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Russian validation study of coma recovery scale-revised

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Question: There is a need for standardized objective approach in assessment of patients with disorders of consciousness (DOC) in Russia as Glasgow coma scale (GCS) and Full outline of unresponsiveness scale (FOUR) are not enough informative in DOC patients. Meanwhile in Europe and USA Coma Recovery Scale – Revised (CRS-R) is widely used for DOC assessment (Giacino et al., 2004). The aim was to perform a validation study of Russian version of CRS-R. Methods: 60 DOC patients in different period after coma (4 weeks – 3 years after accident) and with different etiology (traumatic and non-traumatic) were included. To test concurrent validity of the translated scale, GCS and FOUR were administered. We established minimally conscious state (MCS) diagnosis in accordance with Aspen Workgroup criteria (Giacino et al., 2002). For GCS and FOUR we made a diagnostic algorithm according to these criteria as well (Schnakers et al., 2008). Results: Internal consistency of the CRS-R assessed by Cronbach's alpha was 0.87 ($p<0.001$) that was higher than critical threshold (0.80). Inter-rater reliability of CRS-R evaluated by the Cohen"s kappa was 0.990 (Tab. 1). Test-retest consistency was also high with the Pearson`s correlation coefficient $r=0.96$ ($p<.0001$), indicating the stability of patient"s assessment during the observation period. CRS-R scores correlated significantly ($p<0.01$) with GCS scores ($r=0.90$) and FOUR scores ($r=0.61$), indicating acceptable concurrent validity. The comparison of respective subscales of these scales showed significant correlation ($p<0.05$) between all items, except eye opening in GCS and visual function of CRS-R (Tab.2). Finally, the CRS-R significantly more sensitive for detection of MCS, as compared to GCS and FOUR. Conclusion: Russian version of the CRS-R is a valid and sensitive scale for clinical assessment of rehabilitation progress and in differential diagnosis of DOC. It is also a useful tool for neurological examination of a difficult patient.

Figure 1

SUBCALES	Cohen's kappa	95% Confidence Interval		*p* for Cohen's kappa
		Upper	Lower	
Total score	**0.990**	**0.926**	**1.000**	**<0.001**
Auditory function	0.934	0.848	1.000	<0.001
Visual function	0.873	0.763	0.957	<0.001
Motor function	0.979	0.919	1.000	<0.001
Oromotor function	0.961	0.854	1.000	<0.001
Communication	1.000	1.000	1.000	<0.001
Arousal	1.000	1.000	1.000	<0.001

Figure 2

Scale: subscale	r	p
CRS-R: total score		
GCS: total score	**0,900**	0,0001
FOUR: total score	**0,597**	0,0001
CRS-R: visual function		
GCS: eye response	**0,257**	0,047
FOUR: eye response	**0,702**	0,0001
CRS-R: motor function		
GCS: motor response	**0,336**	0,0001
FOUR: motor response	**0,373**	0,0001
CRS-R: verbal function		
GCS: verbal response	**0,699**	0,0001
CRS-R: communication		
GCS: verbal response	**0,691**	0,0001