Emergency Medicine Course

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Emergent life saving is life changing; your participation in the six workshops held in collaboration with the Saudi Society of Emergency Medicine "SASEM" will hopefully enhance your chances to save a life.

The course aims to provide you with the essential information needed to practise in a modern-day emergency department with an emphasis on improving your practical skills, decision making and dealing with emergencies by covering a variety of topics in the form of workshops.

While this mini booklet has been created and written by us to facilitate your search for information on the workshops you've attended. We have summarised the six workshop in hope to create a fast and simple source to improve your knowledge, enhance your skills and dedication to to become a small part in the cause of a better outcome of critically sick and injured patients.

However, it doesn't replace standard and more in-depth books and other resources; this is only a complimentary guide for you rather than a solo source for your career.

Thank you,
May this be helpful.

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Triage and Vital Signs

High need of having triage systems exits in every emergency department, more on some occasions than others. It's a process of determining the severity of an illness to prioritise patients by distinguishing those who are in need of immediate care to provide them with appropriate diagnostic and therapeutic measures.
A patient is assigned to a triage acuity level after focused assessment to measure the length of a safe wait a patient could make before being examined and treated.

The Canadian Triage and Acuity Scale (CTAS) stratifies patients into five groups from 1 (Resuscitation) to 5 (Non urgent) according to the patient's need of timely care, acuity level and resource needed to improve the flow of patients in the Emergency department.

- Level 1- **Resuscitation:**

These conditions require immediate aggressive interventions for they hold a threat against patients' life or one of their limbs.

e.g. cardiac or respiratory arrest, shock states, major trauma, unconscious patients, severe respiratory distress.

- Level 2- **Emergent:**

While these conditions require rapid medical intervention or delegated acts for they hold a threat against the life of a limb or it's function.

e.g. altered medical state, severe trauma, head injury, neonates, overdose, myocardial infarction and cerebellar vascular accident.

- Level 3- **Urgent:**

Such conditions may require emergency intervention if they progressed to a serious problem. Patients may complain of significant discomfort or an interference with work or daily activities.

e.g. moderate trauma, gastrointestinal bleeding, vaginal bleeding and pregnancy, asthma, acute psychosis or suicidal thoughts and acute pain.

- Level 4- **Less Urgent (Semi Urgent):**

Meanwhile, these conditions are related to the age of the patient, their distress or potential for deteriorations/complications and an intervention within 1-2 hours would be enough help.

e.g. chronic back pain, headache and corneal foreign body.

- Level 5- **Non Urgent:**

Here, conditions are either acute or are part of a chronic problem with or without signs of deteriorations. An intervention for some of these could be delayed or even referred to another area than the emergency room.

e.g. mild abdominal pain, urinary tract infection, sore throat, either vomiting or diarrhea alone without other associated symptoms.

Vital signs assessment measures the body's most basic functions as explained below:

1. **Respiratory Assessment:**
   - **Respiratory Rate (1 2-20 breaths/minute):**
     - Count for 30 seconds
     - If lower than normal, count for one minute to ensure accuracy.
     - Count while palpating the patient's radial pulse to avoid awareness.

   - Pulse Oximetry (97-100%)

2. **Circulation Assessment:**
   - Pulse (60–100 bpm):
     - Palpate the patient's radial nerve
     - Count for 30 seconds at rest
     - Assess for rate, rhythm and regularity

   - Blood Pressure (120/80 mm Hg) manually:
     - Patient should be at rest
     - Restrictive clothing on their arm should be removed
     - Choose an appropriate cuff size (width of the cuff should be 40% of the patient's arm circumference)
     - Keep their arm supported at level of the heart
     - Place the stethoscope over the brachial pulse
     - Inflate the cuff until the radial pulse can no longer be felt
     - Then gradually deflate it
     - Auscultate the Korotkoff sounds
     - Systolic BP is the highest point and initial heard tapping (Korotkoff phase 1) in two uninterested beats during expiration
     - Diastolic BP is equated with the loss of Korotkoff sounds (Korotkoff phase 5)

3. **Temperature:** (36.5° - 37.2° C)

In mass casualty situations, a system involving a color-coded scheme using red, yellow, green, white, and black tags may be used:

- Red tags (immediate):
  Patients can't survive without immediate treatment but have a chance of survival
- Yellow tags (observation):
  Patients require observation to maybe re-triage later as patients are stable for the moment and aren't in immediate danger of death.
- Green tags (can wait):
  Patients will be treated after treating more critical injuries.
- White tags (dismiss):
  Patients with minor injuries; doctor's care is not required.
- Black tags (expectant):
  Deceased and patients with injuries that are so extensive they will not survive them even if care was given.

ABCDE Assessment

Is a systematic approach in some clinical emergencies for assessment and management of acutely ill patients to maintain their life while a diagnosis is made. ABCDE Assessment is only for trauma patients while non-trauma patients only require ABC.
After hand washing, wearing gloves and asking for help, start immediately with ABCDE. The letters represent: A: Airway, B: Breathing, C: Circulation, D: Disability, E: Exposure.

A: Airway assessment

For identification and resolution of the obstructed airway.
If the patient is able to speak with a normal voice, there is no threat to the airway. Otherwise, if they cannot speak or were unconscious patients require rapid assessment.

Look at:	Listen for:	Feel for:
1. Any abnormal movement of the chest and abdomen 2. Obvious signs from trauma 3. Tracheal tug 4. Cyanosis	1. Breath sounds 2. Inspiratory stridor 3. Wheezing 4. Gargling	Expired air on your cheek

B: Breathing Assessment

Look at:	Listen for:	Feel of:	Monitor:
1. Symmetry of chest movement 2. Respiratory rate 3. Usage of accessory muscles 4. Cyanosis 5. Tracheal tug	1. Asymmetry of breath sounds 2. Added sounds such as wheezes or crackles.	1. Palpate the neck and chest wall for any tenderness 2. Tracheal deviation 3. Chest expansion 4. Percussion	1. Oxygen saturation 2. Respiratory rate 3. Peak flowABG

C: Circulation Assessment

Look at:	Listen for:	Feel of:	Monitor
1. Pallor 2. Cyanosis 3. Jugular venous pressure(JVP) 4. Cold peripheries 5. SOB	1. Heart sounds 2. Carotid bruits	1. Precordial cardiac pulsation 2. Pulses – rate, quality, regularity, and symmetry	1. Blood pressure 2. Heart rate 3. Temperature

D: Disability Assessment

1. Check if the patient can move his limbs.
2. Check if the five senses are intact (vision, hearing, smell, taste, and touch)
3. Check for Level of consciousness, using Glasgow Coma Scale.

E: Exposure

Examine patients from top to toe, undress them and look for any signs of wounds, hemorrhage, fractures and bruising. Also check for pupillary response, papilledema and blood glucose levels.

After the 'ABCDE' of the primary survey:

- Head-to-toe examination
- Complete history
- Gather collateral history – (AMPLE)
  - A = Allergies
  - M = Medication currently used
  - P = Past illnesses/Pregnancy
  - L = Last meal
  - E = Events/Environment related to injury
- Reassessment of progress by vital signs
- Review the results of investigations (biochemistry, microbiology, hematology, radiology, ECG and ABG)

Sedation and Anesthesia

Therapeutic goals of sedation in the Emergency Department has to constantly be considered before, during and after the process to guarantee the necessity and adequacy of anesthesia. The potential for pain and discomfort of a given procedure must be weighed with the risks that might be linked with sedative medications. However, needed analgesia or sedation shouldn't be withheld especially in painful or stressful procedures. Doses are always up to adjustment as the situation demands.

Many indications exist for sedation; invasive procedures are extremely stressful and should at least prompt consideration of sedation. Even some minor procedures routinely performed without sedation, such as lumbar puncture, may be facilitated and performed more comfortably with administration of sedatives. Rapid-sequence endotracheal intubation in patients that weren't in arrest is another indication for sedation, frequently used in conjunction with paralytics.

In emergency use, the ideal route of administration is intravenous. Oral and intramuscular absorption may be unreliable and can sometimes be delayed. With intravenous administration, the effect can be assessed fully, since peak effect can be predicted with reasonable accuracy. Allowing repeated dosing with much less chance of unexpected deterioration due to drug accumulation.

1. **Conscious Sedation:**

It's effective and safe for whenever a minor surgery is about to take place or a procedure to diagnose a condition. Conscious sedation is achieved by a combination of a sedative and an anesthetic where patients lay awake but are unable to speak.

2. **Rapid Sequence Intubation:**

Emergency airway management is managed by endotracheal intubation using rapid sequence intubation. Having at least one of the signs of impending respiratory failure will indicate an intubation requirement such as: failure to maintain airway tone, failure to protect the airway against aspiration, failure to ventilate, failure to oxygenate adequately pulmonary capillary blood and anticipated clinical course or deterioration.

Rapid sequence intubation results in rapid unconsciousness and neuromuscular blockade by intubating the trachea without using a bag-valve-mask (BVM) ventilation. It id done by administering 2 drugs: an induction agent and a paralytic agent.

3. **Intubation and Sedation**

4. **Local anesthesia (LA):**

Sensation blockage of pain in a specific area of the body can be achieved by an injection of a local anesthesia applied directly to the skin or mucous membranes as a liquid or gel.

- How to locally anesthetise a patient:

1. Let the patient lie in a comfortable position
2. Warm the LA to body temperature prior to use
3. Wash hands and use gloves

4. Use a fine needle if possible
5. Aspirate and check for blood
6. Inject LA slowly to decrease the pain and do NOT use force at all
7. Maintain a conversation with the patient to calm anxieties and detect toxicity

5. General Anaesthesia:

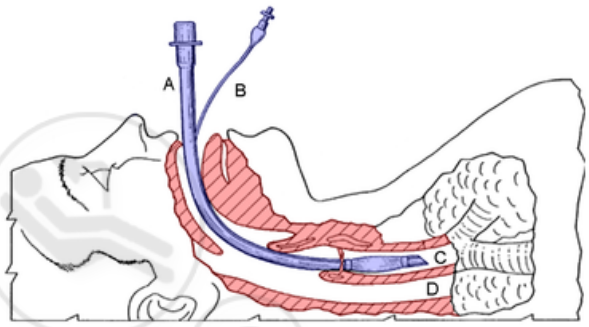
It's only done in the operation room, not in the emergency room.

Endotracheal Intubation

The fundamental aspect of anesthetic practice of emergency and critical care medicine is airway management. Endotracheal intubation (ETI) is the technique that achieves all the goals of airway management, was first described by William MacEwan in 1878 when he passed a tube from the mouth into the trachea, using his fingers as a guide in the conscious patient. ETI is a rapid, simple, safe and non-surgical technique.

Indications of endotracheal intubation:

- Secure or protect airway (in low GCS, bad facial trauma, inhalation injury, etc)
- Oxygenation failure (hypoxia correction).
- Ventilation failure (hypercapnia correction).



Procedure:

Before the procedure the doctor should explain the procedure to the patient and dentures or loose teeth are removed before intubation.

- Position the patient supine with head and neck placed appropriately.
- Administer oxygen at a high flow rate.
- Use either a general or local anesthesia to start the procedure.
- Choose a suitable size of ETT to insert through the mouth or nose with use of laryngoscope or bronchoscope.
- After confirmation of the tube placement, secure the endotracheal tube with tapes or ties.
- Then connect the ETT to a breathing machine to provide invasive assisted ventilation.
- Take a Chest X-ray to confirm the position of the endotracheal tube.

After the procedure, sedation and painkillers are given to the patient to relieve any feelings of discomfort; they may lose some of their consciousness or even become unconscious. A bite block may be placed in their mouth to prevent occlusion of the airway.

Complications of ETI:

(At the time of intubation)

- Failed intubation.
- Injury of the spinal cord and vertebral column.
- Corneal abrasion.
- Occlusion of the retina's central artery and blindness.
- Noxious autonomic reflexes.
- Raised intracranial and intraocular tension.
- Trauma to lips, teeth, tongue and nose.
- Hypertension, bradycardia, tachycardia and arrhythmia.
- Cord avulsions, fractures and dislocation of arytenoids.
- Laryngeal trauma.
- Nasal, retropharyngeal, pharyngeal, uvular, laryngeal, tracheal, oesophageal and bronchial trauma.
- Airway perforation.
- Oesophageal intubation.
- Bronchial intubation.

(While the ETT is in place)

- Pulmonary aspiration.
- Airway obstruction.
- Tension pneumothorax.
- Disconnection and dislodgement.
- Unsatisfactory seal.
- Tracheal tube fire.
- Swallowed ETT.
- Leaky circuits.

(During extubation)

- Difficult extubation.
- ETT sutured to trachea or bronchus.
- Cuff related problems.
- Aspiration of oral or gastric contents
- Laryngeal oedema.

(After intubation)

- Sore throat.
- Hoarseness.
- Laryngeal oedema.
- Superficial laryngeal ulcers.
- Nerve injury.
- Laryngeal granuloma.
- Laryngeal synechiae.
- Glottic and subglottic granulation tissue.
- Vocal cord paralysis and aspiration.
- Laryngotracheal membrane.
- Tracheal stenosis.
- Tracheo-innominate fistula.
- Tracheomalacia Tracheo-oesophageal fistula.

Electrocardiogram (ECG)

Is a noninvasive, painless test with quick results. It's used to monitor the heart; each beat of the heart is triggered by an electrical impulse normally generated from special cells in the upper right chamber of the heart. ECG records these electrical signals as they travel through the heart.

Indications:

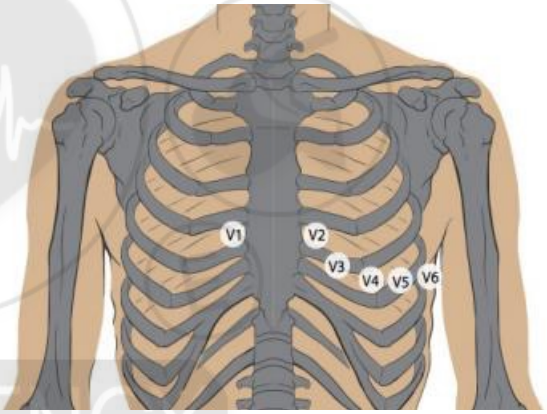
- Chest pain
- Palpitation
- SOB
- Dizziness
- Syncope

Contraindications:

No absolute contraindications to performing an electrocardiogram, other than patient refusal.

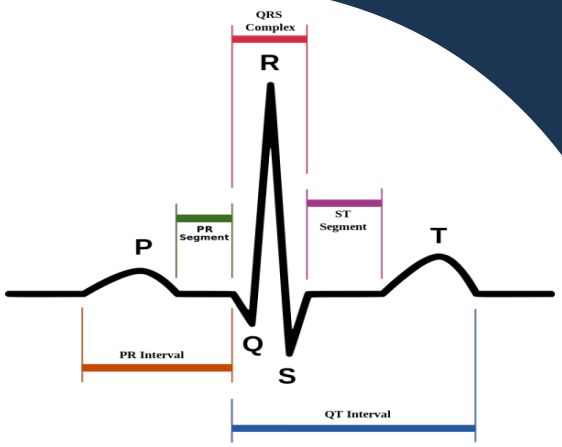
Technique:

Prepare the patient and apply the leads in the following manner; the standard limb leads are recommended to be positioned one on each limb distal to the shoulders and hips. While the precordial leads should be applied next, taking care to be as precise as possible in their positioning.



- **Lead V1**: Fourth intercostal space at the right sternal border.
- **Lead V2**: Left sternal border directly across from V1, also in the fourth intercostal space.
- **Lead V4**: Fifth intercostal space at the mid clavicular line.
- **Lead V3:** Can be placed midway between V2 and V4.
- **Lead V6**: Horizontal plane of V4 at the mid-axillary line.
- **Lead V5**: Same horizontal plane as V4 in the anterior axillary line or midway between V4 and V6 when the anterior axillary line is not readily discernible.

Elements of Trace:



- P wave = Atrial Depolarisation
- QRS = Ventricular Depolarisation
- T = Repolarisation of the Ventricles

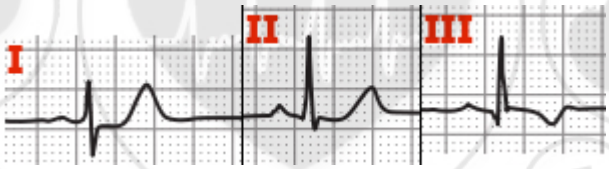
How to read an ECG?

1. **Heart rate.**

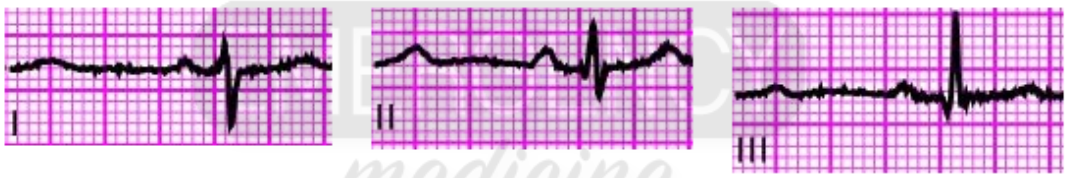
- Work out the number of large squares in one R-R interval
- Then divide 300 by this number and you have your answer

2. **Heart rhythm.**
   - Regular.
   - Irregular, could be:
     - Regular-irregular.
     - Irregular-irregular.

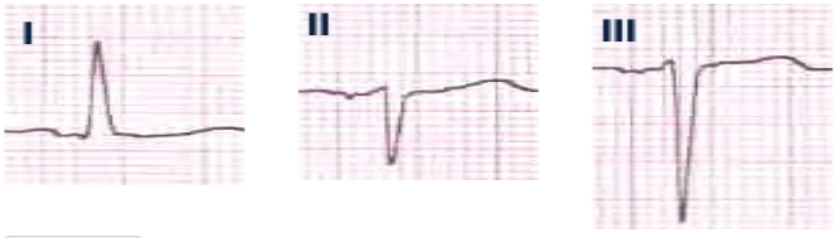
3. **Cardiac axis:** defined as overall direction of electrical spread within the heart.
   - Normal cardiac axis: Lead II has the most positive deflection compared to I and III.



   - Right axis deviation: Lead III has the most positive deflection and lead I should be negative.

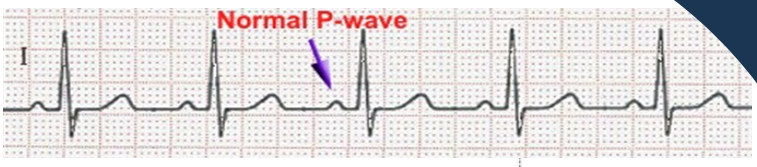


   - Left axis deviation: Lead I has the most positive deflection and Leads II and III are negative.



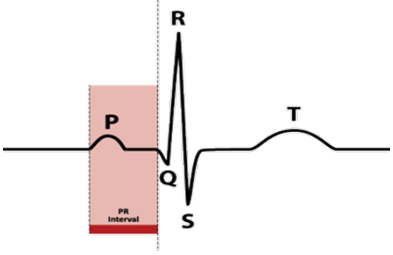
4. **P wave:**

Size (1mm tall and 0.04 width)



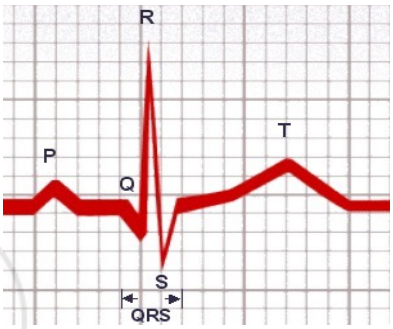
5. **PR interval:**

Duration = 3 – 5 small square = 120 – 200 ms



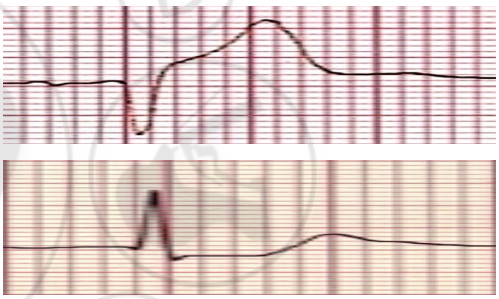
6. **QRS complex:**

- Width: narrow (< 0.12ms) or broad (> 0.12ms).
- Height:
  - Small complexes are defined as < 5mm in the limb leads or < 10 mm in the chest leads.
  - Tall complexes imply ventricular hypertrophy.

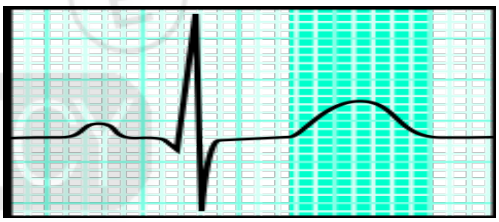


7. **ST segment:**

- ST elevation: More than 3 small square (3 mm).
- ST depression: More than 3 small square (3 mm).



8. **T wave:** Ventricles Repolarisation.



Pain Score

To diagnose patients complaining of pain and set an appropriate treatment for them, an accurate and systematic pain assessment is needed.

🔺 Technique:

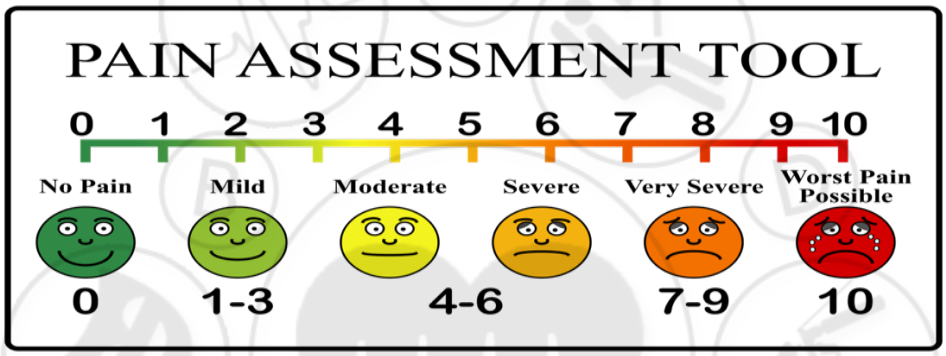
A multidimensional approach is used to assess pain, with determination of the following:

- Chronicity
- Severity
- Quality
- Contributing/associated factors
- Location/distribution or etiology of pain (if it can be identified)
- Mechanism of injury (if relevant)
- Pain assessment barriers

🔺 Pain scales:

Pain measures fall into **TWO** categories:

1. Single-dimensional scales – measures the intensity of pain only through self-reporting of the patient which is useful in acute pain with a clear etiology.



PAIN SCALE:

0 – Pain free.

Mild Pain: *Nagging, annoying, but may not interfere with daily life activities.*

1 – Pain is extremely mild, barely noticeable. Most of the time it's not even thought of.

2 – Minor pain; annoying and may have occasional stronger aches.

3 – Pain is noticeable and distracting, however, can easily get used to it and adapt.

Moderate Pain: *Interferes significantly with daily life activities.*

4 – Moderate pain; can be ignored for a period of time if there was deep activity involvement, but is still distracting.

5 – Moderately strong pain; can't be ignored for more than a few minutes, but with effort work can still be managed or participation in some social activities.

6 – Moderately strong pain that interferes with normal daily activities resulting in difficult concentration.

Severe Pain: *Disabling; unable to perform daily life activities.*

7 – Severe pain that significantly limits the ability to perform normal daily activities or maintain social relationships. Interferes even with sleep.

8 – Intense pain. Physical activity is severely limited and speaking requires great effort.

9 – Excruciating pain, inability to speak, crying out and/or moaning uncontrollably.

10 – Unspeakable pain. Bedridden and possibly delirious. Very few people experience t highest level of pain.

2. Multidimensional scales - measure the intensity, nature, and location of pain as well as the impact of pain on a patient's activity or mood; which is useful in chronic or complex/ persistent acute pain

Pain Assessment in Infants:

behavioral and physiologic measurements is done to assess infants' pain:

- CRIES - has 5 variables (Crying, Requires Oxygen, Increased vital signs, Expression, Sleeplessness) and a scale of 0-2 points assess neonatal postoperative pain.
- Modified Behavioral Pain Scale - has 3 factors (facial expression, crying, movements) and has been validated for children aged 2-6 months.

Pain Assessment in Young Children:

- Limited cognitive or language skills and positive or negative consequences of a child's behaviors may affect pain measures.
- Self-report measures may be used in children older than 3-4 years. However, children may conceal their pain in fear of future injections or other procedures aimed to relieve their pain.

Pain Assessment in Elderlies:

Pain assessment can be difficult in elderly patients for a couple of reasons:

- Lack of discomfort reporting; the patient may not want to complain.
- Pain may be used to mask other newly developing physical or cognitive disabilities.
- Limitation in hearing and visual acuity, making pain assessment tools that require extensive explanation or visualization to perform more difficult and possibly less reliable.

The use of verbal descriptor scale may be the easier for the elderly since it allows them to use common words to describe what they are feeling.

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