ORGANIZATION NEWS

Highlights From the Rehabilitation Measures Database

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Updated Measurement Characteristics and Clinical Utility of the Coma Recovery Scale-Revised Among Individuals With Acquired Brain Injury

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The Coma Recovery Scale-Revised (CRS-R) is a standardized neurobehavioral assessment measure designed for use in patients with disorders of consciousness.[1] There are 6 subscales that assess behaviors mediated by language, visuoperceptual, and motor networks. The items are hierarchically arranged reflecting brainstem, subcortical, and cortically-mediated functions.[2] Serial CRS-R assessment has high sensitivity for detecting signs of consciousness. The CRS-R can further distinguish between features of minimally conscious state plus and minimally conscious state minus. The CRS-R may be used to monitor behavioral recovery, predict outcome,[3] and assess treatment effectiveness. The CRS-R is a National Institute of Neurological Diseases and Stroke Common Data Element and is recommended by the American Congress of Rehabilitation Medicine, the American Academy of Neurology, and the National Institute on Disability, Independent Living, and Rehabilitation Research for use in clinical practice.[4]

CRS-R items demonstrate excellent content and construct validity, internal consistency, interrater and test-retest reliability[1] as well as high sensitivity.[5] Rasch analysis and item response theory support the use of the CRS-R for establishing diagnosis and monitoring recovery of consciousness.[2] Translations and validations are available in 15 languages, and a pediatric version is validated in healthy children. The CRS-R can be used by a range of health professionals.

CRS-R administration takes 15-30 minutes. The CRS-R Administration and Scoring Manual was updated in 2020 based on international survey responses from 63 clinicians and researchers who provided feedback on the clarity of administration and scoring of each CRS-R item. The updated manual, general guidelines, frequently asked questions, suggested training module, and reference list are on the Rehabilitation Measures Database.

This abbreviated summary provides a review of the psychometric properties of the Coma Recovery Scale-Revised in acquired brain injury. A full review of the Come Recovery Scale-Revised and reviews of over 500 other instruments for patients with various health conditions can be found at: www.sralab.org/Rehabilitation-Measures.

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This instrument summary is designed to facilitate the selection of outcome measures by clinicians. The information contained in this summary represents a sample of the peer-reviewed research available at the time of this summary's publication. The information contained in this summary does not constitute an endorsement of this instrument for clinical practice. The views expressed are those of the

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Rehabilitation MEASURES	**Measure Name:** Coma Recovery Scale– Revised	**Acronym:** CRS-R	**Summary Authors:** Bodien YG, Chatelle C, Taubert A, Uchani S, Giacino JT, Ehrlich-Jones L

Populations Reviewed: Acquired Brain Injury	**Administration Time:** 25 minutes	**Items:** 23	**Score:** min=0 max=23	**Required Equipment:** CRS-R Administration and Scoring Manual (updated 2020), common objects (e.g., cup, brush, spoon, phone), object that produces a loud startling noise, hand mirror, brightly colored object, tennis sized ball, pencil, and tongue depressor

Purpose and Administration Instructions:

Establish diagnosis, monitor behavioral recovery, predict outcome and assess treatment effectiveness in patients with DoC. Standardized administration instructions are provided in the CRS-R Manual (2020).

Validity[1]:

Concurrent Validity[1]
Excellent concurrent validity with original CRS (ρ=.97) and Disability Rating Scale (DRS) (ρ= -.90)
Adequate concurrent validity with the Glasgow Coma Scale (GCS) using multivariate analysis

Construct Validity[1]
Detects consciousness (i.e. MCS) even in patients misdiagnosed as being unconscious (i.e. VS) based on clinical consensus

Prognostic Validity[3]
Total scores at admission to inpatient rehabilitation predict outcome at discharge and 3,6, and 12 months post-injury
Change in total score across first 4 weeks of rehabilitation predicts improved responsiveness at discharge (Odds ratio: 1.99).

Reliability[1]:

Test-Retest Reliability
Excellent for total score (ρ=.94) and visual, motor, and communication subscales (κ =.89-1.00)
Adequate for auditory subscale (κ=.63)
Poor for oromotor subscale (κ=.23)

Interrater Reliability
Excellent for total score (ρ=.84, κ=.827) and auditory, motor, oromotor, and communication subscales (κ=.77-.88)
Adequate for visual subscale (κ=.58)

Internal Consistency
Excellent for total score (α=.83)
Adequate for visual subscale (κ=.58)

Rasch Analysis[2]:

Fits the Rasch model and shows excellent internal construct validity
Hierarchical, all items show ordered response categories and fit the model individually
Ceiling and floor effects are negligible

Administration and Scoring Information:

Administer and score as described in the manual. If certain items or subscales are omitted, do not report a total score.
Always start by administering the highest-scoring item on each subscale before progressing to lower items. Once a scorable response is obtained, advance to the next subscale.
A general rule-of-thumb: *If 10 people observed the same response, 9 of 10 would agree that the response criteria were met.*
While the total score should not be relied upon to establish a diagnosis, a total score of 10 or greater indicates a diagnosis of minimally conscious state (MCS) or emerged from MCS (eMCS)[5]
Use Test Completion Codes (TCC) to establish the validity of the examination and document reasons for invalid or incomplete scores.

Considerations:

Examiners should have training and experience with the DoC population and communicate with medical or nursing staff to identify any contraindications or precautionary measures that should be taken prior to CRS-R assessment.
No specific guidelines governing the frequency of CRS-R administration exist. Up to five assessments may be required to capture the optimal level of function. Frequency of assessment is dependent upon the rate of change in the CRS-R, which is usually associated with the length of time post-injury.
Discontinue the CRS-R when all three of the following behaviors have been elicited, concurrently, on three consecutive examinations conducted over two weeks:
- Consistent movement to command (Auditory Subscale = 4)
- Reliable yes-no responses (Communication Subscale = 2)
- Attention (Arousal Subscale = 3)

Abbreviations:

ABI – Acquired Brain Injury
eMCS – Emerged from Minimally Conscious State
MCS – Minimally Conscious State
VS – Vegetative State

Cut-off Criteria:

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Excellent	≥ .6	≥ .75
Adequate	.31-.59	.40 -.74
Poor	≤ .3	< .4