



# LET'S TALK ABOUT NEUROLOGICAL ASSESSMENT

## FUNDAMENTALLY CRITICAL SESSIONS

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# LET'S TALK ABOUT NEUROLOGICAL ASSESSMENT

FUNDAMENTALLY CRITICAL SESSIONS



We don't look  
after Neuro  
patient's here!

Sounds Familiar?

# LET'S TALK ABOUT NEUROLOGICAL ASSESSMENT

## FUNDAMENTALLY CRITICAL SESSIONS



- ▶ Exceedingly common in ICU patients
  - ▶ (Altered consciousness, delirium, seizures, and muscle weakness)
- ▶ >80 % ventilated patients may experience delirium
- ▶ Neurological complications increase both the length of stay in hospital and likelihood of death
- ▶ The mortality rate in neurological complications > 55 %
  - ▶ (compared to 29% for those without)
- ▶ Critical illnesses have been associated with substantial long-term declines in neuropsychological function



# Common causes of altered conscious states in the Critically ill Patient

## ▶ **Metabolic**

- ▶ Hypoxia, hypoglycaemia

## ▶ **Organ dysfunction**

- ▶ Respiratory, Renal, Liver failure; Sepsis

## ▶ **Electrolyte and acid disturbance**

- ▶ Hypo/hyponatraemia

## ▶ **Endocrine**

- ▶ Hypothyroidism, hypopituitarism

## ▶ **Seizure activity**

- ▶ Post-ictal phase, Status Epilepticus

## ▶ **Drugs and toxins**

- ▶ Alcohol, sedatives, analgesics, poisons, overdoses

## ▶ **Body temperature:**

- ▶ Hypo/hyperthermia

## ▶ **Intracranial pathology**

- ▶ Traumatic brain injury
- ▶ Stroke
- ▶ Tumour
- ▶ Infection
- ▶ Inflammation
- ▶ Oedema



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When?

Frequency be determined by the nature and severity of the underlying cause of neurological dysfunction.

At a minimum, on admission to the ICU and once a shift

Be systematic and always assess in the context of the patient admission and past medical history

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### Conscious Patient

- ▶ Cognition (talk to patient and evaluate):
  - ▶ Evaluate Orientation (Time, space, self), attention, coherence, comprehension, memory
- ▶ GCS
- ▶ RASS
- ▶ Screen for Delirium (CAM-ICU)
- ▶ Pupil Reaction
- ▶ Motor Responses
- ▶ Sensory function
- ▶ Symmetry
  
- ▶ Identify symptoms such as headache, nausea, visual impairment

### Altered patient

- ▶ GCS
- ▶ RASS
- ▶ Pattern of breathing
- ▶ Cough reflex
- ▶ Size and reactivity of pupils
- ▶ Corneal reflex
- ▶ Level of Arousal (RASS)
- ▶ Motor responses (Tone, reflexes and posturing)
- ▶ Symmetry
  
- ▶ Take in the clues from blood results (hypernatraemia, Blood glucose, ammonia, alcohol levels)

# Where to start...



## CHECK

For factors Interfering with communication, ability to respond and other injuries



## OBSERVE

Eye opening , content of speech and movements of right and left sides



## STIMULATE

Sound: spoken or shouted request  
Physical: Pressure on finger tip, trapezius or supraorbital notch



## RATE

Assign according to highest response observed

(Institute of Neurological Sciences, NHS, Greater Glasgow and Clyde, 2016)



# Glasgow Coma Scale

Recorded as a total and as its separate components:

e.g. GCS 9/15: E3, V2, M4

## Glasgow Coma Scale

	Child	Score
Eye Opening	Spontaneous	4
	To Speech	3
	To Pain	2
	No Response	1
Best Verbal Response	Oriented, Appropriate	5
	Confused	4
	Inappropriate Words	3
	Incomprehensible Sounds	2
	No Response	1
Best Motor Response	Obeys Commands	6
	Localizes to Pain	5
	Withdraws from Pain	4
	Abnormal Flexion to Pain	3
	Abnormal Extension to Pain	2
	No Response	1

**Minor Brain Injury** = 13-15 points; **Moderate Brain Injury** = 9-12 points; **Severe Brain Injury** = 3-8 points

\*If patient is intubated, unconscious, or preverbal, the most important part of this scale is motor response.

Motor response should be carefully evaluated.

# Diagram for best motor response



**1. Localising to pain using central stimulus- trapezius pinch**



**3. Flexing to pain using trapezius pinch**



**4. Abnormal flexing to pain using trapezius pinch**



**5. Extending to pain using trapezius pinch**

# RASS

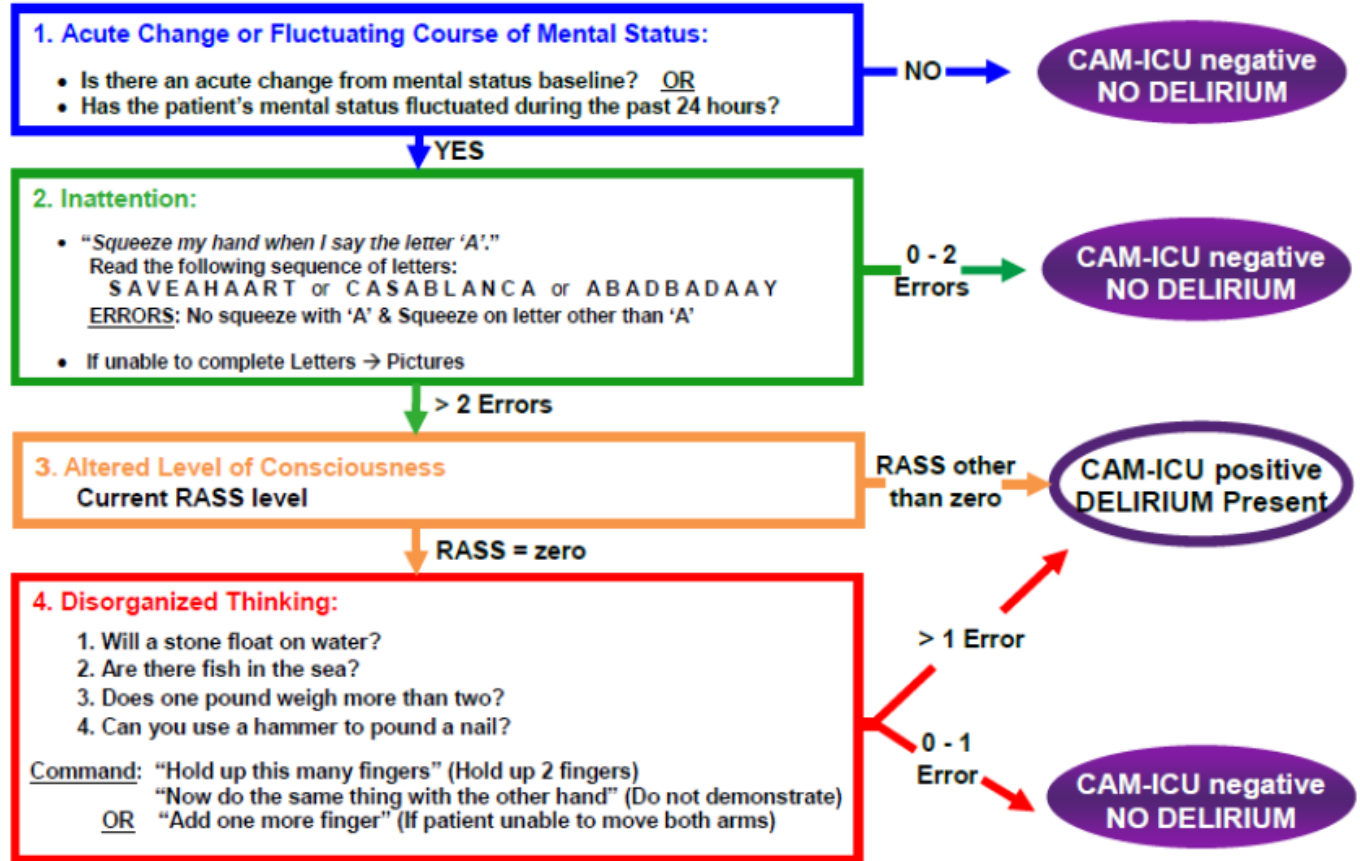
## Richmond Agitation Sedation Scale

Scale	Label	Description	
+4	COMBATIVE	Combative, violent, immediate danger to staff	VOICE
+3	VERY AGITATED	Pulls to remove tubes or catheters; aggressive	
+2	AGITATED	Frequent non-purposeful movement, fights ventilator	
+1	RESTLESS	Anxious, apprehensive, movements not aggressive	
0	ALERT & CALM	Spontaneously pays attention to caregiver	
-1	DROWSY	Not fully alert, but has sustained awakening to voice (eye opening & contact >10 sec)	
-2	LIGHT SEDATION	Briefly awakens to voice (eyes open & contact <10 sec)	
-3	MODERATE SEDATION	Movement or eye opening to voice (no eye contact)	
If RASS is $\geq$ -3 proceed to CAM-ICU (Is patient CAM-ICU positive or negative?)			
-4	DEEP SEDATION	No response to voice, but movement or eye opening to physical stimulation	TOUCH
-5	UNAROUSABLE	No response to voice or physical stimulation	
If RASS is -4 or -5 $\rightarrow$ STOP (patient unconscious), RECHECK later			

# CAM-ICU

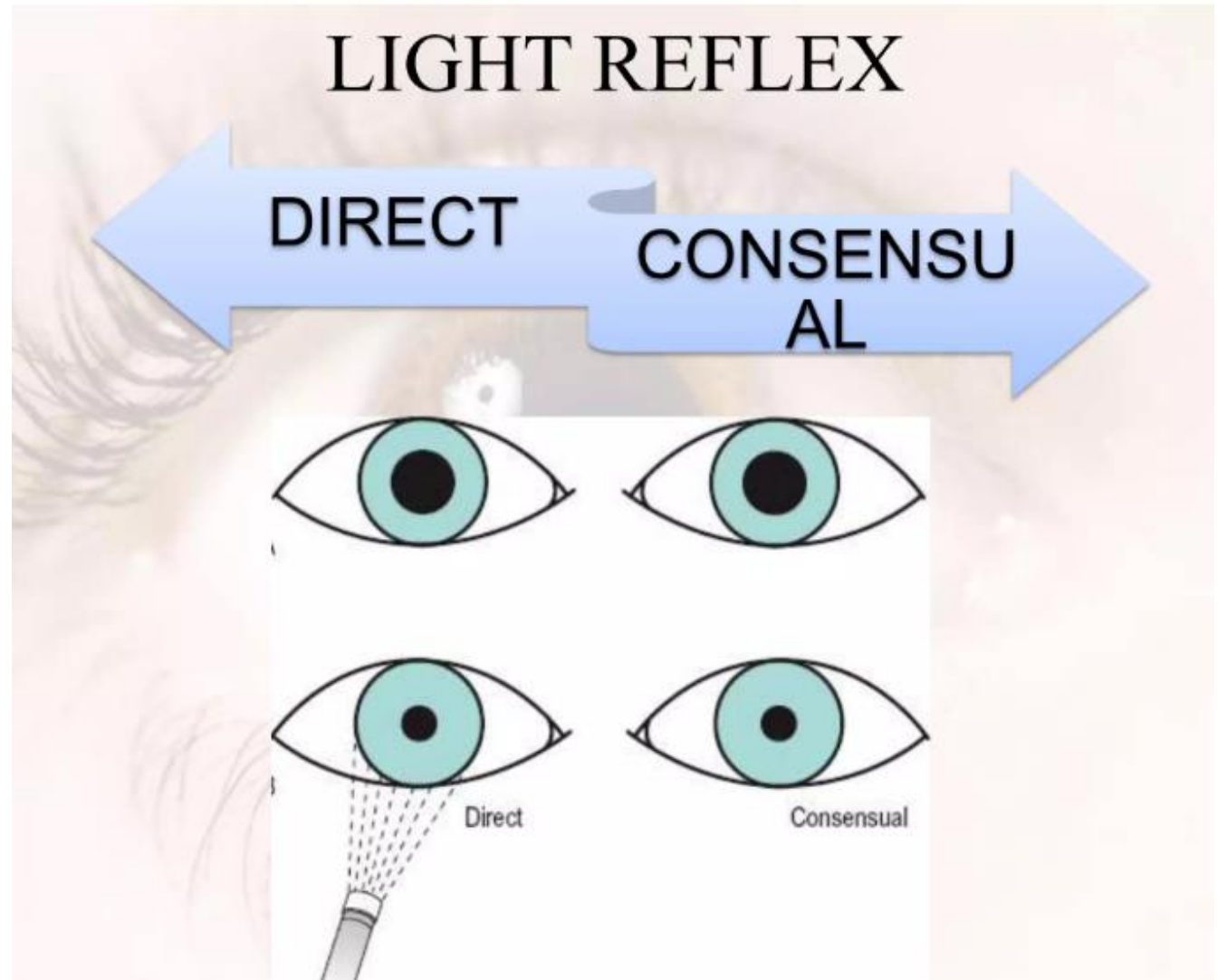
## The CAM-ICU REST FLOWCHART (Ely et al, 2001)

### Confusion Assessment Method for the ICU (CAM-ICU) Flowsheet





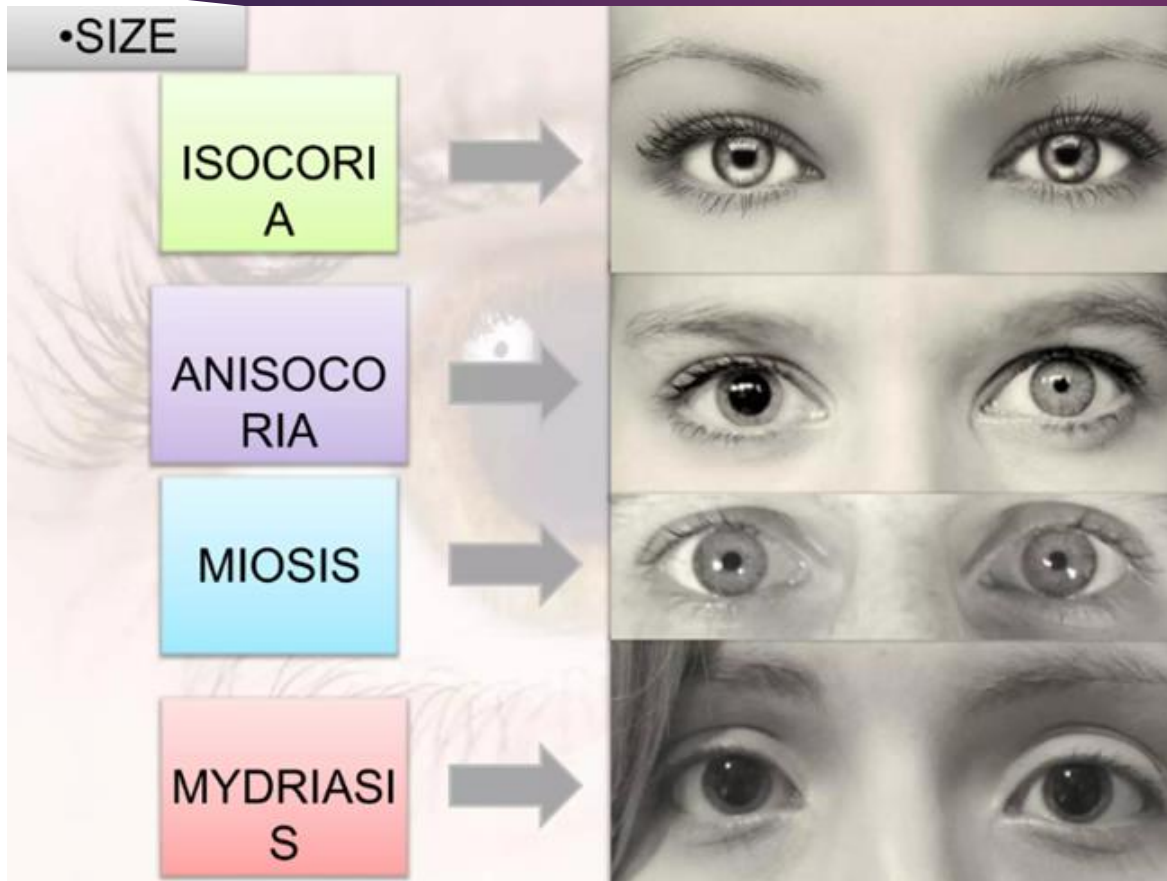
# Pupillary Reaction to Light



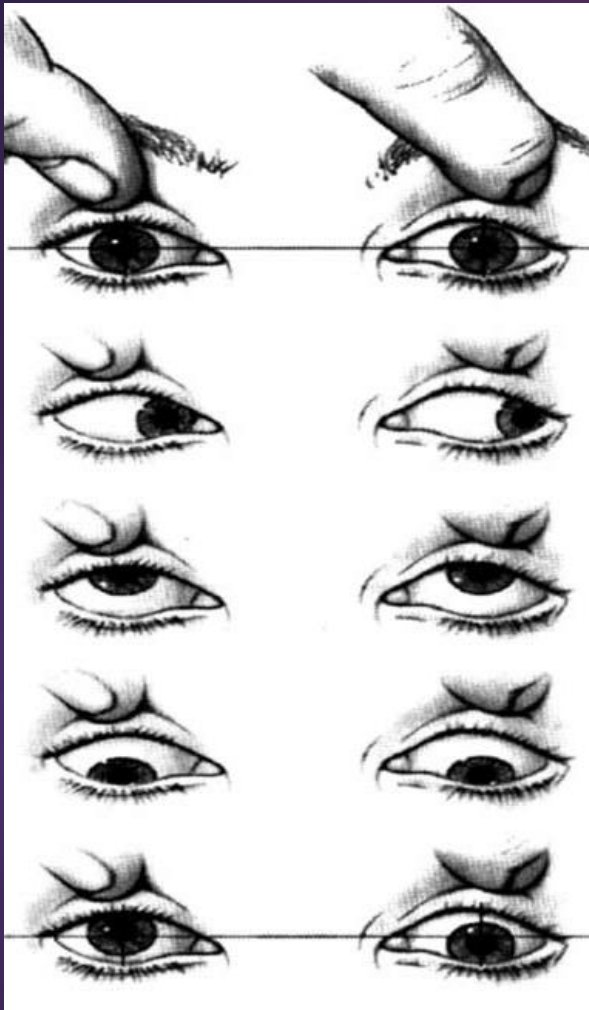


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- ▶ 1) Normal
- ▶ 2) Horizontal conjugate deviation
- ▶ 3) Upward deviation
- ▶ 4) Downward deviation
- ▶ 5) Skew deviation in the resting position

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## MRC Muscle Power Scale

### MRC Muscle Power Scale

Score	Description
0	No contraction
1	Flicker or trace of contraction
2	Active movement, with gravity eliminated
3	Active movement against gravity
4	Active movement against gravity and resistance
5	Normal power

- ▶ Usually done after GCS assessment
- ▶ Used for both upper and lower limbs
- ▶ Comparing symmetry bilaterally

# Final Reminders



Accurate documentation is key to spotting subtle changes and to ensure early detection of changes



Neurological Assessment frequency: at least once a shift, as often as required by patient's condition



Be methodical on your assessment

- ▶ **Bleck TP**, Smith MC, Pierre-Louis SJ, *et al.* Neurologic complications of critical medical illnesses. *Crit Care Med*1993;**21**:98–103.
- ▶ Sharshar, T., Citerio, G., Andrews, P., Chieriegato, A., Latronico, N., Menon, D., Puybasset, L., Sandroni, C. and Stevens, R. (2014). Neurological examination of critically ill patients: a pragmatic approach. Report of an ESICM expert panel. *Intensive Care Medicine*, 40(4), pp.484-495#
- ▶ <https://geekymedics.com/muscle-power-assessment-mrc-scale/#>
- ▶ <https://geekymedics.com/glasgow-coma-scale-gcs/>