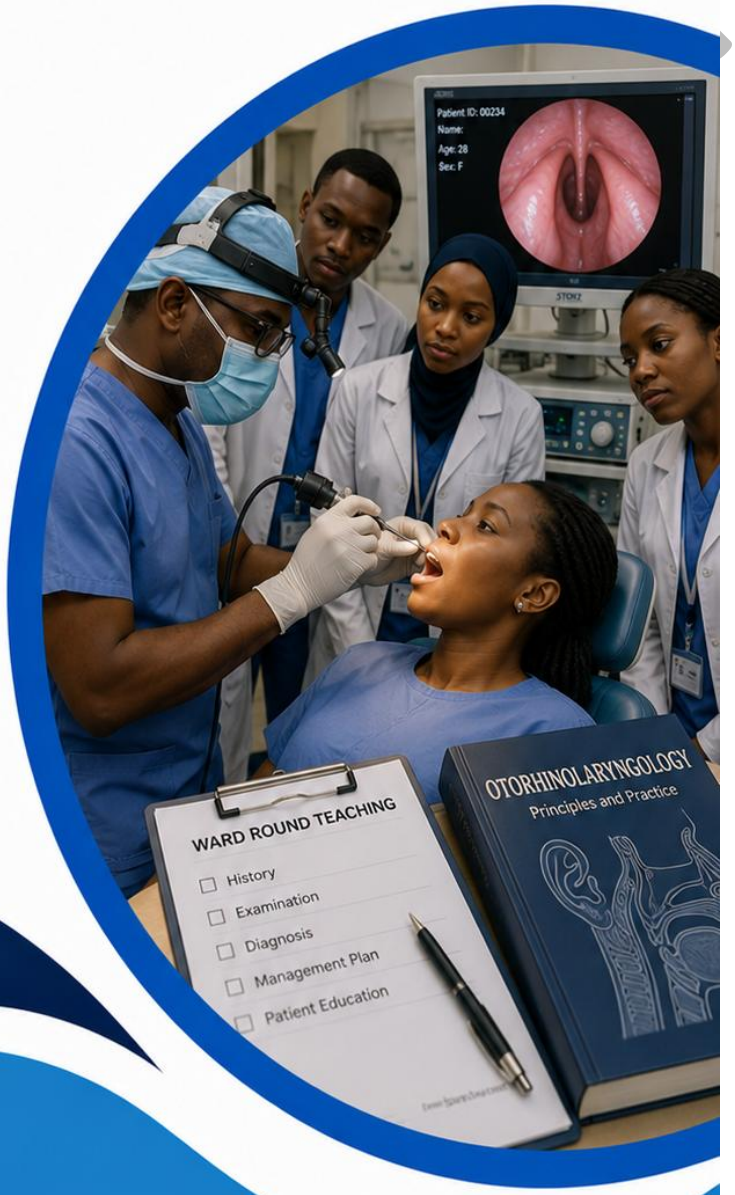
La-Net

ORL 603

CLINIC, THEATRE AND WARD ROUND TEACHING



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Course code: ORL 603

Course title: Clinic, Theatre and Ward Round Teaching

Course credit load: 1 Unit

Series 1: Bedside ENT Examination Skills

- **Part 1.1: The Headlight and General ENT Examination Setup**
  - Sub Part 1.1.1: Use and adjustment of the headlight
  - Sub Part 1.1.2: General setup and positioning for ENT bedside examination
  - Sub Part 1.1.3: Examination of the oral cavity and oropharynx
- **Part 1.2: Otoscopic Examination**
  - Sub Part 1.2.1: Correct otoscope handling technique
  - Sub Part 1.2.2: Systematic otoscopic assessment
  - Sub Part 1.2.3: Common pitfalls in otoscopic examination
- **Part 1.3: Tuning Fork Tests and Minor Bedside Examination**
  - Sub Part 1.3.1: Performing the Rinne test
  - Sub Part 1.3.2: Performing the Weber test
  - Sub Part 1.3.3: Minor bedside examination of the nose and neck

Introduction

Competent otorhinolaryngological practice depends fundamentally on confident, systematic **bedside examination** skills, correctly using the headlight, otoscope, and tuning fork, and performing a structured minor examination of the nose, throat, and neck. These practical skills, refined through repeated clinic, theatre, and ward round exposure, form the essential foundation for every subsequent diagnostic and investigative skill examined throughout this course.

The aim of this Series is to equip you with a thorough, practical understanding of basic clinical bedside examination in otorhinolaryngology, including correct use of the headlight, otoscope, and tuning fork, and minor examination technique.

This Series begins with the **headlight and general ENT examination setup**, before turning to **otoscopic examination**. It concludes with **tuning fork tests and minor bedside examination**.

Series Learning Outcomes

At the end of this Series, you should be able to:

- **SLO 1.1:** correctly set up and adjust a headlight for ENT bedside examination
- **SLO 1.2:** perform a systematic examination of the oral cavity and oropharynx
- **SLO 1.3:** demonstrate correct otoscope handling technique and systematic otoscopic assessment
- **SLO 1.4:** recognise and avoid common pitfalls in otoscopic examination
- **SLO 1.5:** perform and interpret the Rinne and Weber tuning fork tests, and
- **SLO 1.6:** perform minor bedside examination of the nose and neck.

1.1 The Headlight and General ENT Examination Setup

1.1.1 use and adjustment of the headlight

Achieving a stable, coaxial light source for hands-free examination

The **headlight** provides a hands-free, coaxial light source essential to virtually every subsequent ENT bedside examination technique, discussed throughout this Series, and should be secured firmly at an appropriate head strap tension, neither so loose that it slips during examination nor so tight as to cause examiner discomfort during prolonged clinic sessions.

Correct headlight **adjustment** requires aligning the beam so that it converges with the examiner's own line of sight at the approximate working distance to the patient, generally achieved by focusing the light onto one's own outstretched palm before beginning examination, ensuring the illuminated field and the examiner's direct view remain precisely **coincident** throughout the examination.

Fill in the blank: Correct headlight adjustment requires aligning the beam so that it converges with the examiner's own line of sight at the approximate working _____ to the patient.

1.1.2 general setup and positioning for ent bedside examination

Effective ENT bedside examination requires appropriate **patient positioning**, generally seated upright facing the examiner at a comfortable, matched eye level, with the examiner's own seated

or standing position adjusted to avoid awkward posture that could compromise steady, prolonged examination technique.

Essential equipment should be arranged within easy reach before beginning examination, including an appropriately sized **otoscope speculum**, discussed further in the next Part of this Series, nasal speculum, tongue depressor, and tuning fork, discussed later in this Series, minimising unnecessary interruption or repositioning once the examination itself has **begun**.

Fill in the blank: Essential equipment should be arranged within easy reach before beginning examination to minimise unnecessary interruption once the examination has _____.

1.1.3 examination of the oral cavity and oropharynx

Examination of the **oral cavity** proceeds systematically, assessing the lips, buccal mucosa, gingivae, teeth, and tongue, including its lateral borders and undersurface, before using a **tongue depressor** to gently displace the tongue and directly visualise the oropharynx, including the tonsils, soft palate, and posterior pharyngeal wall.

Asking the patient to say **"ah"** during this examination elevates the soft palate, improving visualisation of the oropharynx and additionally allowing basic assessment of palatal movement, relevant to identifying possible vagal or glossopharyngeal nerve **dysfunction** where clinically indicated.

Fill in the blank: Asking the patient to say "ah" during oral cavity examination elevates the soft palate, improving visualisation of the _____.

Figure 1.1: Diagram illustrating correct headlight alignment onto the examiner's outstretched palm to confirm coincident beam and line of sight.

Pilot questions 1.1

1. Describe the correct method for confirming a headlight is properly adjusted before examination. (Linked to SLO 1.1)
2. Describe appropriate patient positioning for ENT bedside examination. (Linked to SLO 1.1)
3. List the essential equipment that should be arranged before beginning an ENT examination. (Linked to SLO 1.1)
4. Describe the systematic approach to examining the oral cavity. (Linked to SLO 1.2)
5. Explain the purpose of asking a patient to say "ah" during oropharyngeal examination. (Linked to SLO 1.2)

1.2 Otoscopic Examination

1.2.1 correct otoscope handling technique

A stable, controlled grip protecting against sudden patient movement

The otoscope should generally be held in a **pen grip**, with the ulnar border of the examining hand resting gently against the patient's cheek or head, providing a stable point of contact that moves together with the patient's head should sudden, unexpected movement occur, discussed further in relation to safety in this sub-Part.

The opposite hand should be used to gently apply **pinna traction**, discussed in relation to otological examination in an earlier related course, upward and backward in adults, or downward and backward in young children, straightening the external auditory canal to allow clear visualisation of the tympanic membrane.

Fill in the blank: The otoscope should generally be held in a pen grip, with the ulnar border of the examining hand resting gently against the patient's cheek or _____.

1.2.2 systematic otoscopic assessment

Systematic otoscopic assessment should proceed in a consistent sequence, first inspecting the external auditory **canal** for wax, discharge, inflammation, or foreign material, before advancing the speculum gently under direct vision to bring the tympanic membrane into clear view.

Assessment of the tympanic membrane itself should systematically note its **colour**, translucency, position, and the presence or absence of the light reflex and visible landmarks, discussed in relation to middle ear examination in an earlier related course, with any abnormal finding described precisely according to its specific **location** on the membrane.

Fill in the blank: Assessment of the tympanic membrane should systematically note its colour, translucency, position, and the presence or absence of the light _____.

1.2.3 common pitfalls in otoscopic examination

Common pitfalls in otoscopic examination include inserting the speculum too **deeply**, risking patient discomfort or canal trauma, particularly in the sensitive bony portion of the canal, and failing to adequately straighten the canal through correct pinna traction, discussed earlier in this Part, resulting in an incomplete or obscured view of the tympanic membrane.

A further recognised pitfall involves mistaking impacted **cerumen** for the tympanic membrane itself, particularly where wax closely approximates the membrane's expected position,

underscoring the importance of confirming genuine visualisation of recognised landmarks, discussed earlier in this Part, before concluding the examination is normal.

Fill in the blank: A recognised pitfall in otoscopic examination involves mistaking impacted cerumen for the tympanic _____ itself.

Table 1.2: Common otoscopic examination pitfalls and their prevention.

Pitfall	Consequence	Prevention
Speculum inserted too deeply	Patient discomfort or canal trauma	Advance gently under direct vision only
Inadequate pinna traction	Obscured or incomplete view	Apply correct traction before advancing speculum
Mistaking cerumen for tympanic membrane	Missed abnormality or false reassurance	Confirm visualisation of recognised landmarks

Pilot questions 1.2

1. Describe the correct grip and hand position for holding an otoscope. (Linked to SLO 1.3)
2. Explain the purpose of resting the examining hand against the patient's cheek during otoscopy. (Linked to SLO 1.3)
3. Describe the systematic sequence of otoscopic examination. (Linked to SLO 1.3)
4. List two common pitfalls in otoscopic examination and describe how to avoid each. (Linked to SLO 1.4)
5. Explain why mistaking impacted cerumen for the tympanic membrane is a recognised risk. (Linked to SLO 1.4)

1.3 Tuning Fork Tests and Minor Bedside Examination

1.3.1 performing the rinne test

Comparing air and bone conduction within a single ear

The **Rinne test** is performed by striking a 512 Hz tuning fork and placing its base firmly against the patient's **mastoid process**, asking the patient to indicate when the sound is no longer audible, before immediately repositioning the vibrating tines approximately 2 centimetres from the external auditory canal, asking whether sound is again audible.

A **Rinne positive** result, air conduction heard louder or longer than bone conduction, represents the normal finding, while a **Rinne negative** result, bone conduction heard louder or longer, suggests conductive hearing loss in the tested ear, discussed in relation to hearing loss differential diagnosis in an earlier related course.

Fill in the blank: A Rinne positive result, air conduction heard louder or longer than bone conduction, represents the normal _____.

1.3.2 performing the weber test

The **Weber test** is performed by striking the tuning fork and placing its base firmly in the midline, generally at the forehead or vertex, asking the patient to report in which ear, if either, the sound appears **louder**, a phenomenon termed lateralisation.

Sound lateralising to the affected ear suggests **conductive** hearing loss in that ear, or sensorineural hearing loss in the opposite, unaffected ear, while lateralisation to the unaffected ear suggests sensorineural hearing loss in the affected ear, with the Weber and Rinne tests generally interpreted **together** to reach a confident overall conclusion.

Fill in the blank: The Weber test is performed by placing the vibrating tuning fork in the midline and asking the patient to report in which ear the sound appears _____.

1.3.3 minor bedside examination of the nose and neck

Minor bedside examination of the nose generally involves brief **anterior rhinoscopy**, discussed in an earlier related course, using a nasal speculum and headlight to inspect the septum and inferior turbinates, together with external inspection of the nasal pyramid for any visible deformity or asymmetry.

Minor bedside neck examination involves systematic **palpation** proceeding from the submental region along the anterior and posterior triangles to the supraclavicular fossa, discussed in relation to neck examination in an earlier related course, together with assessment of thyroid movement on swallowing, each representing an essential, rapidly performed component of comprehensive bedside ENT **assessment**.

Fill in the blank: Minor bedside neck examination involves systematic palpation proceeding from the submental region to the supraclavicular _____.

Figure 1.3: Diagram illustrating correct tuning fork placement on the mastoid process and beside the ear canal for the Rinne test.

Pilot questions 1.3

1. Describe the step-by-step technique for performing the Rinne test. (Linked to SLO 1.5)
2. Interpret a Rinne negative result. (Linked to SLO 1.5)
3. Describe the step-by-step technique for performing the Weber test. (Linked to SLO 1.5)
4. Explain how the Weber and Rinne tests are interpreted together. (Linked to SLO 1.5)
5. Describe the components of minor bedside examination of the nose and neck. (Linked to SLO 1.6)

Series Summary

This opening Series established the practical foundation of **bedside ENT examination skills**, beginning with the **headlight and general ENT examination setup**, correct headlight adjustment, patient and examiner positioning, and examination of the oral cavity and oropharynx, before turning to **otoscopic examination**, correct handling technique, systematic assessment, and common pitfalls to avoid.

We concluded with **tuning fork tests and minor bedside examination**, the Rinne and Weber tests and their interpretation, and minor bedside examination of the nose and neck. Having worked through this Series, you should now possess the essential practical foundation needed to understand balance tests, ocular evaluation, and audiological investigations examined in the next Series of this course.

Glossary of Terms

- **Headlight:** a hands-free, coaxial light source worn by the examiner for ENT bedside examination.
- **Pen grip:** a stable otoscope holding technique with the ulnar border of the hand resting on the patient.
- **Pinna traction:** gentle pulling of the outer ear to straighten the external auditory canal during otoscopy.
- **Tongue depressor:** a flat instrument used to gently displace the tongue for oropharyngeal examination.
- **Rinne test:** a tuning fork test comparing air and bone conduction within a single ear.
- **Weber test:** a tuning fork test assessing lateralisation of sound perception in the midline.
- **Lateralisation:** the perception of sound as louder in one ear during the Weber test.
- **Anterior rhinoscopy:** examination of the nasal cavity using a nasal speculum and headlight.
- **Tympanic membrane landmarks:** recognisable structures, such as the light reflex and malleus, confirming correct visualisation.
- **Cerumen:** ear wax, which can obscure or be mistaken for the tympanic membrane on otoscopy.
- **Bedside examination:** clinical assessment performed directly at the patient's location using portable equipment.
- **Supraclavicular fossa:** the region above the clavicle, an important site in systematic neck examination.

Concept Check Questions [Series 1]

Objective questions

1. Correct headlight adjustment requires aligning the beam so that it converges with the examiner's line of sight at the approximate working _____ to the patient.
2. The otoscope should generally be held in a pen grip, with the ulnar border of the examining hand resting gently against the patient's cheek or _____.

3. A recognised pitfall in otoscopic examination involves mistaking impacted cerumen for the tympanic _____ itself.
4. A Rinne positive result, air conduction heard louder or longer than bone conduction, represents the normal _____.
5. The Weber test is performed by placing the vibrating tuning fork in the midline and asking the patient to report in which ear the sound appears _____.

Short-answer questions

6. Describe the correct method for confirming a headlight is properly adjusted before examination.
7. Explain the purpose of asking a patient to say "ah" during oropharyngeal examination.
8. List two common pitfalls in otoscopic examination and describe how to avoid each.
9. Interpret a Rinne negative result.
10. Explain how the Weber and Rinne tests are interpreted together.

Long-answer questions

11. Discuss the correct use and adjustment of the headlight, general examination setup, and examination of the oral cavity and oropharynx. (Linked to SLO 1.1, SLO 1.2)
12. Discuss correct otoscope handling technique and systematic otoscopic assessment. (Linked to SLO 1.3)
13. Discuss common pitfalls in otoscopic examination and how to avoid them. (Linked to SLO 1.4)
14. Discuss the technique and interpretation of the Rinne and Weber tuning fork tests. (Linked to SLO 1.5)
15. Discuss minor bedside examination of the nose and neck. (Linked to SLO 1.6)

Answers to Concept Check Questions [Series 1]

Objective questions

1. Distance.
2. Head.
3. Membrane.
4. Finding.
5. Louder.

Short-answer questions

6. Focus the beam onto one's own outstretched palm to confirm the light and line of sight are coincident.
7. It elevates the soft palate, improving visualisation of the oropharynx and allowing assessment of palatal movement.
8. Inserting the speculum too deeply risks trauma, prevented by advancing gently under direct vision; inadequate pinna traction obscures the view, prevented by correct traction before advancing.
9. It suggests conductive hearing loss in the tested ear.
10. Lateralisation on the Weber test combined with Rinne results in each ear together confirm whether hearing loss is conductive or sensorineural and which ear is affected.

Long-answer questions

11. **Basic response:** Correct headlight adjustment aligns the beam with the examiner's line of sight, confirmed by focusing onto one's own palm, supporting appropriate patient and examiner positioning.

Value-added response: Systematic oral cavity and oropharyngeal examination assesses the lips, mucosa, tongue, and, with the patient saying "ah," the tonsils, soft palate, and posterior pharyngeal wall.

12. **Basic response:** Correct otoscope handling uses a pen grip with the hand resting on the patient for stability, combined with appropriate pinna traction to straighten the canal.

Value-added response: Systematic assessment proceeds from canal inspection to tympanic membrane evaluation, noting colour, translucency, position, and landmarks.

13. **Basic response:** Common pitfalls include inserting the speculum too deeply, causing trauma, and inadequate pinna traction, obscuring the view.

Value-added response: A further pitfall is mistaking cerumen for the tympanic membrane itself, underscoring the importance of confirming genuine landmark visualisation before concluding normality.

14. **Basic response:** The Rinne test compares air and bone conduction within one ear, with a positive result being normal and a negative result suggesting conductive loss.

Value-added response: The Weber test assesses lateralisation, with the two tests interpreted together to determine the type and side of any hearing loss present.

15. **Basic response:** Minor nasal examination involves anterior rhinoscopy and external inspection, while minor neck examination involves systematic palpation from the submental region to the supraclavicular fossa.

Value-added response: Both represent essential, rapidly performed components of comprehensive bedside ENT assessment, complementing the otoscopic and tuning fork examination discussed earlier in this Series.

Answers to Pilot Questions [Series 1]

Part 1.1

1. Focus the beam onto one's own outstretched palm to confirm coincidence with the line of sight.
2. Seated upright facing the examiner at a comfortable, matched eye level.
3. Otoscope with appropriate speculum, nasal speculum, tongue depressor, and tuning fork.
4. Assessing lips, buccal mucosa, gingivae, teeth, and tongue, then using a tongue depressor to visualise the oropharynx.
5. It elevates the soft palate, improving visualisation and allowing assessment of palatal movement.

Part 1.2

1. A pen grip with the ulnar border of the hand resting gently against the patient's cheek or head.
2. It provides a stable point of contact that moves with the patient's head if sudden movement occurs.
3. Inspect the canal first, then advance the speculum gently to visualise the tympanic membrane.
4. Inserting too deeply (avoid by advancing gently under direct vision), and inadequate pinna traction (avoid by applying correct traction).
5. Because wax may closely approximate the membrane's expected position, risking false reassurance if landmarks are not confirmed.

Part 1.3

1. Strike the fork, place it on the mastoid until inaudible, then reposition near the ear canal and ask if sound returns.
2. It suggests conductive hearing loss in that ear.

3. Strike the fork and place its base firmly in the midline, asking in which ear the sound is louder.
4. Lateralisation and Rinne findings in each ear are combined to determine the type and side of hearing loss.
5. Anterior rhinoscopy and external nasal inspection, and systematic neck palpation with thyroid assessment on swallowing.

References and Attributions [Series 1]

- Gleeson, M. (Ed.). (2008). Scott-Brown's Otorhinolaryngology, Head and Neck Surgery (7th ed.). Hodder Arnold.
- Probst, R., Grevers, G., & Iro, H. (2018). Basic Otorhinolaryngology: A Step-by-Step Learning Guide (2nd ed.). Thieme.
- Bickley, L. S. (2020). Bates' Guide to Physical Examination and History Taking (13th ed.). Wolters Kluwer.
- Dhillon, R. S., & East, C. A. (2013). Ear, Nose and Throat and Head and Neck Surgery: An Illustrated Colour Text (4th ed.). Churchill Livingstone.

Figures, Plates, Tables, and Boxes

- Figure 1.1: Diagram illustrating correct headlight alignment onto the examiner's outstretched palm to confirm coincident beam and line of sight. AI-generated using the prompt: "A single clean, clinically accurate instructional diagram showing a person wearing a headlight with the light beam focused onto their own outstretched open palm held at arm's length, medical textbook instructional style, clear labelled light path line, neutral background, no other panels."
- Table 1.2: Common otoscopic examination pitfalls and their prevention. AI-generated using the prompt: "Create a clean clinical reference table titled Common Otoscopic Examination Pitfalls, listing pitfall, consequence, and prevention. Medical reference table style with outside border, no photographic elements."
- Figure 1.3: Diagram illustrating correct tuning fork placement on the mastoid process and beside the ear canal for the Rinne test. AI-generated using the prompt: "A single clean, clinically accurate instructional diagram showing two sequential positions: a tuning fork held against the mastoid bone behind the ear, and the same tuning fork held near the ear canal opening, medical textbook instructional style, clear labelled sequence numbering, neutral background, no other panels."

Course code: ORL 603

Course title: Clinic, Theatre and Ward Round Teaching

Course credit load: 1 Unit

Series 2: Balance Tests, Ocular Evaluation, and Audiological Investigations

- **Part 2.1: Balance (Vestibular) Tests**
  - Sub Part 2.1.1: Romberg's test and gait assessment
  - Sub Part 2.1.2: The Dix-Hallpike test
  - Sub Part 2.1.3: The caloric test
- **Part 2.2: Ocular Evaluation in ORL Practice**
  - Sub Part 2.2.1: Assessment of nystagmus
  - Sub Part 2.2.2: Extraocular movement examination
  - Sub Part 2.2.3: Clinical applications of ocular evaluation in vestibular disorders
- **Part 2.3: Pure Tone Audiometry**
  - Sub Part 2.3.1: Principles and technique of pure tone audiometry
  - Sub Part 2.3.2: Interpreting the audiogram
  - Sub Part 2.3.3: Clinical applications of pure tone audiometry

Introduction

In the last Series, we established the essential bedside ENT examination skills. We now turn to more specialised **balance testing**, **ocular evaluation**, and formal **audiological investigation**, skills essential to confidently assessing patients presenting with vertigo, imbalance, or hearing loss within the clinic setting.

The aim of this Series is to equip you with a thorough, practical understanding of balance tests, ocular evaluation, and the supportive investigations of pure tone audiometry and the caloric test, together with their clinical applications.

This Series begins with **balance (vestibular) tests**, before turning to **ocular evaluation in ORL practice**. It concludes with **pure tone audiometry**.

Series Learning Outcomes

At the end of this Series, you should be able to:

- **SLO 2.1:** perform and interpret Romberg's test, gait assessment, and the Dix-Hallpike test
- **SLO 2.2:** describe the technique and clinical application of the caloric test
- **SLO 2.3:** perform assessment of nystagmus and extraocular movement examination
- **SLO 2.4:** describe the clinical applications of ocular evaluation in vestibular disorders
- **SLO 2.5:** describe the principles, technique, and interpretation of pure tone audiometry, and
- **SLO 2.6:** describe the clinical applications of pure tone audiometry.

2.1 Balance (Vestibular) Tests

2.1.1 romberg's test and gait assessment

Simple bedside tests of postural stability

Romberg's test assesses the patient's ability to maintain balance while standing with feet together and eyes closed, removing visual compensation for any underlying **proprioceptive** or **vestibular** deficit, with a positive test, marked swaying or falling, suggesting impairment of one or both of these systems rather than a purely cerebellar problem.

Gait assessment, observing the patient walking a straight line and, where safe, performing **tandem gait**, walking heel-to-toe, provides further useful information, with consistent deviation toward one side during walking with eyes closed suggesting a unilateral **vestibular** lesion on that side.

Fill in the blank: Romberg's test removes visual compensation for any underlying proprioceptive or vestibular deficit by having the patient stand with feet together and eyes _____.

2.1.2 the dix-hallpike test

The **Dix-Hallpike test** is performed by rapidly moving the seated patient to a supine position with the head extended and turned 45 degrees to one side, observing for the onset of **vertigo** and characteristic **nystagmus** after a brief latency period, supporting a diagnosis of benign paroxysmal positional vertigo, discussed in an earlier related course.

A positive test typically demonstrates **torsional**, upbeating nystagmus that fatigues with repeated testing, with the specific side producing the response indicating the affected ear, information directly relevant to subsequent **repositioning manoeuvre** treatment for confirmed benign paroxysmal positional vertigo.

Fill in the blank: The Dix-Hallpike test is performed by rapidly moving the seated patient to a supine position with the head extended and turned 45 degrees to one _____.

2.1.3 the caloric test

The **caloric test** assesses the function of each **horizontal semicircular canal** independently by irrigating the external auditory canal with water or air at a temperature above and below body temperature, inducing a convection current within the endolymph, discussed in relation to inner ear structure in an earlier related course, that produces a predictable nystagmus response.

Warm water irrigation produces nystagmus with the fast phase toward the **irrigated** ear, while cold water irrigation produces nystagmus with the fast phase toward the **opposite** ear, summarised by the mnemonic COWS (cold opposite, warm same), with reduced or absent response on one side indicating **unilateral** vestibular hypofunction.

Fill in the blank: The caloric test mnemonic COWS stands for cold opposite, warm _____, describing the direction of nystagmus fast phase.

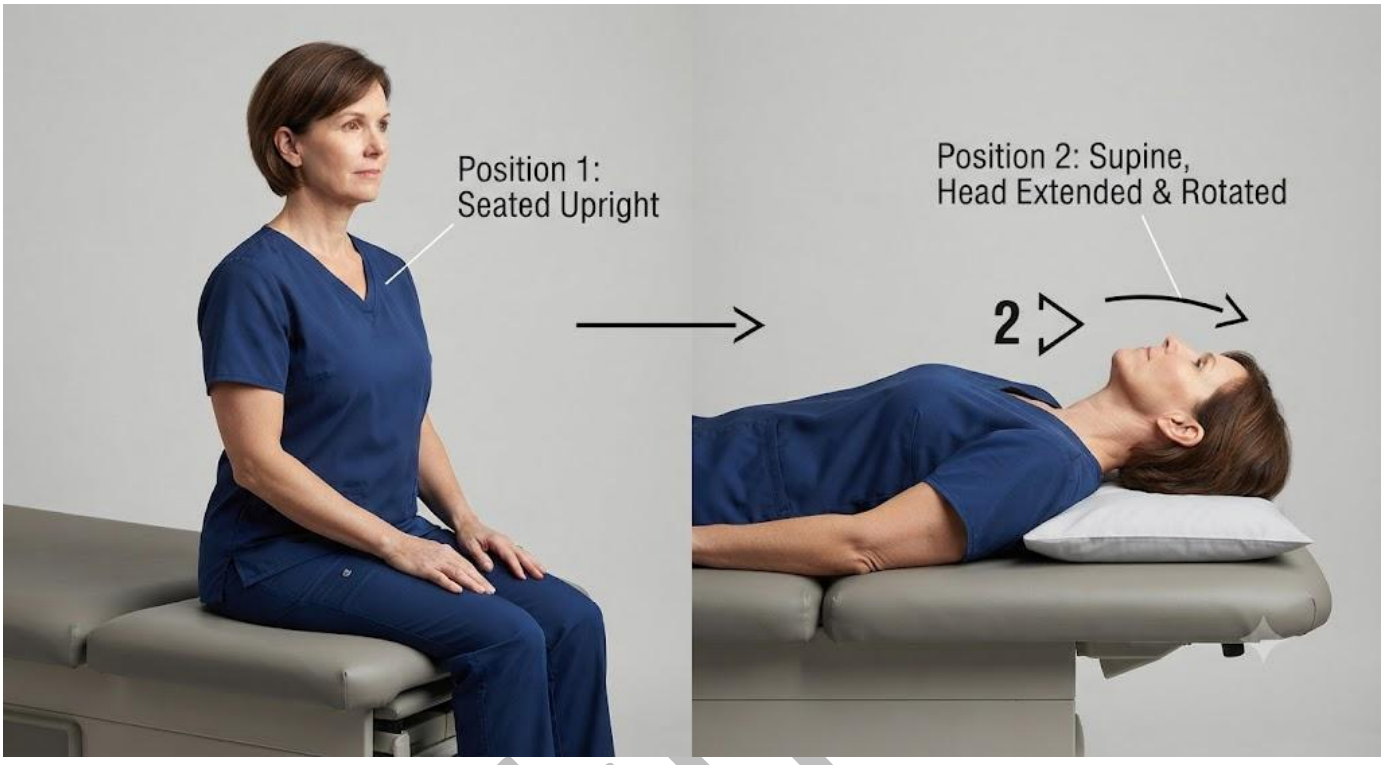

Figure 2.1: Diagram illustrating correct patient positioning for the Dix-Hallpike test, showing head extension and 45-degree turn.

Pilot questions 2.1

- Describe how Romberg's test is performed and interpreted. (Linked to SLO 2.1)
- Describe tandem gait assessment and its clinical significance. (Linked to SLO 2.1)
- Describe the technique of the Dix-Hallpike test. (Linked to SLO 2.1)
- Describe the characteristic nystagmus finding in a positive Dix-Hallpike test. (Linked to SLO 2.1)
- Describe the technique of the caloric test and explain the COWS mnemonic. (Linked to SLO 2.2)

2.2 Ocular Evaluation in ORL Practice

2.2.1 assessment of nystagmus

Involuntary rhythmic eye movement revealing vestibular dysfunction

Nystagmus is an involuntary, rhythmic oscillation of the eyes, generally described according to its **fast** and **slow** phase directions, with the fast phase conventionally used to name the direction

of the nystagmus, and assessed both spontaneously and, as discussed earlier in this Series, in response to specific provocative manoeuvres.

Nystagmus is examined by asking the patient to follow the examiner's finger through the cardinal **gaze positions**, noting whether nystagmus is present at rest, only on extreme lateral gaze, or changes direction, since these specific patterns carry distinct diagnostic implications relevant to peripheral versus central vestibular pathology.

Fill in the blank: Nystagmus is generally described according to its fast and slow phase directions, with the fast phase conventionally used to name the direction of the _____.

2.2.2 extraocular movement examination

Extraocular movement examination assesses the function of the six muscles controlling eye movement, generally examined by asking the patient to follow the examiner's finger through an **H-shaped** pattern of movement, observing for smooth, full, conjugate movement in all directions.

Restricted or asymmetric extraocular movement may indicate cranial nerve palsy, discussed in relation to facial and other cranial nerve involvement in an earlier related course, or orbital pathology, discussed in relation to orbital complications of sinusitis in an earlier related course, each requiring careful correlation with the patient's broader clinical **presentation**.

Fill in the blank: Extraocular movement examination is generally performed by asking the patient to follow the examiner's finger through an _____-shaped pattern of movement.

2.2.3 clinical applications of ocular evaluation in vestibular disorders

Ocular evaluation, combining nystagmus assessment and extraocular movement examination discussed throughout this Part, assists in distinguishing **peripheral** vestibular disorders, discussed in an earlier related course, typically producing unidirectional, fatiguing nystagmus, from **central** vestibular disorders, which may produce nystagmus that changes direction or fails to fatigue with repeated testing.

This distinction carries direct clinical significance, since central vestibular pathology, discussed in relation to intracranial complications in an earlier related course, may reflect serious underlying neurological disease requiring urgent further investigation, meaning careful ocular evaluation represents an essential component of comprehensive assessment for any patient presenting with vertigo or **imbalance**.

Fill in the blank: Ocular evaluation assists in distinguishing peripheral vestibular disorders, which typically produce unidirectional, fatiguing nystagmus, from central vestibular _____.

Table 2.2: Comparing peripheral and central nystagmus.

Feature	Peripheral nystagmus	Central nystagmus
Direction	Unidirectional	May change direction
Fatigability	Fatigues with repeated testing	Does not fatigue
Clinical concern	Generally benign vestibular cause	May reflect serious central neurological disease

Pilot questions 2.2

1. Define nystagmus and describe how its direction is conventionally named. (Linked to SLO 2.3)
2. Describe the technique for extraocular movement examination. (Linked to SLO 2.3)
3. List two possible causes of restricted extraocular movement. (Linked to SLO 2.3)
4. Distinguish peripheral from central nystagmus in terms of direction and fatigability. (Linked to SLO 2.4)
5. Explain why distinguishing peripheral from central vestibular disorders carries direct clinical significance. (Linked to SLO 2.4)

2.3 Pure Tone Audiometry

2.3.1 principles and technique of pure tone audiometry

A formal, standardised measure of hearing thresholds

Pure tone audiometry measures the quietest sound intensity, or **threshold**, a patient can reliably detect at a range of specific frequencies, generally performed within a sound-treated booth using calibrated **headphones** for air conduction testing and a bone vibrator placed on the mastoid for bone conduction testing, discussed in relation to tuning fork tests in the previous Series of this course.

During testing, the non-test ear is generally **masked** with noise where necessary to prevent it from detecting the test tone through cross-hearing, ensuring the measured threshold genuinely reflects the hearing of the ear actually being **tested** rather than being confounded by the contralateral ear's superior hearing.

Fill in the blank: During pure tone audiometry, the non-test ear is generally masked with noise where necessary to prevent it from detecting the test tone through cross-_____.

2.3.2 interpreting the audiogram

The resulting **audiogram** plots hearing threshold in decibels against frequency, with air and bone conduction thresholds recorded separately, discussed in relation to the air-bone gap in an earlier related course, and severity classified as mild, moderate, severe, or profound according to established decibel threshold **ranges**.

The overall audiogram **pattern**, whether flat, sloping, or notched at a specific frequency, together with the presence or absence of an air-bone gap, discussed in an earlier related course, provides important additional diagnostic information regarding the likely underlying cause of a patient's hearing loss.

Fill in the blank: The overall audiogram pattern, whether flat, sloping, or notched at a specific frequency, provides important additional _____ information regarding the likely cause of hearing loss.

2.3.3 clinical applications of pure tone audiometry

Pure tone audiometry finds direct clinical application in objectively quantifying the degree and type of hearing loss, discussed throughout this course, guiding decisions regarding hearing aid fitting, discussed in an earlier related course, and providing a baseline against which future hearing change can be reliably **compared**.

Further important applications include monitoring for progression of **noise-induced** hearing loss in occupational health surveillance, discussed further in a later Series of this course, and objective documentation of treatment response following interventions such as corticosteroid therapy for sudden sensorineural hearing loss, discussed in an earlier related course.

Fill in the blank: Pure tone audiometry finds application in monitoring for progression of _____ hearing loss in occupational health surveillance.

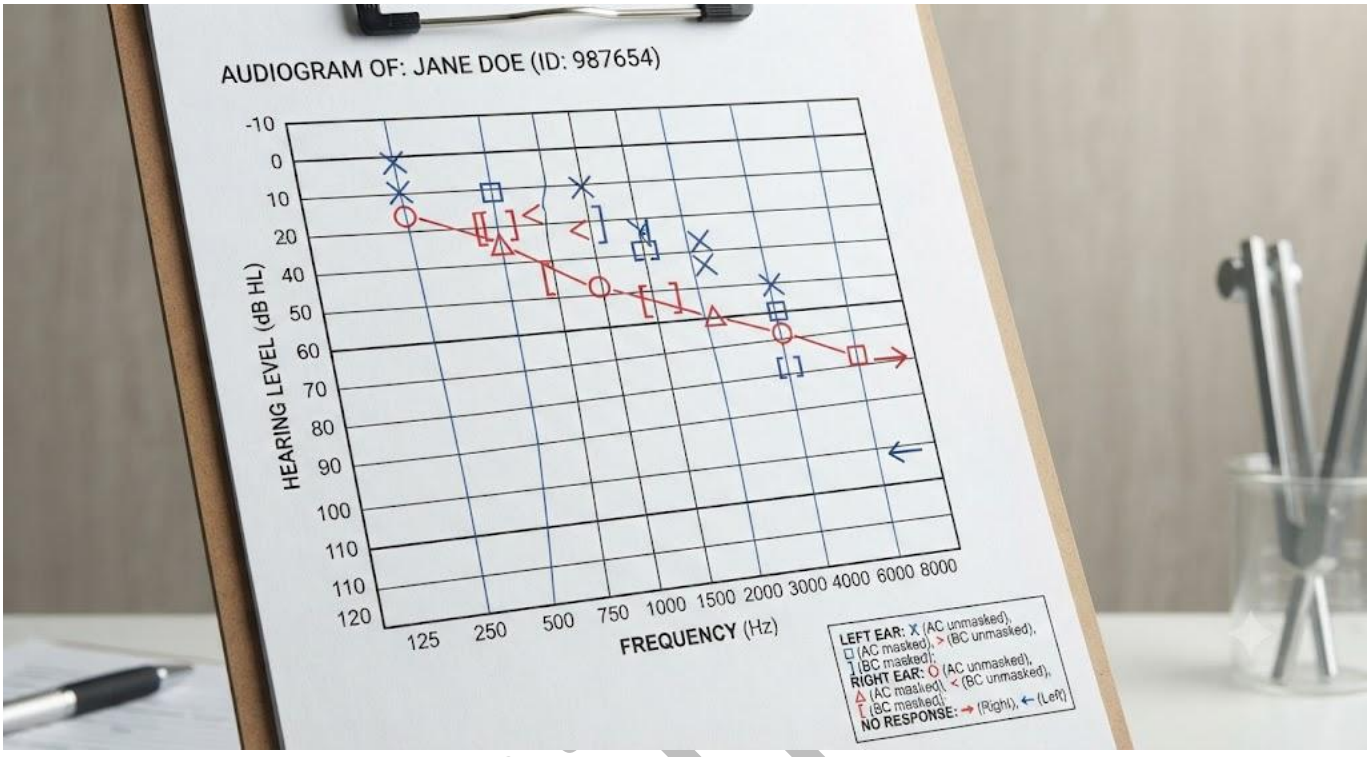

Figure 2.3: Diagram of an audiogram showing symbols for air and bone conduction thresholds plotted against frequency.

Pilot questions 2.3

1. Define pure tone audiometry and describe the basic testing setup. (Linked to SLO 2.5)
2. Explain the purpose of masking the non-test ear during audiometry. (Linked to SLO 2.5)
3. Describe what is plotted on an audiogram. (Linked to SLO 2.5)
4. Describe how audiogram pattern and air-bone gap contribute to diagnosis. (Linked to SLO 2.5)
5. List two clinical applications of pure tone audiometry. (Linked to SLO 2.6)

Series Summary

This Series examined **balance tests, ocular evaluation, and audiological investigations**, beginning with **balance (vestibular) tests**, Romberg's test, gait assessment, the Dix-Hallpike test, and the caloric test, before turning to **ocular evaluation in ORL practice**, nystagmus assessment, extraocular movement examination, and their application in distinguishing peripheral from central vestibular disorders.

We concluded with **pure tone audiometry**, its principles and technique, audiogram interpretation, and its clinical applications. Having worked through this Series, you should now be equipped to understand radiological, haematological, and biochemical investigations in ORL examined in the next Series of this course.

Glossary of Terms

1. **Romberg's test:** a bedside test of balance assessing postural stability with eyes closed.
2. **Dix-Hallpike test:** a positional test provoking vertigo and nystagmus to diagnose benign paroxysmal positional vertigo.
3. **Caloric test:** a test of horizontal semicircular canal function using warm or cold water or air irrigation.
4. **COWS mnemonic:** cold opposite, warm same, describing caloric test nystagmus direction.
5. **Nystagmus:** involuntary, rhythmic oscillation of the eyes, described by its fast and slow phases.
6. **Extraocular movement examination:** assessment of the six eye muscles' function through an H-shaped gaze test.
7. **Peripheral vestibular disorder:** a balance disorder arising from the inner ear or vestibular nerve.
8. **Central vestibular disorder:** a balance disorder arising from central nervous system pathology.
9. **Pure tone audiometry:** a formal hearing test measuring air and bone conduction thresholds across frequencies.
10. **Audiogram:** a chart plotting hearing threshold in decibels against frequency.
11. **Masking:** introducing noise to the non-test ear during audiometry to prevent cross-hearing.
12. **Air-bone gap:** the difference between air and bone conduction thresholds, indicating conductive hearing loss.

Concept Check Questions [Series 2]

Objective questions

1. Romberg's test removes visual compensation by having the patient stand with feet together and eyes _____.
2. The Dix-Hallpike test involves head extension and a 45-degree turn to one _____.

3. The COWS mnemonic stands for cold opposite, warm _____.
4. Nystagmus direction is conventionally named according to its fast _____.
5. During pure tone audiometry, the non-test ear is masked to prevent cross-_____.

Short-answer questions

- Describe the characteristic nystagmus finding in a positive Dix-Hallpike test.
- Describe the technique of the caloric test.
- Distinguish peripheral from central nystagmus in terms of direction and fatigability.
- Describe the basic testing setup for pure tone audiometry.
- List two clinical applications of pure tone audiometry.

Long-answer questions

1. Discuss Romberg's test, gait assessment, and the Dix-Hallpike test. (Linked to SLO 2.1)
2. Discuss the technique and clinical application of the caloric test. (Linked to SLO 2.2)
3. Discuss nystagmus assessment and extraocular movement examination. (Linked to SLO 2.3)
4. Discuss the clinical applications of ocular evaluation in distinguishing peripheral from central vestibular disorders. (Linked to SLO 2.4)
5. Discuss the principles, technique, interpretation, and clinical applications of pure tone audiometry. (Linked to SLO 2.5, SLO 2.6)

Answers to Concept Check Questions [Series 2]

Objective questions

6. Closed.
7. Side.
8. Same.
9. Phase.
10. Hearing.

Short-answer questions

11. Torsional, upbeating nystagmus that fatigues with repeated testing, appearing after a brief latency period.
12. Irrigating the ear canal with warm and cold water or air to induce an endolymph convection current and observe the resulting nystagmus.

13. Peripheral nystagmus is unidirectional and fatigues with testing; central nystagmus may change direction and does not fatigue.
14. A sound-treated booth with calibrated headphones for air conduction and a bone vibrator on the mastoid for bone conduction.
15. Quantifying hearing loss degree and type, and guiding hearing aid fitting or monitoring treatment response.

Long-answer questions

16. **Basic response:** Romberg's test assesses balance with eyes closed to remove visual compensation, while gait assessment, including tandem gait, reveals unilateral vestibular lesions through consistent deviation.

Value-added response: The Dix-Hallpike test provokes characteristic torsional nystagmus after repositioning, supporting diagnosis of benign paroxysmal positional vertigo and identifying the affected side.

17. **Basic response:** The caloric test assesses each horizontal semicircular canal independently using water or air irrigation at temperatures above and below body temperature.

Value-added response: The resulting nystagmus follows the COWS pattern, with reduced or absent response indicating unilateral vestibular hypofunction relevant to further clinical evaluation.

18. **Basic response:** Nystagmus assessment examines involuntary eye oscillation at rest and during provocative testing, while extraocular movement examination assesses the six eye muscles through an H-shaped gaze pattern.

Value-added response: Restricted or asymmetric movement may indicate cranial nerve palsy or orbital pathology requiring further clinical correlation.

19. **Basic response:** Peripheral vestibular disorders typically produce unidirectional, fatiguing nystagmus, while central disorders may produce nystagmus that changes direction or fails to fatigue.

Value-added response: This distinction carries direct clinical significance, since central pathology may reflect serious neurological disease requiring urgent further investigation.

20. **Basic response:** Pure tone audiometry measures hearing thresholds across frequencies using calibrated headphones and a bone vibrator, with masking preventing cross-hearing.

Value-added response: The resulting audiogram, interpreted through its pattern and air-bone gap, supports quantifying hearing loss, guiding hearing aid fitting, and monitoring treatment response over time.

Answers to Pilot Questions [Series 2]

Part 2.1

11. Standing with feet together and eyes closed; marked swaying or falling suggests proprioceptive or vestibular impairment.
12. Walking heel-to-toe; consistent deviation with eyes closed suggests a unilateral vestibular lesion on that side.
13. Rapidly moving the seated patient supine with the head extended and turned 45 degrees to one side.
14. Torsional, upbeating nystagmus appearing after a brief latency and fatiguing with repeated testing.
15. Irrigating the ear canal with warm and cold water or air; COWS describes cold opposite, warm same nystagmus direction.

Part 2.2

1. An involuntary, rhythmic eye oscillation; its direction is named according to the fast phase.
2. Asking the patient to follow the examiner's finger through an H-shaped pattern of movement.
3. Cranial nerve palsy and orbital pathology.
4. Peripheral nystagmus is unidirectional and fatigues; central nystagmus may change direction and does not fatigue.
5. Because central pathology may reflect serious underlying neurological disease requiring urgent further investigation.

Part 2.3

6. A test measuring hearing thresholds at specific frequencies, using headphones and a bone vibrator in a sound-treated booth.
7. To prevent the non-test ear from detecting the tone through cross-hearing, ensuring accurate results for the tested ear.
8. Hearing threshold in decibels plotted against frequency, with air and bone conduction shown separately.

9. The pattern (flat, sloping, notched) and presence of an air-bone gap provide additional diagnostic information on the likely cause.
10. Quantifying hearing loss and guiding hearing aid fitting, and monitoring occupational noise-induced hearing loss.

References and Attributions [Series 2]

11. Gleeson, M. (Ed.). (2008). Scott-Brown's Otorhinolaryngology, Head and Neck Surgery (7th ed.). Hodder Arnold.
12. Probst, R., Grevers, G., & Iro, H. (2018). Basic Otorhinolaryngology: A Step-by-Step Learning Guide (2nd ed.). Thieme.
13. Bickley, L. S. (2020). Bates' Guide to Physical Examination and History Taking (13th ed.). Wolters Kluwer.
14. American Speech-Language-Hearing Association (2023). Guidelines for audiometric symbols and threshold interpretation.

Figures, Plates, Tables, and Boxes

1. Figure 2.1: Diagram illustrating correct patient positioning for the Dix-Hallpike test, showing head extension and 45-degree turn. AI-generated using the prompt: "A single clean, clinically accurate instructional diagram showing two sequential positions: a person seated upright, and the same person reclined supine with the head extended backward and turned to one side, medical textbook instructional style, clear labelled sequence arrows, neutral background, no other panels."
2. Table 2.2: Comparing peripheral and central nystagmus. AI-generated using the prompt: "Create a clean clinical reference table titled Comparing Peripheral and Central Nystagmus, listing feature, peripheral nystagmus, and central nystagmus. Medical reference table style with outside border, no photographic elements."
3. Figure 2.3: Diagram of an audiogram showing symbols for air and bone conduction thresholds plotted against frequency. AI-generated using the prompt: "A single clean, accurate audiogram chart diagram with frequency on the horizontal axis and hearing level in decibels on the vertical axis, showing standard threshold symbols plotted for air and bone conduction, medical textbook diagnostic chart style, clearly labelled axes, symbols, and legend, neutral background, no other panels."

Course code: ORL 603

Course title: Clinic, Theatre and Ward Round Teaching

Course credit load: 1 Unit

Series 3: Radiological, Haematological, and Biochemical Investigations in ORL

- **Part 3.1: Radiological Investigations in ORL**
  - Sub Part 3.1.1: Plain radiography in ORL practice
  - Sub Part 3.1.2: Computed tomography in ORL
  - Sub Part 3.1.3: Magnetic resonance imaging in ORL
- **Part 3.2: Haematological Investigations**
  - Sub Part 3.2.1: Full blood count and its interpretation in ORL practice
  - Sub Part 3.2.2: Coagulation studies and their relevance
  - Sub Part 3.2.3: Erythrocyte sedimentation rate and blood film
- **Part 3.3: Biochemical Investigations**
  - Sub Part 3.3.1: Electrolytes and renal function tests
  - Sub Part 3.3.2: Thyroid function tests
  - Sub Part 3.3.3: Other relevant biochemical investigations

Introduction

In the last Series, we established balance testing, ocular evaluation, and pure tone audiometry. We now turn to the essential **radiological**, **haematological**, and **biochemical** investigations that support and confirm clinical diagnoses across otorhinolaryngology, together with their specific clinical applications, an essential skill for interpreting results encountered throughout clinic, theatre, and ward round practice.

The aim of this Series is to equip you with a thorough, practical understanding of radiological, haematological, and biochemical investigations relevant to ORL practice, and the ability to interpret their results with confidence.

This Series begins with **radiological investigations in ORL**, before turning to **haematological investigations**. It concludes with **biochemical investigations**.

Series Learning Outcomes

At the end of this Series, you should be able to:

- **SLO 3.1:** describe the role of plain radiography and computed tomography in ORL investigation
- **SLO 3.2:** describe the role of magnetic resonance imaging in ORL investigation
- **SLO 3.3:** interpret a full blood count and describe its relevance in ORL practice
- **SLO 3.4:** describe coagulation studies and their relevance to ORL surgical practice
- **SLO 3.5:** describe the erythrocyte sedimentation rate and blood film and their applications, and
- **SLO 3.6:** interpret electrolyte, renal, and thyroid function tests and describe other relevant biochemical investigations in ORL practice.

3.1 Radiological Investigations in ORL

3.1.1 plain radiography in ORL practice

A basic, widely available imaging tool with specific limited applications

Plain radiography retains a limited but useful role in ORL practice, including lateral **soft tissue neck** films for suspected epiglottitis, discussed in an earlier related course, or radiopaque foreign body identification, and plain sinus views, though largely superseded by computed tomography, discussed further in the next sub-Part, for detailed sinus assessment.

Plain radiography remains valued for its wide **availability**, low cost, and low radiation dose relative to cross-sectional imaging, meaning it retains genuine practical value in resource-limited settings, discussed in relation to healthcare financing in an earlier related course, even where computed tomography would represent the theoretically preferred **investigation**.

Fill in the blank: Plain radiography retains genuine practical value in resource-limited settings given its wide availability, low cost, and low radiation _____ relative to cross-sectional imaging.

3.1.2 computed tomography in orl

Computed tomography, or **CT**, provides detailed cross-sectional imaging particularly well suited to assessing **bony** anatomy, making it the investigation of choice for evaluating temporal bone pathology, discussed in an earlier related course, chronic rhinosinusitis and paranasal sinus anatomy prior to endoscopic sinus surgery, and staging of laryngeal or hypopharyngeal malignancy.

CT additionally plays an essential role in urgent assessment of suspected intracranial or orbital complications of ear or sinus disease, discussed in earlier related courses, providing rapid, widely available cross-sectional information supporting urgent clinical decision making in these genuine otorhinolaryngological **emergencies**.

Fill in the blank: Computed tomography is particularly well suited to assessing bony anatomy, making it the investigation of choice for evaluating temporal _____ pathology.

3.1.3 magnetic resonance imaging in orl

Magnetic resonance imaging, or **MRI**, provides superior **soft tissue** contrast resolution compared with CT, discussed in the previous sub-Part, making it the preferred investigation for assessing vestibular schwannoma, discussed in an earlier related course, and other lesions of the internal auditory canal and cerebellopontine angle.

MRI additionally plays an important role in the detailed assessment of head and neck malignancy, discussed in an earlier related course, particularly for evaluating soft tissue tumour extent and perineural spread, though its longer acquisition time and limited availability in many resource-limited settings mean CT frequently remains the more practically accessible initial **investigation**.

Fill in the blank: MRI provides superior soft tissue contrast resolution, making it the preferred investigation for assessing vestibular _____.

Table 3.1: Comparing plain radiography, CT, and MRI in ORL practice.

Modality	Best suited for	Key limitation
Plain radiography	Basic screening (e.g. soft tissue neck, foreign body)	Limited detail compared with cross-sectional imaging
Computed tomography (CT)	Bony anatomy (temporal bone, sinuses, staging)	Radiation exposure; limited soft tissue detail
Magnetic resonance imaging (MRI)	Soft tissue detail (vestibular schwannoma, tumour extent)	Longer acquisition time and limited availability

Pilot questions 3.1

- Describe two applications of plain radiography in ORL practice. (Linked to SLO 3.1)
- Explain why plain radiography retains value despite being superseded by CT for many indications. (Linked to SLO 3.1)
- Describe two applications of CT in ORL practice. (Linked to SLO 3.1)
- Describe the role of MRI in assessing vestibular schwannoma. (Linked to SLO 3.2)
- Explain why CT often remains the more practically accessible initial investigation compared with MRI. (Linked to SLO 3.2)

3.2 Haematological Investigations

3.2.1 full blood count and its interpretation in ORL practice

A basic screening test with several relevant ORL applications

The **full blood count** provides essential baseline information regarding **haemoglobin** concentration, relevant to assessing anaesthetic fitness before ORL surgery, and **white cell count**, with an elevated neutrophil count supporting a diagnosis of bacterial infection in conditions such as acute mastoiditis or deep neck space infection, discussed in earlier related courses.

Platelet count assessment is additionally essential before any surgical procedure carrying significant bleeding risk, discussed in relation to epistaxis and otological surgery in earlier related courses, with a low platelet count requiring further investigation and correction before elective surgery proceeds.

Fill in the blank: An elevated neutrophil count on full blood count supports a diagnosis of bacterial infection in conditions such as acute mastoiditis or deep neck space _____.

3.2.2 coagulation studies and their relevance

Coagulation studies, including **prothrombin time** and **activated partial thromboplastin time**, assess the extrinsic and intrinsic clotting pathways respectively, becoming particularly relevant in patients on **anticoagulant** medication presenting with epistaxis, discussed in an earlier related course, or requiring surgical intervention.

Abnormal coagulation studies may reflect anticoagulant medication effect, underlying liver disease affecting clotting factor synthesis, or, less commonly, an inherited **coagulopathy**, each requiring specific correction or specialist haematology input before proceeding with elective ORL surgery carrying significant bleeding **risk**.

Fill in the blank: Coagulation studies, including prothrombin time and activated partial thromboplastin time, become particularly relevant in patients on _____ medication presenting with epistaxis.

3.2.3 erythrocyte sedimentation rate and blood film

The **erythrocyte sedimentation rate**, or **ESR**, is a non-specific marker of inflammation, generally elevated in infective or inflammatory conditions, and, of particular otorhinolaryngological relevance, in **giant cell arteritis**, a condition that can present with head and neck symptoms including jaw claudication and, occasionally, sudden hearing loss.

Blood film examination provides direct microscopic assessment of red cell, white cell, and platelet morphology, occasionally revealing findings relevant to systemic disease presenting with otorhinolaryngological manifestations, such as haematological malignancy presenting with **lymphadenopathy**, discussed in an earlier related course.

Fill in the blank: The erythrocyte sedimentation rate is of particular otorhinolaryngological relevance in giant cell arteritis, a condition that can present with jaw claudication and, occasionally, sudden hearing _____.

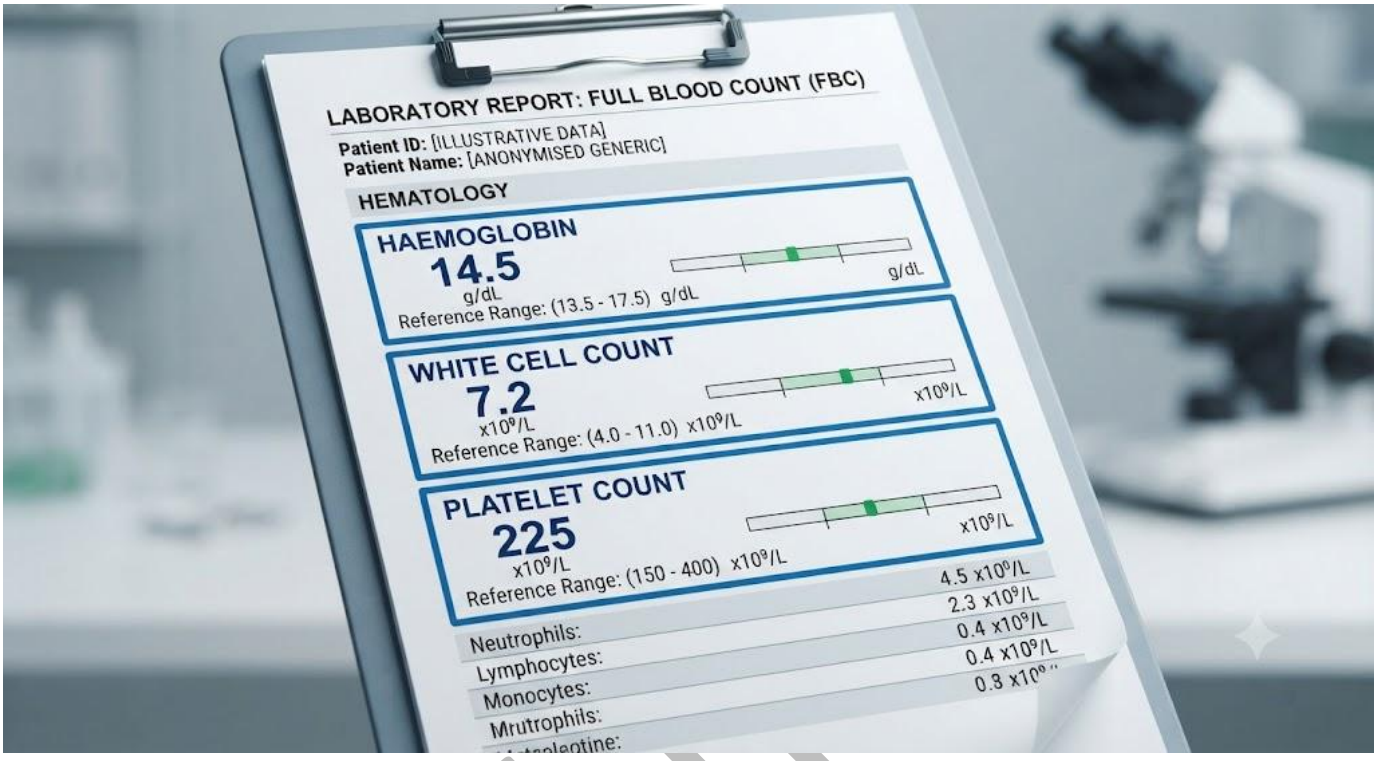

Figure 3.2: Diagram of a full blood count report highlighting the haemoglobin, white cell count, and platelet count parameters relevant to ORL practice.

Pilot questions 3.2

1. Describe the relevance of haemoglobin and white cell count assessment in ORL practice. (Linked to SLO 3.3)
2. Explain why platelet count assessment is important before ORL surgery. (Linked to SLO 3.3)
3. Name the two coagulation studies discussed and the pathways they assess. (Linked to SLO 3.4)
4. Describe two causes of abnormal coagulation studies relevant to ORL practice. (Linked to SLO 3.4)
5. Describe the relevance of ESR to giant cell arteritis in otorhinolaryngological practice. (Linked to SLO 3.5)

3.3 Biochemical Investigations

3.3.1 electrolytes and renal function tests

Baseline assessment relevant to surgical fitness and systemic disease

Serum electrolytes, including sodium and potassium, and **renal function tests**, including urea and creatinine, provide essential baseline information regarding a patient's overall **physiological** status before major ORL surgery, discussed in an earlier related course, and are particularly relevant in elderly or comorbid patients.

Renal impairment, discussed in relation to its cutaneous manifestations in an earlier related course, may additionally influence drug dosing decisions relevant to perioperative antibiotic or analgesic prescribing, meaning baseline renal function assessment carries direct practical relevance to safe **prescribing** throughout ORL clinical practice.

Fill in the blank: Baseline renal function assessment carries direct practical relevance to safe _____ throughout ORL clinical practice, particularly regarding perioperative antibiotic or analgesic dosing.

3.3.2 thyroid function tests

Thyroid function tests, including **thyroid-stimulating hormone**, or **TSH**, and free **thyroxine**, are essential in the assessment of a suspected thyroid mass, discussed in an earlier related course, and before thyroid surgery, guiding appropriate perioperative management of any identified thyroid dysfunction.

Thyroid function tests are additionally relevant in patients presenting with cutaneous or other systemic features suggestive of thyroid disease, discussed in an earlier related course, and in monitoring patients following thyroid surgery for the development of postoperative **hypothyroidism**, requiring appropriate hormone replacement where confirmed.

Fill in the blank: Thyroid function tests are essential in the assessment of a suspected thyroid mass and before thyroid _____.

3.3.3 other relevant biochemical investigations

Calcium level assessment is particularly relevant following thyroid or parathyroid surgery, discussed in the previous sub-Part, given the risk of postoperative **hypocalcaemia** resulting from inadvertent parathyroid gland injury or removal, with symptomatic hypocalcaemia requiring prompt recognition and calcium **replacement**.

Further relevant biochemical investigations include **C-reactive protein**, a further marker of inflammation complementing the ESR discussed earlier in this Series, and specific tumour **markers** occasionally relevant to monitoring treatment response in selected head and neck

malignancies, discussed in an earlier related course, though these remain used more selectively than the routine investigations discussed throughout this Series.

Fill in the blank: Calcium level assessment is particularly relevant following thyroid or parathyroid surgery, given the risk of postoperative _____.

Table 3.3: Comparing key biochemical investigations relevant to ORL surgery.

Investigation	Main relevance	Key concern if abnormal
Electrolytes and renal function	Baseline surgical fitness and drug dosing	Altered perioperative risk and drug clearance
Thyroid function tests	Thyroid mass assessment and thyroid surgery	Perioperative or postoperative thyroid dysfunction
Calcium	Post-thyroid/parathyroid surgery monitoring	Symptomatic hypocalcaemia requiring replacement

Pilot questions 3.3

1. Describe the relevance of serum electrolytes and renal function tests before major ORL surgery. (Linked to SLO 3.6)
2. Describe the relevance of thyroid function tests to thyroid surgery. (Linked to SLO 3.6)
3. Explain why calcium level assessment is important following thyroid or parathyroid surgery. (Linked to SLO 3.6)
4. Describe the relevance of C-reactive protein in ORL practice. (Linked to SLO 3.6)
5. Describe a situation in which a tumour marker might be used in head and neck practice. (Linked to SLO 3.6)

Series Summary

This Series examined **radiological, haematological, and biochemical investigations in ORL**, beginning with **radiological investigations**, plain radiography, CT, and MRI, and their respective roles and limitations, before turning to **haematological investigations**, the full blood count, coagulation studies, ESR, and blood film.

We concluded with **biochemical investigations**, electrolytes and renal function, thyroid function tests, and other relevant investigations including calcium and C-reactive protein. Having worked

through this Series, you should now be equipped to understand referral skills and community ORL screening programmes examined in the next Series of this course.

Glossary of Terms

1. **Plain radiography:** basic X-ray imaging with limited but useful applications in ORL practice.
2. **Computed tomography (CT):** cross-sectional imaging well suited to assessing bony anatomy.
3. **Magnetic resonance imaging (MRI):** cross-sectional imaging providing superior soft tissue contrast.
4. **Full blood count:** a baseline blood test measuring haemoglobin, white cells, and platelets.
5. **Coagulation studies:** tests, including prothrombin time and APTT, assessing blood clotting pathways.
6. **Erythrocyte sedimentation rate (ESR):** a non-specific marker of inflammation.
7. **Giant cell arteritis:** an inflammatory vasculitis that can present with head and neck symptoms and hearing loss.
8. **Blood film:** direct microscopic examination of blood cell morphology.
9. **Thyroid function tests:** blood tests, including TSH and free thyroxine, assessing thyroid gland activity.
10. **Hypocalcaemia:** low blood calcium, a recognised risk following thyroid or parathyroid surgery.
11. **C-reactive protein:** a blood marker of acute inflammation.
12. **Tumour marker:** a blood test occasionally used to monitor treatment response in selected malignancies.

Concept Check Questions [Series 3]

Objective questions

1. Plain radiography retains value in resource-limited settings given its wide availability, low cost, and low radiation _____.
2. Computed tomography is particularly well suited to assessing _____ anatomy.
3. MRI provides superior soft tissue contrast, making it the preferred investigation for assessing vestibular _____.

4. Coagulation studies become particularly relevant in patients on _____ medication presenting with epistaxis.
5. Calcium level assessment is particularly relevant following thyroid or parathyroid surgery, given the risk of postoperative _____.

Short-answer questions

- Describe two applications of CT in ORL practice.
- Explain why platelet count assessment is important before ORL surgery.
- Name the two coagulation studies discussed and the pathways they assess.
- Describe the relevance of ESR to giant cell arteritis in otorhinolaryngological practice.
- Describe the relevance of thyroid function tests to thyroid surgery.

Long-answer questions

1. Discuss the roles of plain radiography, CT, and MRI in ORL investigation. (Linked to SLO 3.1, SLO 3.2)
2. Discuss the full blood count and its interpretation in ORL practice. (Linked to SLO 3.3)
3. Discuss coagulation studies and their relevance to ORL surgical practice. (Linked to SLO 3.4)
4. Discuss the erythrocyte sedimentation rate and blood film and their applications. (Linked to SLO 3.5)
5. Discuss electrolyte, renal, and thyroid function tests and other relevant biochemical investigations in ORL practice. (Linked to SLO 3.6)

Answers to Concept Check Questions [Series 3]

Objective questions

6. Dose.
7. Bony.
8. Schwannoma.
9. Anticoagulant.
10. Hypocalcaemia.

Short-answer questions

11. Assessing temporal bone pathology, and evaluating paranasal sinus anatomy or laryngeal malignancy staging.

12. Because a low platelet count carries significant bleeding risk requiring correction before elective surgery.
13. Prothrombin time assesses the extrinsic pathway; activated partial thromboplastin time assesses the intrinsic pathway.
14. ESR is elevated in giant cell arteritis, which can present with head and neck symptoms and occasionally sudden hearing loss.
15. They guide identification and perioperative management of thyroid dysfunction before and after thyroid surgery.

Long-answer questions

16. **Basic response:** Plain radiography retains limited but useful applications given its availability and low cost, while CT provides detailed bony assessment for temporal bone, sinus, and malignancy staging.

Value-added response: MRI offers superior soft tissue contrast for vestibular schwannoma and tumour extent assessment, though its longer acquisition time and limited availability mean CT often remains more practically accessible.

17. **Basic response:** The full blood count provides baseline haemoglobin, white cell, and platelet information relevant to anaesthetic fitness, infection diagnosis, and surgical bleeding risk assessment.

Value-added response: These parameters directly inform perioperative decision making across a wide range of ORL clinical presentations.

18. **Basic response:** Coagulation studies, including prothrombin time and APTT, assess the extrinsic and intrinsic clotting pathways, becoming relevant in anticoagulated patients with epistaxis or requiring surgery.

Value-added response: Abnormal results may reflect medication effect, liver disease, or inherited coagulopathy, requiring correction or specialist input before elective surgery.

19. **Basic response:** ESR is a non-specific inflammatory marker of particular relevance in giant cell arteritis, which can present with head and neck symptoms and sudden hearing loss.

Value-added response: Blood film examination provides direct morphological assessment, occasionally revealing haematological malignancy presenting with lymphadenopathy.

20. **Basic response:** Electrolytes and renal function tests provide baseline surgical fitness information and inform safe perioperative prescribing, while thyroid function tests guide assessment of thyroid masses and surgery.

Value-added response: Further investigations, including calcium monitoring after thyroid or parathyroid surgery and selectively used markers such as CRP or tumour markers, complement these routine investigations.

Answers to Pilot Questions [Series 3]

Part 3.1

11. Lateral soft tissue neck films for suspected epiglottitis, and radiopaque foreign body identification.
12. Because of its wide availability, low cost, and low radiation dose, particularly valuable in resource-limited settings.
13. Temporal bone pathology assessment, and chronic rhinosinusitis or malignancy staging.
14. MRI provides superior soft tissue contrast, making it preferred for assessing internal auditory canal and cerebellopontine angle lesions.
15. Because MRI has longer acquisition time and more limited availability in many resource-limited settings.

Part 3.2

1. Haemoglobin assesses anaesthetic fitness; white cell count, particularly neutrophils, supports diagnosis of bacterial infection.
2. Because a low count carries significant bleeding risk requiring correction before elective surgery.
3. Prothrombin time assesses the extrinsic pathway; activated partial thromboplastin time assesses the intrinsic pathway.
4. Anticoagulant medication effect, and underlying liver disease affecting clotting factor synthesis.
5. ESR is elevated in giant cell arteritis, which can present with jaw claudication and occasionally sudden hearing loss.

Part 3.3

6. They provide baseline physiological status information relevant to anaesthetic and surgical fitness, particularly in elderly or comorbid patients.

7. They guide identification and perioperative management of thyroid dysfunction before and after thyroid surgery.
8. Because of the risk of hypocalcaemia from inadvertent parathyroid gland injury or removal during surgery.
9. It is a further marker of inflammation complementing ESR in assessing infective or inflammatory conditions.
10. Monitoring treatment response in selected head and neck malignancies.

References and Attributions [Series 3]

11. Gleeson, M. (Ed.). (2008). Scott-Brown's Otorhinolaryngology, Head and Neck Surgery (7th ed.). Hodder Arnold.
12. Probst, R., Grevers, G., & Iro, H. (2018). Basic Otorhinolaryngology: A Step-by-Step Learning Guide (2nd ed.). Thieme.
13. Provan, D. (Ed.). (2017). Oxford Handbook of Clinical Haematology (4th ed.). Oxford University Press.
14. Longmore, M., et al. (2020). Oxford Handbook of Clinical Medicine (10th ed.). Oxford University Press.

Figures, Plates, Tables, and Boxes

1. Table 3.1: Comparing plain radiography, CT, and MRI in ORL practice. AI-generated using the prompt: "Create a clean clinical reference table titled Comparing Plain Radiography, CT, and MRI in ORL Practice, listing modality, best suited for, and key limitation. Medical reference table style with outside border, no photographic elements."
2. Figure 3.2: Diagram of a full blood count report highlighting the haemoglobin, white cell count, and platelet count parameters relevant to ORL practice. AI-generated using the prompt: "A single clean, accurate diagram of a simplified laboratory report format highlighting three boxed parameters labelled haemoglobin, white cell count, and platelet count with example reference ranges, medical textbook reference style, neutral background, no other panels, no real patient data."
3. Table 3.3: Comparing key biochemical investigations relevant to ORL surgery. AI-generated using the prompt: "Create a clean clinical reference table titled Comparing Key Biochemical Investigations in ORL Surgery, listing investigation, main relevance, and key concern if abnormal. Medical reference table style with outside border, no photographic elements."

Course code: ORL 603

Course title: Clinic, Theatre and Ward Round Teaching

Course credit load: 1 Unit

Series 4: Referral Skills and Community ORL Screening Programmes

- **Part 4.1: Identifying Problems Beyond Level of Skill and Referral Processes**
  - Sub Part 4.1.1: Recognising when a case exceeds primary level competence
  - Sub Part 4.1.2: The referral process and effective referral letters
  - Sub Part 4.1.3: Onward referral to specialist and relevant hospital services
- **Part 4.2: Community Epidemiological Surveys and Deafness Prevalence**
  - Sub Part 4.2.1: Principles of epidemiological surveys in ORL
  - Sub Part 4.2.2: Conducting a community survey of deafness prevalence
  - Sub Part 4.2.3: Community-based medical education field trips
- **Part 4.3: Screening Programmes for ENT Problems**
  - Sub Part 4.3.1: Early screening tests for common ENT problems
  - Sub Part 4.3.2: Universal neonatal hearing screening
  - Sub Part 4.3.3: Organising and evaluating a screening programme

Introduction

In the last Series, we established radiological, haematological, and biochemical investigations in ORL. We now turn to two further essential practical skills, recognising when a case genuinely exceeds one's own level of skill and executing an effective **referral**, and understanding the practical conduct of **community epidemiological surveys** and **screening programmes** for common ENT problems, including universal neonatal hearing screening.

The aim of this Series is to equip you with a thorough, practical understanding of identifying problems beyond your level of skill, the referral process, community epidemiological surveys into the prevalence of deafness, and early screening tests for ENT problems, including universal neonatal hearing screening.

This Series begins with **identifying problems beyond level of skill and referral processes**, before turning to **community epidemiological surveys and deafness prevalence**. It concludes with **screening programmes for ENT problems**.

Series Learning Outcomes

At the end of this Series, you should be able to:

- **SLO 4.1:** recognise when a clinical problem exceeds primary level competence
- **SLO 4.2:** describe the referral process and construct an effective referral letter
- **SLO 4.3:** describe onward referral to specialist and relevant hospital services
- **SLO 4.4:** describe the principles of conducting a community epidemiological survey of deafness prevalence
- **SLO 4.5:** describe community-based medical education field trips as a survey method, and
- **SLO 4.6:** describe early screening tests for common ENT problems, including universal neonatal hearing screening.

4.1 Identifying Problems Beyond Level of Skill and Referral Processes

4.1.1 recognising when a case exceeds primary level competence

Honest self-assessment as an essential clinical safety skill

Recognising when a clinical problem exceeds one's own current level of skill or **competence** represents an essential patient safety skill, requiring honest, ongoing self-assessment against recognised diagnostic and management standards, discussed throughout this course, rather than attempting to manage every presentation independently regardless of genuine clinical uncertainty.

Specific indicators warranting recognition of the need for referral include diagnostic uncertainty despite appropriate initial assessment, discussed in earlier related courses, any of the recognised otorhinolaryngological emergencies, discussed in earlier related courses, and any condition requiring specialist investigation or intervention genuinely beyond available local **resources**.

Fill in the blank: Recognising when a clinical problem exceeds one's own current level of skill requires honest, ongoing self-assessment against recognised diagnostic and management _____.

4.1.2 the referral process and effective referral letters

An effective **referral letter** clearly states the specific reason for referral, relevant history and examination findings, discussed in relation to bedside examination in an earlier Series of this course, results of any investigations already performed, discussed in the previous Series of this course, and the specific clinical question the referring clinician wishes the specialist to address.

The referral process additionally requires appropriate communication of **urgency**, distinguishing a routine referral from one requiring urgent or emergency specialist assessment, discussed in relation to otorhinolaryngological emergencies in earlier related courses, together with clear patient contact information supporting efficient onward **appointment** scheduling.

Fill in the blank: An effective referral letter clearly states the specific reason for referral, relevant history and examination findings, and results of any _____ already performed.

4.1.3 onward referral to specialist and relevant hospital services

Onward referral generally requires accurate knowledge of the specific specialist services and referral **pathways** available within the local health system, discussed in relation to the tiered health system and two-way referral in earlier related courses, ensuring patients are directed to the most appropriate level and type of specialist care for their specific condition.

Effective onward referral additionally requires appropriate patient **communication**, discussed in relation to the patient-centred approach in an earlier related course, explaining the reason for referral and what the patient should expect, supporting genuine patient understanding and engagement with the subsequent specialist referral process.

Fill in the blank: Effective onward referral requires appropriate patient communication, explaining the reason for referral and what the patient should _____.

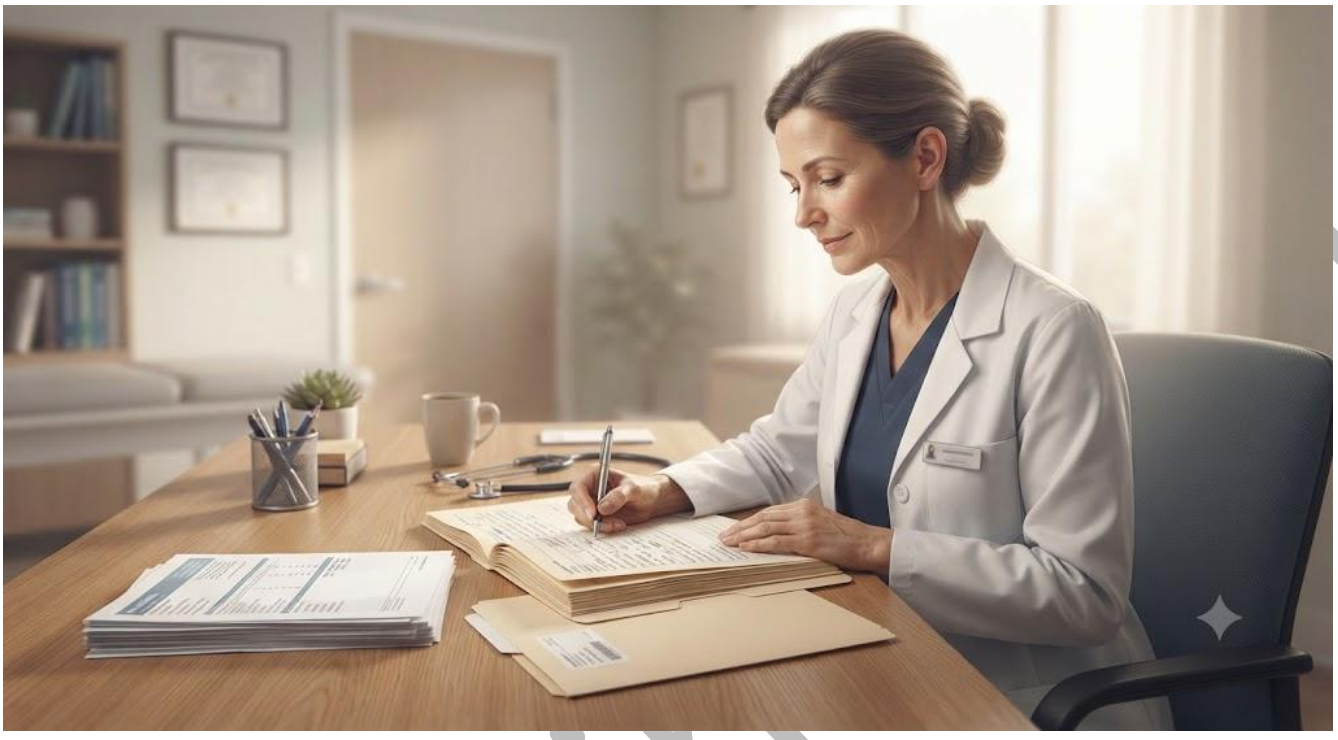

Figure 4.1: A clinician drafting a structured referral letter at a desk with a patient's chart and investigation results.

Pilot questions 4.1

- Explain why honest self-assessment of one's own competence is an essential patient safety skill. (Linked to SLO 4.1)
- List two specific indicators warranting recognition of the need for referral. (Linked to SLO 4.1)
- List the essential components of an effective referral letter. (Linked to SLO 4.2)
- Explain why clear communication of urgency is an important part of the referral process. (Linked to SLO 4.2)
- Describe the requirements for effective onward referral to specialist and relevant hospital services. (Linked to SLO 4.3)

4.2 Community Epidemiological Surveys and Deafness Prevalence

4.2.1 principles of epidemiological surveys in orl

Systematically quantifying disease burden within a defined population

Epidemiological surveys relevant to otorhinolaryngology, discussed in relation to health survey planning in an earlier related course, systematically assess the prevalence of specific ORL conditions, particularly deafness, within a defined community, providing essential evidence to guide health **planning** and resource allocation decisions.

Effective ORL epidemiological surveys require a clearly defined survey **objective**, discussed in relation to health survey planning in an earlier related course, an appropriate sampling method, and standardised, reliable case definitions and testing protocols, ensuring findings genuinely reflect the true prevalence within the surveyed community rather than measurement artefact.

Fill in the blank: Effective ORL epidemiological surveys require a clearly defined survey objective, an appropriate sampling method, and standardised, reliable case _____.

4.2.2 conducting a community survey of deafness prevalence

Conducting a community survey of deafness prevalence generally involves systematic hearing screening, discussed further in the next Part of this Series, of a representative community sample, together with structured data collection regarding relevant risk factors, discussed in relation to noise exposure and other otological risk factors in earlier related courses, contributing to the overall community prevalence estimate.

Findings from such surveys carry direct practical value in informing local health service **planning**, discussed in an earlier related course, including identification of priority areas for hearing rehabilitation service development, discussed in an earlier related course, and advocacy for continued investment in ear and hearing care within the surveyed community.

Fill in the blank: Findings from community deafness prevalence surveys carry direct practical value in informing local health service _____.

4.2.3 community-based medical education field trips

Community-based medical education, or **CBME**, field trips provide students direct, practical exposure to conducting ORL epidemiological survey work within genuine community settings, discussed earlier in this Part, complementing classroom and clinic-based learning with authentic, real-world practical experience.

Effective participation in CBME field trips requires careful advance **preparation**, including familiarity with the specific screening protocols and data collection instruments to be used,

discussed in relation to hearing screening in the next Part of this Series, and genuine cultural sensitivity when engaging with community members during the fieldwork **process**.

Fill in the blank: Effective participation in community-based medical education field trips requires careful advance preparation and genuine cultural _____ when engaging with community members.

Table 4.2: Key components of an ORL community prevalence survey.

Component	Purpose	Example
Survey objective	Defines what the survey aims to measure	Estimate prevalence of childhood deafness
Sampling method	Ensures a representative community sample	Random selection of households in a defined area
Standardised testing protocol	Ensures consistent, reliable measurement	Same hearing screening test applied to all participants

Pilot questions 4.2

1. Describe the purpose of epidemiological surveys relevant to otorhinolaryngology. (Linked to SLO 4.4)
2. List three requirements for an effective ORL epidemiological survey. (Linked to SLO 4.4)
3. Describe how a community survey of deafness prevalence is generally conducted. (Linked to SLO 4.4)
4. Describe the practical value of community deafness prevalence survey findings. (Linked to SLO 4.4)
5. Describe the purpose and preparation required for community-based medical education field trips. (Linked to SLO 4.5)

4.3 Screening Programmes for ENT Problems

4.3.1 early screening tests for common ent problems

Simple, rapid tests identifying problems requiring further assessment

Early screening tests for common ENT problems generally prioritise **simplicity**, speed, and acceptable sensitivity, allowing large numbers of individuals to be rapidly assessed, with those

screening positive referred for more detailed **diagnostic** assessment, discussed throughout this course, rather than attempting definitive diagnosis at the screening stage itself.

Examples relevant to common ENT problems include simple hearing screening using **whisper tests** or portable audiometric devices, discussed in relation to pure tone audiometry in an earlier Series of this course, and basic visual inspection screening for conditions such as chronic suppurative otitis media within school health screening **programmes**.

Fill in the blank: Early screening tests for common ENT problems generally prioritise simplicity, speed, and acceptable _____.

4.3.2 universal neonatal hearing screening

Universal neonatal hearing screening aims to identify significant congenital hearing loss, discussed in relation to sensorineural hearing loss in an earlier related course, as early as possible in every newborn infant, generally using **otoacoustic emissions** testing or **automated auditory brainstem response** testing, both rapid, objective techniques suitable for use in the neonatal period.

Early identification through universal neonatal hearing screening is of considerable importance, since prompt intervention, discussed in relation to hearing rehabilitation in an earlier related course, during the critical early period of speech and language development substantially improves long-term communication and developmental **outcomes** compared with later identification.

Fill in the blank: Universal neonatal hearing screening generally uses otoacoustic emissions testing or automated auditory brainstem response testing, both rapid, objective techniques suitable for use in the neonatal _____.

4.3.3 organising and evaluating a screening programme

Organising an effective screening programme requires careful attention to appropriate programme **scale** and target population definition, discussed in relation to community survey principles earlier in this Series, adequate workforce training in the specific screening technique to be used, and clear, functioning referral pathways, discussed earlier in this Series, for individuals screening positive.

Evaluating a screening programme's effectiveness, consistent with the health service evaluation principles discussed in an earlier related course, generally requires monitoring programme coverage, the proportion of the target population actually screened, and follow-up completion

rates among those screening **positive**, ensuring the programme achieves genuine practical impact rather than existing in name alone.

Fill in the blank: Evaluating a screening programme's effectiveness generally requires monitoring programme coverage and follow-up completion rates among those screening _____.

Figure 4.3: A health worker performing otoacoustic emissions hearing screening on a sleeping newborn infant.

Pilot questions 4.3

1. Describe the general characteristics prioritised in early ENT screening tests. (Linked to SLO 4.6)
2. Give two examples of early screening tests relevant to common ENT problems. (Linked to SLO 4.6)
3. Define universal neonatal hearing screening and name the two techniques generally used. (Linked to SLO 4.6)
4. Explain why early identification through neonatal hearing screening is of considerable importance. (Linked to SLO 4.6)
5. Describe the components required to organise and evaluate an effective screening programme. (Linked to SLO 4.6)

Series Summary

This Series examined **referral skills and community ORL screening programmes**, beginning with **identifying problems beyond level of skill and referral processes**, recognising the need for referral, constructing effective referral letters, and executing onward referral, before turning to **community epidemiological surveys and deafness prevalence**, survey principles, conducting a community deafness survey, and community-based medical education field trips.

We concluded with **screening programmes for ENT problems**, early screening tests, universal neonatal hearing screening, and organising and evaluating an effective screening programme. Having worked through this Series, you should now be equipped to understand noise conservation, ICT resources, and first aid in ORL practice examined in the final Series of this course.

Glossary of Terms

1. **Referral letter:** a structured document communicating relevant clinical information to a receiving specialist.
2. **Referral pathway:** the defined route by which a patient is directed to appropriate specialist care.
3. **Epidemiological survey:** a systematic study assessing the prevalence of a condition within a defined population.
4. **Sampling method:** the approach used to select a representative subset of a population for study.
5. **Community-based medical education (CBME):** training that provides students practical exposure within genuine community settings.
6. **Screening test:** a simple, rapid test identifying individuals requiring further diagnostic assessment.
7. **Universal neonatal hearing screening:** systematic hearing testing of every newborn infant to detect congenital hearing loss early.
8. **Otoacoustic emissions testing:** a rapid, objective hearing screening technique measuring cochlear response to sound.
9. **Automated auditory brainstem response:** an objective hearing screening technique measuring neural response to sound.

10. **Programme coverage:** the proportion of a target population actually reached by a screening programme.
11. **Case definition:** a standardised set of criteria used to consistently identify cases within a survey.
12. **Onward referral:** directing a patient to the appropriate next level or type of specialist care.

Concept Check Questions [Series 4]

Objective questions

1. Recognising when a clinical problem exceeds one's own level of skill requires honest, ongoing self-assessment against recognised diagnostic and management _____.
2. An effective referral letter states the reason for referral, relevant findings, and results of any investigations already _____.
3. Effective ORL epidemiological surveys require a clearly defined objective, appropriate sampling, and standardised, reliable case _____.
4. Early screening tests for common ENT problems prioritise simplicity, speed, and acceptable _____.
5. Universal neonatal hearing screening generally uses otoacoustic emissions testing or automated auditory brainstem response testing, both suitable for use in the neonatal _____.

Short-answer questions

- List two specific indicators warranting recognition of the need for referral.
- List the essential components of an effective referral letter.
- Describe how a community survey of deafness prevalence is generally conducted.
- Give two examples of early screening tests relevant to common ENT problems.
- Explain why early identification through neonatal hearing screening is of considerable importance.

Long-answer questions

1. Discuss recognising when a case exceeds level of skill and the referral process, including effective referral letters. (Linked to SLO 4.1, SLO 4.2)
2. Discuss onward referral to specialist and relevant hospital services. (Linked to SLO 4.3)
3. Discuss the principles of epidemiological surveys in ORL and conducting a community survey of deafness prevalence. (Linked to SLO 4.4)
4. Discuss community-based medical education field trips. (Linked to SLO 4.5)

5. Discuss early screening tests for common ENT problems and universal neonatal hearing screening. (Linked to SLO 4.6)

Answers to Concept Check Questions [Series 4]

Objective questions

6. Standards.
7. Performed.
8. Definitions.
9. Sensitivity.
10. Period.

Short-answer questions

11. Diagnostic uncertainty despite appropriate assessment, and any recognised otorhinolaryngological emergency.
12. Reason for referral, relevant history and findings, investigation results, and the specific clinical question for the specialist.
13. Systematic hearing screening of a representative sample, together with structured data collection on relevant risk factors.
14. Whisper tests or portable audiometric devices, and basic visual inspection screening in school health programmes.
15. Because prompt intervention during the critical early period of speech and language development substantially improves long-term outcomes.

Long-answer questions

16. **Basic response:** Recognising the need for referral requires honest self-assessment against recognised standards, guided by indicators such as diagnostic uncertainty or emergency presentation.

Value-added response: An effective referral letter clearly states the reason for referral, relevant findings, investigation results, and urgency, supporting efficient specialist assessment.

17. **Basic response:** Onward referral requires accurate knowledge of local referral pathways to direct patients to appropriate specialist care.

Value-added response: Effective communication with the patient about the reason for referral and what to expect supports genuine understanding and engagement with the process.

18. **Basic response:** Epidemiological surveys systematically assess ORL condition prevalence within a community, requiring clear objectives, appropriate sampling, and standardised protocols.

Value-added response: Community deafness prevalence surveys involve systematic hearing screening and risk factor data collection, informing health service planning and advocacy.

19. **Basic response:** Community-based medical education field trips provide students direct, practical exposure to conducting ORL survey work within genuine community settings.

Value-added response: Effective participation requires advance preparation with screening protocols and instruments, together with genuine cultural sensitivity during fieldwork.

20. **Basic response:** Early ENT screening tests prioritise simplicity and speed, using tools such as whisper tests or visual inspection to identify individuals for further assessment.

Value-added response: Universal neonatal hearing screening, using otoacoustic emissions or automated auditory brainstem response testing, enables early intervention that substantially improves long-term developmental outcomes.

Answers to Pilot Questions [Series 4]

Part 4.1

11. Because attempting to manage every presentation independently despite genuine uncertainty risks patient harm.
12. Diagnostic uncertainty despite appropriate assessment, and recognised emergencies or resource limitations.
13. Reason for referral, relevant history and examination findings, investigation results, and the specific clinical question.
14. Because it distinguishes routine from urgent or emergency referrals, guiding appropriate specialist response timing.
15. Accurate knowledge of local referral pathways and appropriate patient communication about the referral.

Part 4.2

1. To systematically assess the prevalence of specific ORL conditions within a defined community, guiding health planning.
2. A clearly defined objective, appropriate sampling method, and standardised, reliable case definitions and protocols.
3. Through systematic hearing screening of a representative sample and structured collection of relevant risk factor data.
4. It informs local health service planning, identifies priority areas for rehabilitation services, and supports advocacy for continued investment.
5. To provide practical exposure to community survey work; preparation requires familiarity with screening protocols and cultural sensitivity.

Part 4.3

6. Simplicity, speed, and acceptable sensitivity, allowing rapid assessment of large numbers of individuals.
7. Whisper tests or portable audiometric devices, and visual inspection screening in school health programmes.
8. Systematic hearing testing of every newborn infant; otoacoustic emissions testing and automated auditory brainstem response testing.
9. Because prompt intervention during the critical early period of speech and language development substantially improves long-term outcomes.
10. Appropriate scale and target population definition, adequate workforce training, clear referral pathways, and ongoing monitoring of coverage and follow-up.

References and Attributions [Series 4]

11. World Health Organization (2021). World Report on Hearing.
12. Joint Committee on Infant Hearing (2019). Year 2019 Position Statement: Principles and Guidelines for Early Hearing Detection and Intervention Programs.
13. Gleeson, M. (Ed.). (2008). Scott-Brown's Otorhinolaryngology, Head and Neck Surgery (7th ed.). Hodder Arnold.
14. National Universities Commission, Nigeria (2018). Benchmark minimum academic standards for medical and dental education.

Figures, Plates, Tables, and Boxes

1. Figure 4.1: A clinician drafting a structured referral letter at a desk with a patient's chart and investigation results. AI-generated using the prompt: "A single clean, realistic illustration of a clinician writing at a desk with a patient chart and printed documents visible nearby, calm professional setting, natural lighting, no legible text detail, no other panels, respectful depiction, no identifying facial features."
2. Table 4.2: Key components of an ORL community prevalence survey. AI-generated using the prompt: "Create a clean reference table titled Key Components of an ORL Community Prevalence Survey, listing component, purpose, and example. Reference table style with outside border, no photographic elements."
3. Figure 4.3: A health worker performing otoacoustic emissions hearing screening on a sleeping newborn infant. AI-generated using the prompt: "A single clean, realistic clinical illustration of a health worker gently placing a small screening probe in the ear of a sleeping newborn infant, calm respectful clinical setting, soft natural lighting, no text overlays, no other panels, no identifying facial features, respectful and accurate depiction."

Course code: ORL 603

Course title: Clinic, Theatre and Ward Round Teaching

Course credit load: 1 Unit

Series 5: Noise Conservation, ICT Resources, and First Aid in ORL Practice

- **Part 5.1: Noise Pollution and Hearing Conservation**
  - Sub Part 5.1.1: Noise pollution as an occupational health hazard
  - Sub Part 5.1.2: Principles of hearing conservation programmes
  - Sub Part 5.1.3: Monitoring and protecting industrial workers' hearing
- **Part 5.2: ICT Resources for ORL Practice**
  - Sub Part 5.2.1: Seeking reliable information on ORL disease via the web
  - Sub Part 5.2.2: Evaluating the quality of online medical information
  - Sub Part 5.2.3: Keeping up to date with recent advances in ORL practice
- **Part 5.3: First Aid for Common ENT Problems**
  - Sub Part 5.3.1: First aid for epistaxis and foreign bodies
  - Sub Part 5.3.2: First aid for ear pain and minor ear trauma
  - Sub Part 5.3.3: First aid for airway-related ENT emergencies

Introduction

In the last Series, we established referral skills and community ORL screening programmes. We now conclude this course with **noise pollution and hearing conservation**, a critical occupational health concern for industrial workers, **ICT resources** supporting reliable, up-to-date ORL clinical knowledge, and **first aid** for common ENT problems, revising and consolidating the practical examination skills established throughout this course into genuine, immediately applicable clinical action.

The aim of this Series is to equip you with a thorough, practical understanding of noise pollution as an occupational health hazard and hearing conservation, methods of seeking reliable

information on the web regarding ORL disease and recent advances, and first aid treatment for common ENT problems.

This Series begins with **noise pollution and hearing conservation**, before turning to **ICT resources for ORL practice**. It concludes with **first aid for common ENT problems**.

Series Learning Outcomes

At the end of this Series, you should be able to:

- **SLO 5.1:** describe noise pollution as an occupational health hazard for industrial workers
- **SLO 5.2:** describe the principles of hearing conservation programmes and monitoring industrial workers' hearing
- **SLO 5.3:** describe methods of seeking reliable information on ORL disease via the web
- **SLO 5.4:** evaluate the quality of online medical information and describe how to stay up to date with recent ORL advances
- **SLO 5.5:** provide first aid for epistaxis, foreign bodies, ear pain, and minor ear trauma, and
- **SLO 5.6:** provide first aid for airway-related ENT emergencies.

5.1 Noise Pollution and Hearing Conservation

5.1.1 noise pollution as an occupational health hazard

A preventable, cumulative cause of permanent hearing loss

Noise pollution within industrial and occupational settings represents a significant, entirely **preventable** cause of permanent sensorineural hearing loss, discussed in relation to noise-induced hearing loss in an earlier related course, with risk directly related to both the intensity, measured in **decibels**, and cumulative duration of exposure over an individual's working life.

Occupations carrying particular noise exposure risk within the Nigerian context include manufacturing and heavy industry, construction, discussed in relation to occupational health practices in an earlier related course, and certain transportation-related occupations, meaning workplace noise assessment represents an essential component of comprehensive occupational health **surveillance**.

Fill in the blank: Noise pollution risk is directly related to both the intensity, measured in decibels, and cumulative duration of exposure over an individual's working _____.

5.1.2 principles of hearing conservation programmes

Hearing conservation programmes rest on a hierarchy of control measures, prioritising **engineering controls**, such as noise reduction at source or sound-insulating enclosures, over personal protective equipment, since eliminating or reducing noise at its source represents a more reliable, sustainable protective strategy than relying solely on individual worker compliance.

Where engineering controls alone prove insufficient, appropriate **personal hearing protection**, including earplugs or earmuffs providing adequate noise attenuation for the specific exposure level, discussed earlier in this Part, becomes an essential additional protective measure, alongside regular audiometric monitoring, discussed further in the next sub-Part.

Fill in the blank: Hearing conservation programmes prioritise engineering controls over personal protective equipment, since eliminating or reducing noise at its _____ represents a more reliable protective strategy.

5.1.3 monitoring and protecting industrial workers' hearing

Monitoring industrial workers' hearing generally involves baseline **audiometric assessment**, discussed in relation to pure tone audiometry in an earlier Series of this course, at the commencement of employment in a noise-exposed role, followed by periodic repeat testing to detect any progressive **threshold shift** indicating developing noise-induced hearing damage.

Effective protection additionally requires ongoing worker **education** regarding noise hazards and correct use of provided hearing protection, together with employer commitment to regular workplace noise level assessment and appropriate remedial action where noise levels are found to exceed recognised occupational exposure **limits**.

Fill in the blank: Monitoring industrial workers' hearing generally involves baseline audiometric assessment followed by periodic repeat testing to detect any progressive threshold _____.

Figure 5.1: An industrial worker wearing earmuff hearing protection while operating machinery in a factory setting.

Pilot questions 5.1

- Explain why noise pollution is described as an entirely preventable cause of permanent hearing loss. (Linked to SLO 5.1)
- List two occupations carrying particular noise exposure risk within the Nigerian context. (Linked to SLO 5.1)
- Explain why engineering controls are prioritised over personal protective equipment in hearing conservation programmes. (Linked to SLO 5.2)
- Describe the components of appropriate personal hearing protection. (Linked to SLO 5.2)
- Describe how industrial workers' hearing is monitored over time. (Linked to SLO 5.2)

5.2 ICT Resources for ORL Practice

5.2.1 seeking reliable information on orl disease via the web

Navigating a vast and variable online information landscape

Seeking reliable information on ORL disease via the web requires deliberate reliance on recognised, reputable sources, including peer-reviewed journal databases, professional society

guidelines, discussed throughout this course, and established medical reference resources, rather than uncritically accepting information from unverified general internet search results alone.

Effective web-based information seeking additionally benefits from using specific, precise search **terms**, drawing on the accurate medical terminology developed throughout this course, and cross referencing information across multiple reputable sources before accepting a specific clinical claim as reliable and current **practice**.

Fill in the blank: Seeking reliable information on ORL disease via the web requires deliberate reliance on recognised, reputable sources, including peer-reviewed journal databases and professional society _____.

5.2.2 evaluating the quality of online medical information

Evaluating the quality of online medical information requires assessing the **authorship** and institutional affiliation of a given source, the presence or absence of a clear publication or last-updated **date**, and whether the information is supported by appropriate references to primary evidence rather than presented as unsupported assertion.

Further important quality indicators include the absence of conflicting commercial or promotional **interest** that might bias the presented information, and consistency with recognised professional guidelines and the broader body of evidence discussed throughout this course, rather than representing an isolated, unverified claim.

Fill in the blank: Evaluating online medical information quality requires assessing authorship, publication date, and the absence of conflicting commercial or promotional _____.

5.2.3 keeping up to date with recent advances in orl practice

Keeping up to date with recent advances in ORL practice generally involves regular review of **peer-reviewed** otorhinolaryngology journals, discussed in relation to reliable information sources earlier in this Part, together with participation in relevant continuing professional development activities, discussed in relation to continuing professional development in an earlier related course.

Professional society **websites** and structured clinical guideline updates provide further valuable, reliable means of tracking evolving best practice, meaning a combination of these approaches, rather than reliance on any single information channel alone, best supports genuinely current, evidence-based ORL clinical **practice**.

Fill in the blank: A combination of peer-reviewed journals, continuing professional development, and professional society updates, rather than reliance on a single channel alone, best supports genuinely current, evidence-based ORL clinical _____.

Table 5.2: Assessing the reliability of an online ORL information source.

Quality indicator	Reliable source	Unreliable source
Authorship	Named, credentialed author or institution	Anonymous or unverifiable author
Evidence base	References to primary evidence or guidelines	Unsupported assertions
Commercial interest	Clearly independent of promotional interest	Undisclosed commercial bias

Pilot questions 5.2

1. Describe how to seek reliable information on ORL disease via the web. (Linked to SLO 5.3)
2. List three factors relevant to evaluating the quality of online medical information. (Linked to SLO 5.4)
3. Explain why cross referencing information across multiple reputable sources is important. (Linked to SLO 5.3)
4. Describe the approaches recommended for keeping up to date with recent advances in ORL practice. (Linked to SLO 5.4)
5. Explain why relying on a single information channel alone is not recommended. (Linked to SLO 5.4)

5.3 First Aid for Common ENT Problems

5.3.1 first aid for epistaxis and foreign bodies

Simple, immediate measures preventing complication and distress

First aid for **epistaxis**, discussed in an earlier related course, involves firm, sustained direct pressure over the soft cartilaginous part of the nose for at least ten minutes, with the patient seated upright and leaning **forward**, avoiding the historical practice of tilting the head backward, which risks blood aspiration or swallowing.

First aid for a suspected ear or nose **foreign body** involves avoiding potentially harmful home removal attempts, particularly with sharp instruments or by irrigation where a button battery or similarly hazardous object is suspected, instead seeking prompt professional assessment and removal, discussed in relation to foreign body management in an earlier related course.

Fill in the blank: First aid for epistaxis involves firm, sustained direct pressure over the soft cartilaginous part of the nose, with the patient seated upright and leaning _____.

5.3.2 first aid for ear pain and minor ear trauma

First aid for simple **ear pain**, discussed in relation to otalgia in an earlier related course, generally includes appropriate oral analgesia and avoidance of inserting any object into the ear canal, with prompt clinical assessment recommended where pain is severe, persistent, or accompanied by fever or discharge suggesting underlying infection.

First aid for minor **ear trauma**, such as a simple pinna laceration, involves gentle cleaning and application of a clean dressing, with prompt professional assessment recommended for any significant laceration, cartilage exposure, or suspected underlying fracture, discussed in relation to temporal bone trauma in an earlier related course.

Fill in the blank: First aid for simple ear pain generally includes appropriate oral analgesia and avoidance of inserting any object into the ear _____.

5.3.3 first aid for airway-related ent emergencies

First aid for a patient with **significant stridor** or evident airway obstruction, discussed in an earlier related course, involves keeping the patient calm and in the position they find most comfortable, generally sitting upright, and arranging **immediate** emergency transport to the nearest appropriate facility, avoiding any attempt at direct oropharyngeal examination that could worsen obstruction.

For a **choking** patient with suspected foreign body airway obstruction, standard first aid sequences, including back blows and abdominal thrusts for a conscious adult, discussed in relation to basic life support principles in an earlier related course, should be applied, with cardiopulmonary resuscitation initiated if the patient becomes **unresponsive**.

Fill in the blank: First aid for a patient with significant stridor involves keeping the patient calm and arranging immediate emergency transport, avoiding any attempt at direct oropharyngeal _____ that could worsen obstruction.

Figure 5.3: A first responder applying firm direct pressure to the nose of a seated patient leaning forward during an epistaxis first aid demonstration.

Pilot questions 5.3

1. Describe the correct first aid technique for epistaxis. (Linked to SLO 5.5)
2. Explain why tilting the head backward during epistaxis first aid should be avoided. (Linked to SLO 5.5)
3. Describe appropriate first aid for a suspected ear or nose foreign body. (Linked to SLO 5.5)
4. Describe first aid for a patient with significant stridor or airway obstruction. (Linked to SLO 5.6)
5. Describe the standard first aid sequence for a choking conscious adult. (Linked to SLO 5.6)

Series Summary

This final Series examined **noise conservation, ICT resources, and first aid in ORL practice**, beginning with **noise pollution and hearing conservation**, its impact as an occupational health hazard, hearing conservation programme principles, and worker monitoring and protection,

before turning to **ICT resources for ORL practice**, seeking reliable web-based information, evaluating information quality, and staying current with recent advances.

We concluded with **first aid for common ENT problems**, appropriate first aid for epistaxis, foreign bodies, ear pain, minor ear trauma, and airway-related emergencies. Having worked through this Series, and indeed this entire course, you should now possess a comprehensive, practically grounded foundation in clinic, theatre, and ward round ORL skills, from bedside examination technique and specialised investigation through referral skills, community screening, and, finally, occupational hearing conservation, reliable information seeking, and practical first aid addressed throughout ORL 603.

Glossary of Terms

1. **Noise pollution:** excessive environmental or occupational noise capable of causing permanent hearing damage.
2. **Hearing conservation programme:** a structured occupational health programme protecting workers from noise-induced hearing loss.
3. **Engineering control:** a measure reducing hazard at its source, prioritised over personal protective equipment.
4. **Threshold shift:** a measurable change in hearing threshold detected through periodic audiometric monitoring.
5. **Peer-reviewed journal:** a publication in which submitted articles are evaluated by independent experts before publication.
6. **Continuing professional development:** ongoing learning activities maintaining a clinician's current knowledge and skills.
7. **Online information reliability:** the trustworthiness of a web-based source, assessed by authorship, evidence, and bias.
8. **First aid:** immediate, basic care provided before professional medical treatment is available.
9. **Direct pressure (epistaxis):** firm, sustained compression of the nasal soft tissue used to control anterior nose bleeding.
10. **Button battery:** a small battery posing significant hazard if lodged as a foreign body in the ear or nose.
11. **Basic life support:** fundamental emergency techniques, including CPR, used to sustain life before advanced care arrives.
12. **Occupational health surveillance:** ongoing monitoring of workplace hazards and worker health to prevent occupational disease.

Concept Check Questions [Series 5]

Objective questions

1. Noise pollution risk is directly related to both intensity, measured in decibels, and cumulative duration of exposure over an individual's working _____.
2. Hearing conservation programmes prioritise engineering controls over personal protective equipment, since eliminating noise at its _____ is more reliable.
3. Evaluating online medical information quality requires assessing authorship, publication date, and the absence of conflicting commercial or promotional _____.
4. First aid for epistaxis involves firm pressure over the soft cartilaginous nose, with the patient seated upright and leaning _____.
5. First aid for a patient with significant stridor involves avoiding any attempt at direct oropharyngeal examination that could worsen _____.

Short-answer questions

- List two occupations carrying particular noise exposure risk within the Nigerian context.
- Describe how industrial workers' hearing is monitored over time.
- List three factors relevant to evaluating the quality of online medical information.
- Explain why tilting the head backward during epistaxis first aid should be avoided.
- Describe the standard first aid sequence for a choking conscious adult.

Long-answer questions

1. Discuss noise pollution as an occupational health hazard and the principles of hearing conservation programmes. (Linked to SLO 5.1, SLO 5.2)
2. Discuss monitoring and protecting industrial workers' hearing. (Linked to SLO 5.2)
3. Discuss methods of seeking reliable information on ORL disease via the web and evaluating information quality. (Linked to SLO 5.3, SLO 5.4)
4. Discuss keeping up to date with recent advances in ORL practice. (Linked to SLO 5.4)
5. Discuss first aid for epistaxis, foreign bodies, ear pain, minor ear trauma, and airway-related ENT emergencies. (Linked to SLO 5.5, SLO 5.6)

Answers to Concept Check Questions [Series 5]

Objective questions

6. Life.
7. Source.

8. Interest.
9. Forward.
10. Obstruction.

Short-answer questions

11. Manufacturing and heavy industry, and construction.
12. Through baseline audiometric assessment at employment commencement followed by periodic repeat testing.
13. Authorship and institutional affiliation, presence of a publication or update date, and referencing of primary evidence.
14. Because it risks blood aspiration or swallowing.
15. Back blows and abdominal thrusts, with cardiopulmonary resuscitation initiated if the patient becomes unresponsive.

Long-answer questions

16. **Basic response:** Noise pollution is a preventable cause of permanent hearing loss, with risk related to both intensity and cumulative exposure duration.

Value-added response: Hearing conservation programmes prioritise engineering controls over personal protective equipment, reflecting a hierarchy of control favouring elimination of hazard at its source.

17. **Basic response:** Monitoring industrial workers' hearing involves baseline and periodic audiometric assessment to detect progressive threshold shift.

Value-added response: Effective protection additionally requires ongoing worker education and employer commitment to regular workplace noise assessment and remedial action.

18. **Basic response:** Reliable web-based information seeking relies on reputable sources, precise search terms, and cross referencing across multiple sources.

Value-added response: Evaluating information quality requires assessing authorship, evidence base, and absence of commercial bias, ensuring consistency with recognised guidelines.

19. **Basic response:** Keeping up to date with ORL advances involves regular review of peer-reviewed journals and continuing professional development activities.

Value-added response: Professional society websites and guideline updates provide further valuable channels, with a combined approach best supporting current, evidence-based practice.

20. **Basic response:** First aid for epistaxis involves direct pressure with the patient leaning forward, while foreign bodies require professional removal rather than risky home attempts.

Value-added response: First aid for airway-related emergencies prioritises keeping the patient calm, arranging urgent transport, and applying standard choking first aid sequences where indicated.

Answers to Pilot Questions [Series 5]

Part 5.1

11. Because it results directly from controllable exposure to intensity and duration of workplace noise.
12. Manufacturing and heavy industry, and construction.
13. Because eliminating or reducing noise at its source is a more reliable, sustainable protective strategy than relying on individual compliance.
14. Earplugs or earmuffs providing adequate noise attenuation for the specific exposure level.
15. Through baseline audiometric assessment followed by periodic repeat testing to detect threshold shift.

Part 5.2

1. By relying on reputable sources such as peer-reviewed journals, professional guidelines, and established reference resources.
2. Authorship, publication or update date, evidence referencing, and absence of commercial bias.
3. Because it helps confirm a specific clinical claim is genuinely reliable and consistent with current practice.
4. Regular review of peer-reviewed journals, continuing professional development, and professional society updates.
5. Because no single channel alone provides comprehensive, reliably current coverage of evolving best practice.

Part 5.3

6. Firm, sustained direct pressure over the soft nose for at least ten minutes, with the patient upright and leaning forward.

7. Because it risks blood aspiration or swallowing.
8. Avoiding risky home removal attempts, particularly with sharp instruments or hazardous objects, and seeking prompt professional assessment.
9. Keeping the patient calm and in a comfortable position, and arranging immediate emergency transport, avoiding distressing examination.
10. Back blows and abdominal thrusts, with CPR initiated if the patient becomes unresponsive.

References and Attributions [Series 5]

11. World Health Organization (2021). World Report on Hearing.
12. National Institute for Occupational Safety and Health (2018). Occupational Noise Exposure: Criteria for a Recommended Standard.
13. Gleeson, M. (Ed.). (2008). Scott-Brown's Otorhinolaryngology, Head and Neck Surgery (7th ed.). Hodder Arnold.
14. British Red Cross (2023). First aid manual: guidance for common emergencies (relevant sections).

Figures, Plates, Tables, and Boxes

1. Figure 5.1: An industrial worker wearing earmuff hearing protection while operating machinery in a factory setting. AI-generated using the prompt: "A single clean, realistic illustration of a worker wearing earmuff-style hearing protection while operating machinery in an industrial factory setting, calm occupational safety context, natural lighting, no text overlays, no other panels, no identifying facial features, respectful and accurate depiction."
2. Table 5.2: Assessing the reliability of an online ORL information source. AI-generated using the prompt: "Create a clean reference table titled Assessing the Reliability of an Online ORL Information Source, listing quality indicator, reliable source, and unreliable source. Reference table style with outside border, no photographic elements."
3. Figure 5.3: A first responder applying firm direct pressure to the nose of a seated patient leaning forward during an epistaxis first aid demonstration. AI-generated using the prompt: "A single clean, realistic clinical illustration of a first responder gently but firmly pinching the soft lower nose of a seated patient who is leaning forward, calm first aid setting, natural lighting, no text overlays, no other panels, no identifying facial features, respectful depiction, no graphic detail."