

{ Commentary }

Predicting outcome from subacute unresponsive wakefulness syndrome or vegetative state

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## Abstract

Predicting recovery of consciousness in patients who survive their coma but evolve to a vegetative state (recently coined unresponsive wakefulness syndrome) remains a challenge. Most previous prognostic studies have focused on the acute coma phase. A novel outcome scale (combining behavioural, aetiology, electroencephalographic, sleep electroencephalographic and somatosensory evoked potential data) has been proposed for patients in subacute unresponsive wakefulness syndrome. The scale's clinical application awaits validation in a larger population.

The diagnosis, prognosis and therapeutic management of patients with disorders of consciousness remain a challenge. In a recent issue of *Critical Care*, Kang and colleagues proposed an innovative tool [1] to better assess the prognosis of patients with unresponsive wakefulness syndrome (UWS; previously vegetative state (VS) [2]). Studies on prognostication of patients with severe brain injuries, from anoxic-ischaemic, traumatic, or other aetiologies, have so far focused on the acute phase upon admission or during the patients stay in the ICU. Many of these studies have used mortality rate as an outcome (for example [3]) and their findings cannot be easily transposed to the population of subacute patients with VS/UWS.

Accurate outcome prediction is important for medical caregivers, families and healthcare administrators aiming to optimise the attribution of limited resources. Previous studies on subacute or chronic disorders of consciousness have shown that increased age at time of injury and decreased levels of consciousness are predictors of bad recovery in ischaemic-anoxic [4,5], subarachnoid haemorrhage [6] or traumatic [7] aetiologies. A limited number of studies also used electrophysiological measurements in the subacute or chronic phase with the aim of providing a more accurate prognosis, assessing electroencephalographic reactivity [8],

the presence of N400 evoked potentials to speech [9] or the absence of the middle component of auditory evoked potentials [10]. Finally, functional magnetic resonance imaging studies in UWS have shown that high-level cortical activation heralds better outcome [11].

The recently proposed TMS-EN outcome score, developed by Kang and colleagues [1], would allow clinicians to better estimate the probability of consciousness recovery in patients with post-coma VS/UWS. To the best of our knowledge, this is the first time a multi-item scale, combining information from clinical and complimentary testings, has been specifically designed to assess the prognosis in this challenging condition. The combination of five clinical and electrophysiological items - type of brain injury (traumatic vs. nontraumatic), flexion motor response to noxious stimuli, electroencephalographic reactivity, sleep spindles and N20 component of somatosensory evoked potentials - provided high positive and negative predictive values in the 56 enrolled patients [1], which now awaits validation in larger multicentric cohorts.

How easily this scale can be translated to real-life hospital settings, where long-duration overnight electroencephalographic recordings and even somatosensory evoked potentials are not always easily available, remains to be shown. The fact that no effect of age was found in the current study, as noted by the authors, might be related to the same small and heterogeneous sample size. Previous studies have found that older patients with severe brain injuries have worse outcome [4-7,10]. Information coming from structural (for example, diffusion tensor imaging) and functional magnetic resonance imaging, also assumed to have predictive power in coma [12,13], could be further assessed in the subacute and chronic setting and could possibly be added to future multimodal prognostic scales. Finally, it is important to stress that the use of these scales in terms of intensity of care, long-term management and end-of-life decisions needs a wider societal discussion involving not only physicians working in the ICU, neurology and rehabilitation, but also ethicists and legal scholars.

In conclusion, we very much welcome the authors' effort aiming to reduce prognostic uncertainty in the challenging group of patients with VS/UWS [1] and emphasise that no good medical (and ethical) decisions can be made in the absence of good clinical and prognostic knowledge [14,15].

Abbreviations{Level 1 heading}

UWS, unresponsive wakefulness syndrome; VS, vegetative state.

Competing interests{Level 1 heading}

The authors declare that they have no competing interests.

Acknowledgements{Level 1 heading}

OB is a research fellow and SL is a research director at the National Funds for Scientific Research (FRS-FNRS).

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