

5th Congress of the European Academy of Neurology

Oslo, Norway, June 29 - July 2, 2019

Teaching Course 14

Diagnosing coma and disorders of consciousness - pearls and pitfalls from a new EAN guideline (Level 1 or 2)

Clinical examination in rehabilitation

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Conflict of Interest



In relation to this presentation and manuscript:

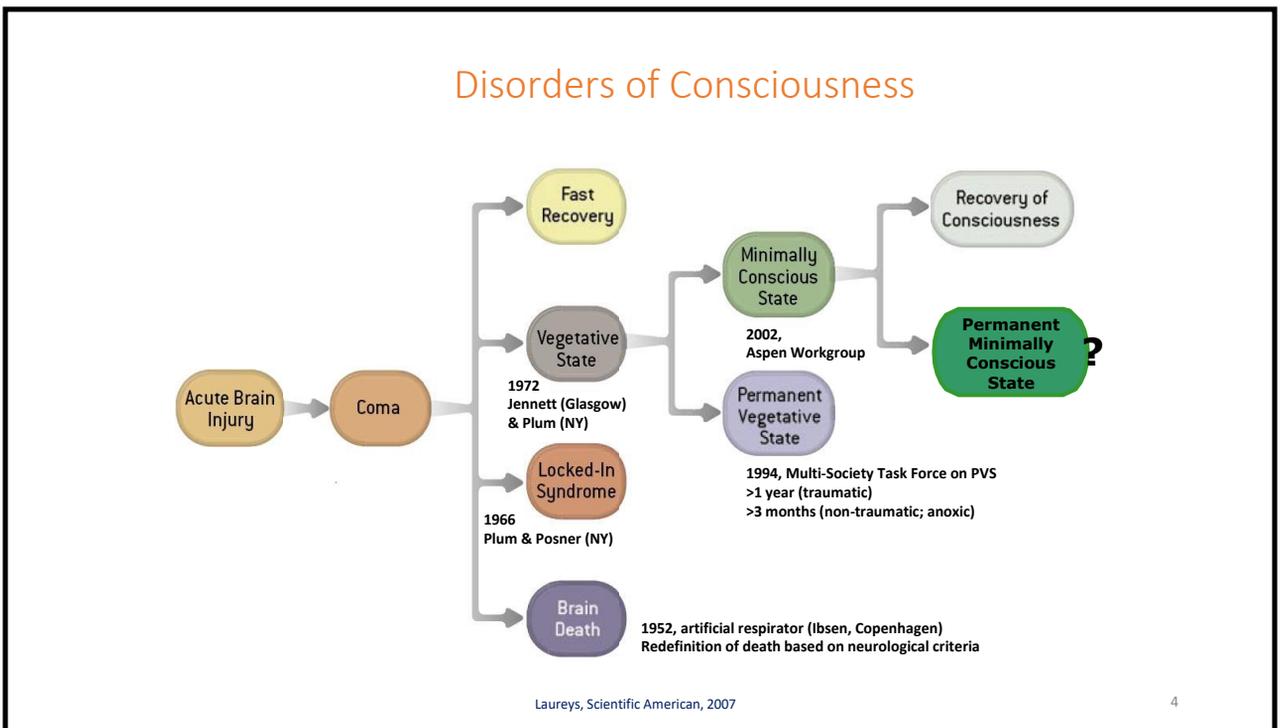
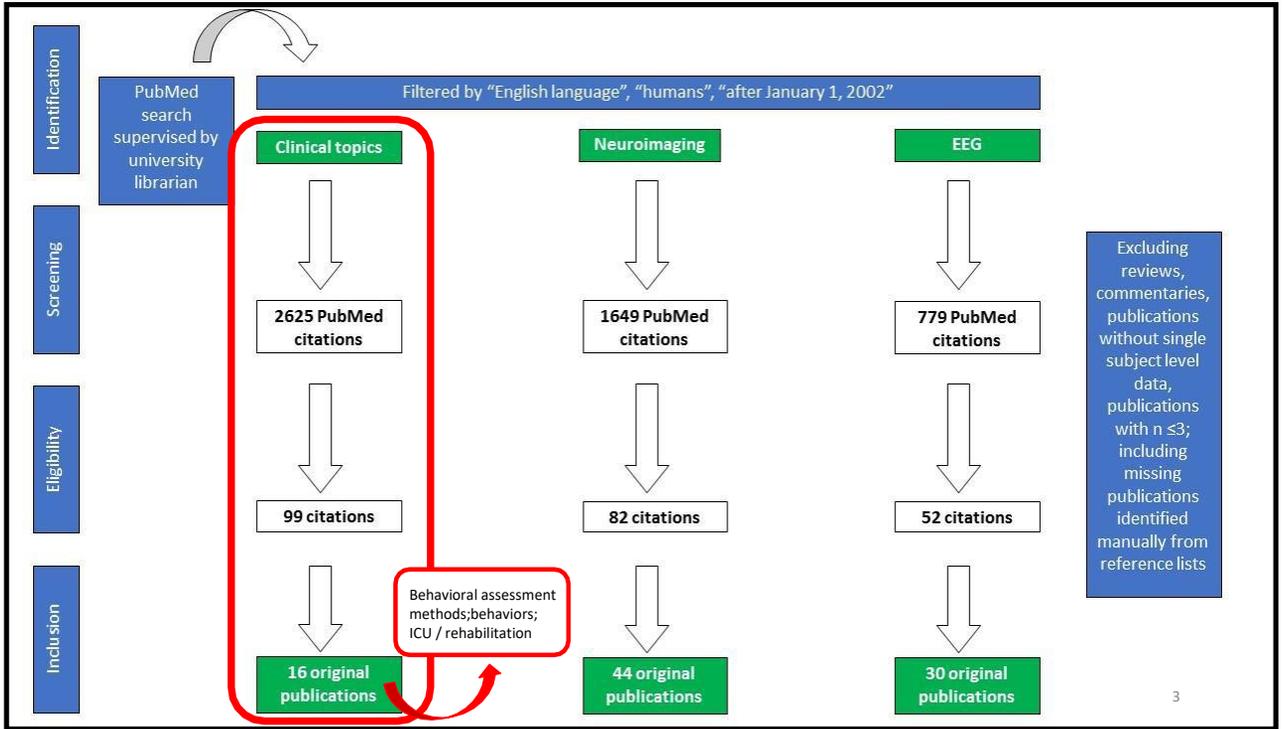
- the Author has no conflict of interest in relation to this manuscript.
- the Author serves as medical consultant to: (insert company names)
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EAN Guideline on the Classification of Coma and other Disorders of Consciousness

-
Clinical topics

Camille Chatelle
Liège



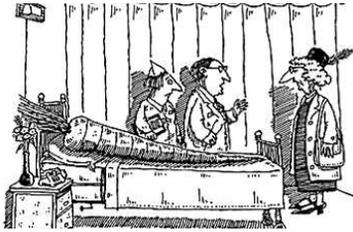
Vegetative/unresponsive wakefulness syndrome

BMC Medicine

Highly accessed Open Access

Unresponsive wakefulness syndrome: a new name for the vegetative state or apallic syndrome

Steven Laureys¹, Gastone G. Celesia², Francois Cohadon³, Jan Lavrijsen⁴, José León-Carrión⁵, Walter G. Sannita^{6,7}, Leon Szabon⁸, Erich Schmutzhard⁹, Klaus R. von Wild^{10,11}, Adam Zeman¹² and Giuliano Dolce¹³ for the European Task Force on Disorders of Consciousness



"There's nothing we can do... he'll always be a vegetable."

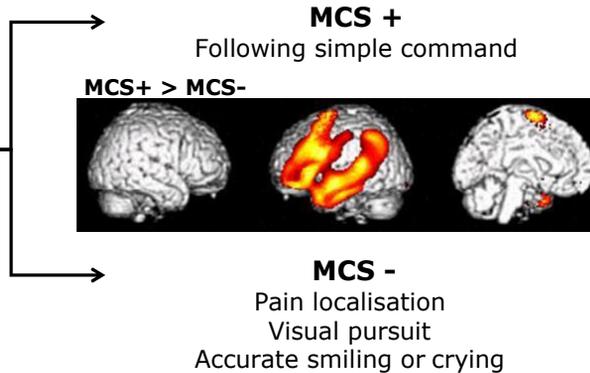


Laureys et al, BMC Medicine 2011

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MCS: new terminology

Minimally Conscious state

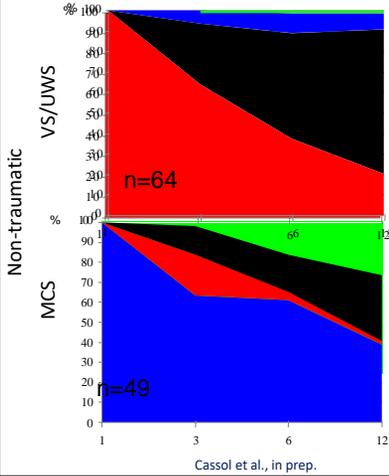


Bruno & Vanhaudenhuyse et al., 2011; Bruno et al., 2011

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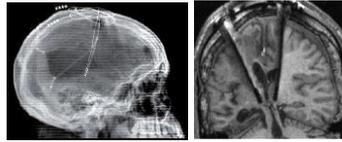
Diagnosing DoC

Prognosis

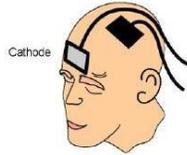


Cassol et al., in prep.

Treatment

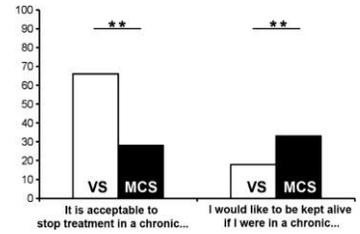


Schiff et al., Nature, 2007



Thibaut et al., Neurology, 2014

Ethics



Demertzi et al., J Neurology 2011

Question "Should the patient's eyelids be opened by the examiner to diagnose voluntary eye movements in patients with DoC without spontaneous eye opening?"

No eligible publication

Answer "To assess for signs of voluntary eye movements, it is crucial to passively open the eyes of patients without spontaneous eye opening or lack of eye opening on stimulation (very low evidence, strong recommendation)."



- Assess horizontal AND vertical eye movement
- Resistance to eye opening:
 - ✓ Associated with level of consciousness
 - ✓ 6/23 UWS, 5 showed atypical brain preservation

Van Ommen et al. J Neurool. 2018

JFK COMA RECOVERY SCALE - REVISED #2004																	
Record Form																	
This form should only be used in association with the "CRS-R ADMINISTRATION AND SCORING GUIDELINES" which provide instructions for standardized administration of the scale.																	
Patient:		Diagnosis:					Etiology:										
Date of Onset:		Date of Admission:															
Date:																	
Week:		ADJ	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
AUDITORY FUNCTION SCALE																	
4 - Consistent Movement to Command *																	
3 - Reproducible Movement to Command *																	
2 - Localization to Sound																	
1 - Auditory Startle																	
0 - None																	
VISUAL FUNCTION SCALE																	
5 - Object Recognition *																	
4 - Object Localization: Reaching *																	
3 - Visual Pursuit *																	
2 - Fixation *																	
1 - Visual Startle																	
0 - None																	
MOTOR FUNCTION SCALE																	
6 - Functional Object Use *																	
5 - Automatic Motor Response *																	
4 - Object Manipulation *																	
3 - Localization to Noxious Stimulation *																	
2 - Flexion Withdrawal																	
1 - Abnormal Posturing																	
0 - None/Flaccid																	
OROMOTOR/VERBAL FUNCTION SCALE																	
3 - Intelligible Verbalization *																	
2 - Vocalization/Oral Movement																	
1 - Oral Reflexive Movement																	
0 - None																	
COMMUNICATION SCALE																	
2 - Functional - Accurate *																	
1 - Non-Functional - Intentional *																	
0 - None																	
AROUSAL SCALE																	
3 - Attention																	
2 - Eye Opening w/o Stimulation																	
1 - Eye Opening with Stimulation																	
0 - Unarousable																	
TOTAL SCORE																	

Denotes emergence from MCS¹
Denotes MCS²

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Giacino et al. 2004

Question "Should the Coma Recovery Scale-Revised (CRS-R) be used to diagnose the level of consciousness in patients with DoC?"

n=126 post-coma

- 51 VS/UWS by medical consensus
- 18 signs of consciousness (CRS-R)

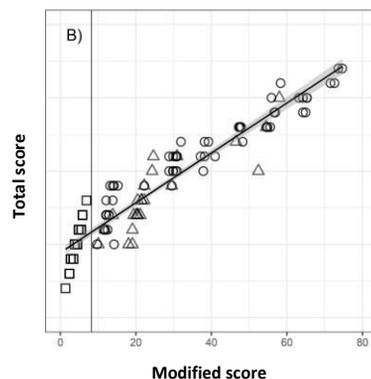
→ 30 - 40% misdiagnosis!

Schnakers et al. BMC Neurol. 2009;
van Erp et al., JAMDA 2015

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CRS-R

- Guidelines of administration & scoring procedures
- Excellent content validity & test-retest reliability
- Standardized administration and scoring
- Most sensitive scale to detect MCS
 - Use subscores – total score less sensitive to detect consciousness (score of 10 or higher = sensitivity of 0.78 [identification of MCS or EMCS] and specificity of 1.00 [identification of VS/UWS or coma] or...
 - Modified score

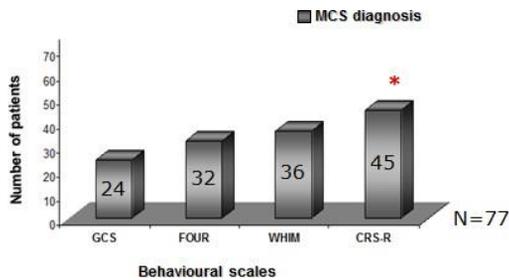


Diagnosis

- UWS (Solely reflexes)
- △ MCS- (Language independent signs of awareness)
- MCS+ (Language dependent signs of awareness, i.e. command following, intelligible verbalisation and intentional communication)

Giacino et al., Neurology, 2002; Bruno et al, J Neurology, 2011; Chatelle et al, APMR, 2016; Bodien et al., APMR 2016; Sattin et al., Int. J. of Rehab. Res. 2015; Annen et al., under review

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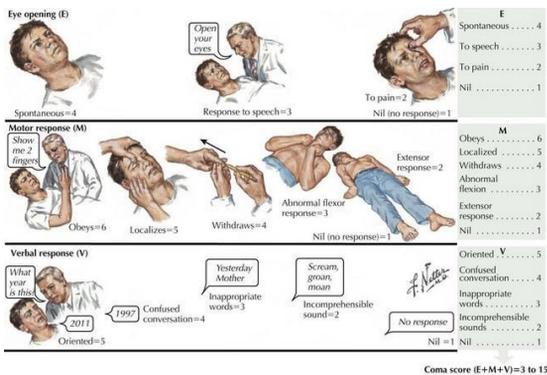
Schnakers et al. Brain Inj. 2008

Question "Should the Coma Recovery Scale-Revised (CRS-R) be used to diagnose the level of consciousness in patients with DoC?"

8 eligible publications
 925 patients
 RR for detecting evidence of consciousness with the CRS-R as compared to other behavioral assessment methods was 1.45 (95% CI 1.32-1.60; p<0.0001)

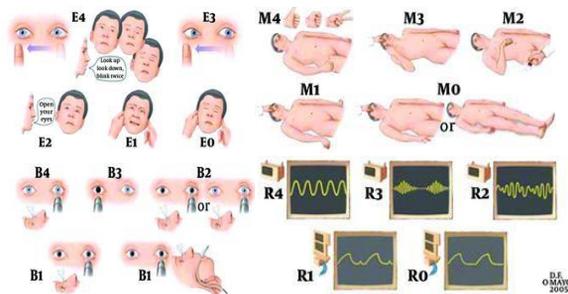
Answer "The CRS-R should be used to classify the level of consciousness (*moderate evidence, strong recommendation*)."

Question "Should the FOUR (Full Outline of UnResponsiveness) score be used to diagnose the level of consciousness in patients with DoC in the intensive care unit?"



Glasgow Coma Scale

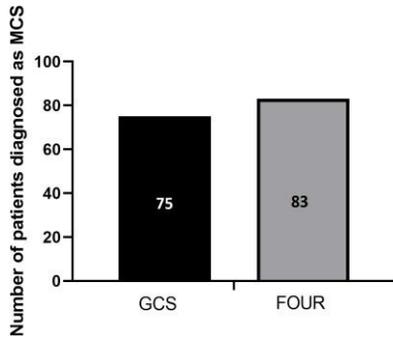
Teasdale & Jennett, The Lancet, 1974



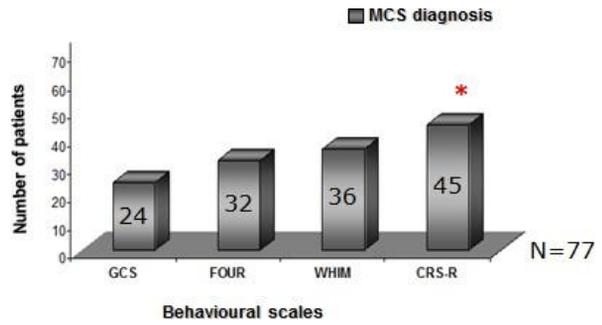
FOUR

Wijdicks et al., Ann Neurol., 2006

Question "Should the FOUR (Full Outline of UnResponsiveness) score be used to diagnose the level of consciousness in patients with DoC in the intensive care unit?"



Bruno et al. Brain Inj. 2011

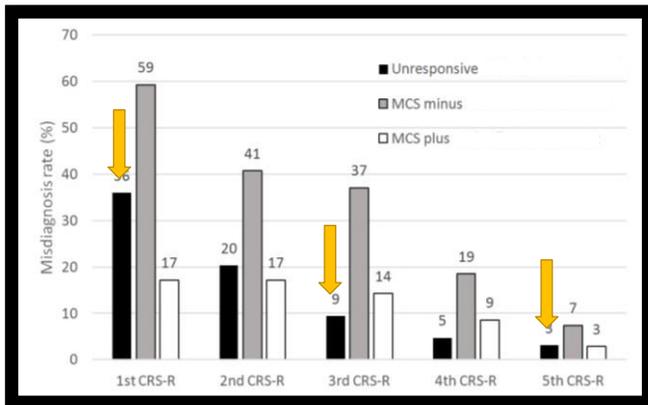


Schnakers et al. Brain Inj. 2008

3 eligible publications
 313 patients
 RR for evidence of consciousness detected by the FOUR as compared to the GCS was 1.46 (95% CI 1.04-2.05; p=0.03)

Answer "The FOUR score should be used to assess the level of consciousness in patients with DoC in the ICU instead of the GCS (moderate evidence, strong recommendation)."

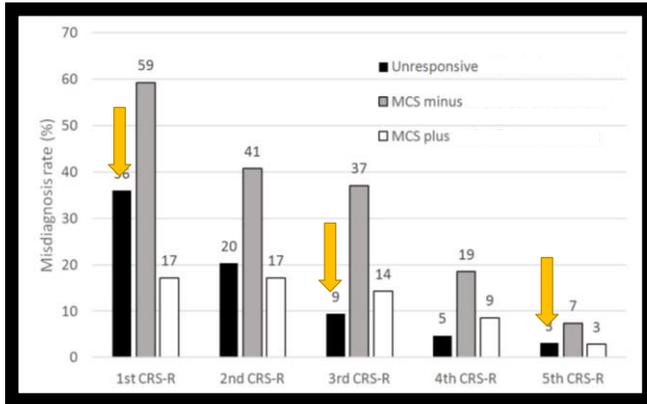
Question "Should behavioral assessment of the level of consciousness be repeated (and if so, how often) to diagnose the level of consciousness in patients with DoC?"



Wanzez et al. JNNP 2017

1 eligible publication
 123 patients
 RR for evidence of consciousness with repeated assessments as compared to single assessments was 1.36 (95% CI 1.10-1.69; p=0.005)

Question "Should behavioral assessment of the level of consciousness be repeated (and if so, how often) to diagnose the level of consciousness in patients with DoC?"



Wannez et al. JNNP 2017

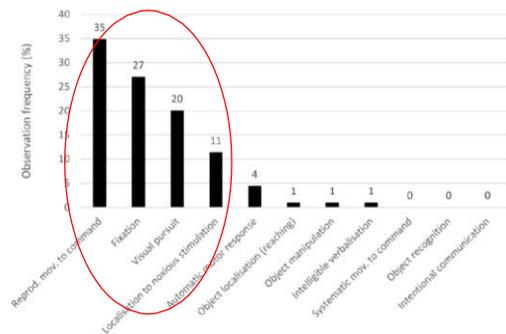
1 eligible publication
123 patients
RR for evidence of consciousness with repeated assessments as compared to single assessments was 1.36 (95% CI 1.10-1.69; p=0.005)

Answer "Always repeat the behavioral assessment. Classification of consciousness levels should never be made based on an isolated assessment (low evidence, strong recommendation)."

Visual pursuit

Visual pursuit :

- Higher prevalence in MCS
- Late improvement
- Further interactive and social behaviors
- Visual response as first sign of consciousness in course of recovery in 42.9% of patients (23.8% visual fixation; 19.1% visual pursuit)



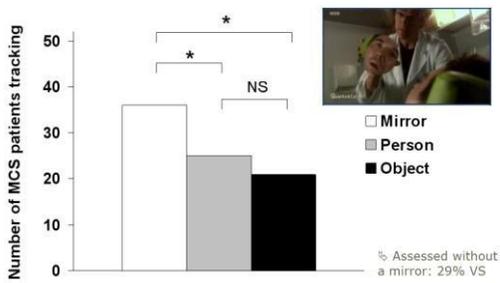
Wannez et al. Neuropsychol Rehabil, 2017

Question "Should a mirror be used to diagnose visual pursuit in patients with DoC?"

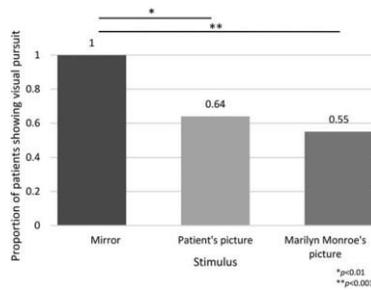


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Question "Should a mirror be used to diagnose visual pursuit in patients with DoC?"



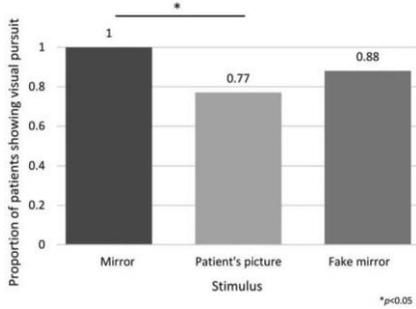
Vanhaudenhuyse et al. JNNP 2008
Thonnard et al., Brain Inj. 2014



Wannez et al. Brain Inj. 2017

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Question "Should a mirror be used to diagnose visual pursuit in patients with DoC?"

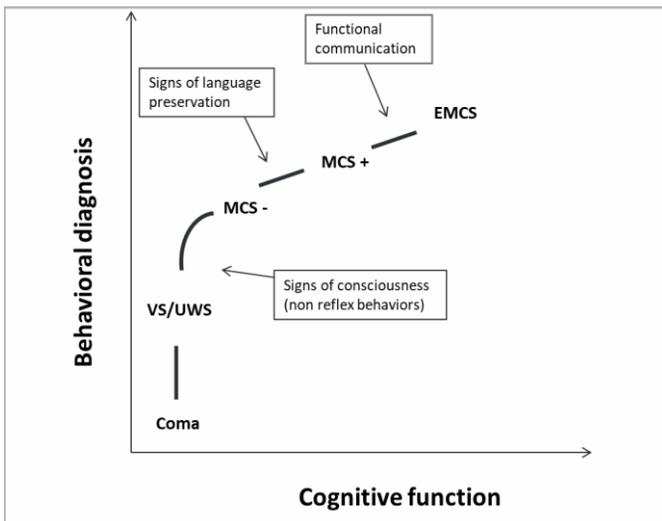


3 eligible publications
 374 patients
 RR for visual pursuit detected with a mirror as compared to other stimuli was 1.49 (95%CI 1.33-1.67; p<0.0001)

Answer "Always use a mirror in DoC patients to diagnose visual pursuit (*low evidence, strong recommendation*)."

Wannez et al. Brain Inj. 2017

Question "Should the Nociception Coma Scale-Revised (NCS-R) be used to diagnose signs of possible discomfort or nociception in patients with DoC?"



VERBAL RESPONSE

- 3 – Verbalisation intelligible
- 2 – Vocalisation
- 1 – Groaning
- 0 – None

MOTOR RESPONSE

- 3 – Localization to noxious stimulation
- 2 – Flexion withdrawal
- 1 – Abnormal posturing
- 0 – None/Flaccid

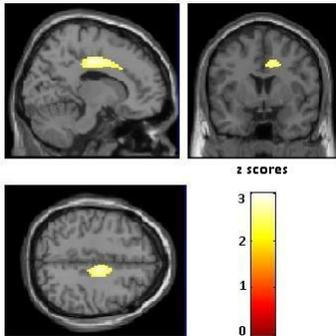
FACIAL EXPRESSION

- 3 – Cry
- 2 – Grimace
- 1 – Oral reflexive movement/Startle response
- 0 – None

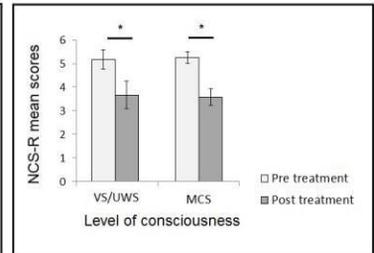
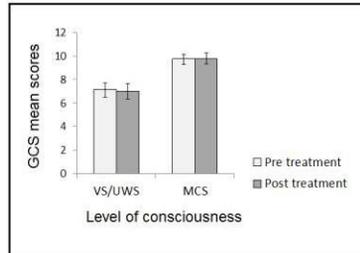
Schnakers et al. Pain 2010

Question "Should the Nociception Coma Scale-Revised (NCS-R) be used to diagnose signs of possible discomfort or nociception in patients with DoC?"

- Good psychometric properties



Chatelle et al. NNR 2014



Chatelle & De Val et al. Clin J Pain 2015

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Question "Should the Nociception Coma Scale-Revised (NCS-R) be used to diagnose signs of possible discomfort or nociception in patients with DoC?"

VERBAL RESPONSE

- 3 – Verbalisation intelligible
- 2 – Vocalisation
- 1 – Groaning
- 0 – None

No eligible publication

MOTOR RESPONSE

- 3 – Localization to noxious stimulation
- 2 – Flexion withdrawal
- 1 – Abnormal posturing
- 0 – None/Flaccid

Answer "Consider using the Nociception Coma Scale-Revised for regular monitoring of signs of discomfort (very low evidence, weak recommendation)"

FACIAL EXPRESSION

- 3 – Cry
- 2 – Grimace
- 1 – Oral reflexive movement/Startle response
- 0 – None

Schnakers et al. Pain 2010

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Conclusions

- Prefer using the CRS-R (independently of the setting) to avoid misdiagnosis
 - Open eyes when necessary
 - Repeat assessment
 - Mirror
 - Use of subscores
- FOUR is an alternative for ICU when time is limited
- NCS-R for pain assessment/management: to be confirmed
- More studies are needed to replicate those findings and increase the power of these recommendations
 - Risks of bias: convenience sample, absence of blinding, single-center, retrospective, patient overlap
 - Many studies excluded due to missing single subject data! (contingency table)

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Thank you!

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