

The SECONDS Index Score to assess consciousness fluctuations in acute patients with severe brain injury

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Introduction

The *Simplified Evaluation of CONsciousness Disorders* (SECONDS) is a new fast and easy-to-use tool dedicated to the diagnosis of disorders of consciousness (DoC), which was previously validated based on its total score in chronic patients with severe brain injury (1,2).

We here aim to validate the SECONDS index score, a score out of 100 computed by summing the weighted scores associated to the 8 SECONDS items, to better track fluctuations of consciousness levels in acute patients with severe brain injury.

Methods

A total of 25 DoC patients will be included in the intensive care units and assessed for 5 consecutive weeks. Weekly, *Coma Recovery Scale-Revised* (CRS-R) and SECONDS evaluations were performed on the same day. Another SECONDS assessment was performed after any healthcare-related intercurrent event (e.g., tracheotomy removal or infection) potentially impacting consciousness levels.

Hypotheses testing and standardized response means analyses comparing the differences in SECONDS index scores, SECONDS total scores and CRS-R total scores were used as complementary approaches to examine the index score's sensitivity to change.

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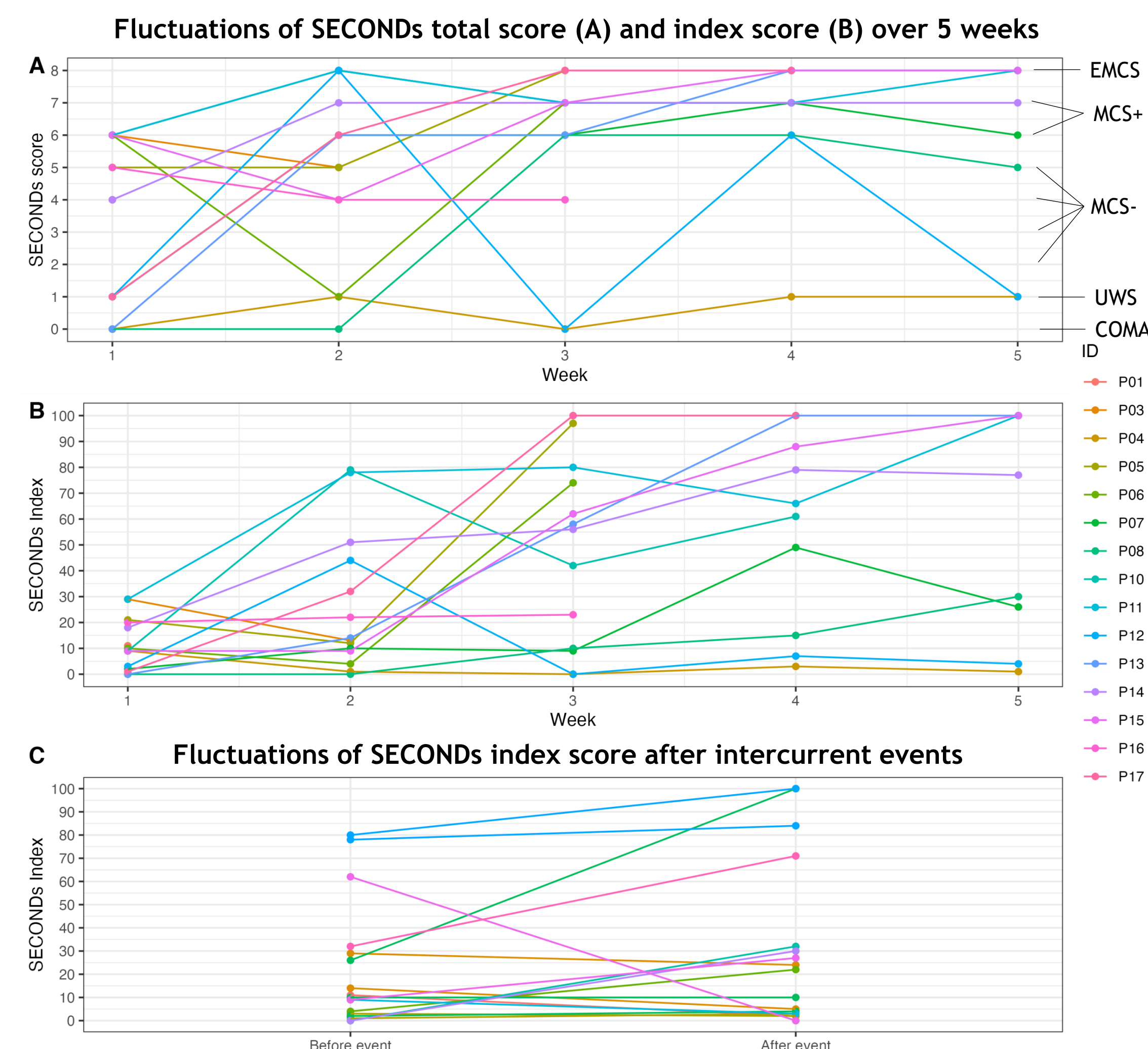
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Results

Preliminary data: n = 15

Patients		Demographic information			
ID	Age	Gender	Etiology	Days since onset	
P01	64	M	Stroke	9	
P03	54	M	Stroke	14	
P04	72	F	Stroke	9	
P05	63	M	TBI	12	
P06	75	M	Anoxia	24	
P07	70	M	Anoxia	25	
P08	71	F	Stroke	28	
P10	74	M	Stroke	6	
P11	49	M	Anoxia	9	
P12	67	F	Stroke	15	
P13	18	F	TBI	25	
P14	56	M	Stroke	16	
P15	48	F	Stroke	13	
P16	48	F	Stroke	18	
P17	57	F	Stroke	11	



Hypotheses testing		
Hypothesis 1: Moderate to very strong positive correlations between Δ SECONDS total score and Δ CRS-R total score		
Weeks	r	p
2-1	0,867 (very strong)	<0,001*
3-1	0,464 (moderate)	0,110
4-1	0,557 (moderate)	0,094
5-1	0,410 (moderate)	0,313
Hypothesis 2: Moderate to very strong positive correlations between Δ SECONDS index score and Δ CRS-R total score		
Weeks	r	p
2-1	0,216 (weak)	0,458
3-1	0,330 (weak)	0,295
4-1	0,662 (strong)	0,074
5-1	0,597 (strong)	0,157
Hypothesis 3: Moderate to very strong positive correlations between Δ SECONDS total score and Δ SECONDS index score		
Weeks	r	p
2-1	0,561 (moderate)	0,037
3-1	0,833 (very strong)	<0,001*
4-1	0,042 (weak)	0,922
5-1	0,094 (weak)	0,841

→ Confirmation of 66% of hypotheses (75% have to be confirmed)

Standardized Response Means				
Weeks	2-1	3-1	4-1	5-1
CRS-R total score	0,770	1,204	2,405	1,752
SECONDS total score	0,463	0,893	1,477	1,248
SECONDS index score	0,231	1,368	2,044	1,387

→ Index score SRMs > total score SRMs for 3 of the 4 differences
→ Index score SRMs > CRS-R total score SRMs for 1 of the 4 differences

Despite the lack of statistical power related to the small sample size, we here highlight promising preliminary data on 15 patients.

The index score tends to show good sensitivity to patients' fluctuations of consciousness and responsiveness to the intercurrent events with either positive or negative impact.

SECONDS video-illustrated guidelines



Conclusion

The SECONDS index score provides a refined measure of consciousness fluctuations in acute DoC patients. This study has important clinical implications as these patients are prone to rapid changes based on both spontaneous recovery and intercurrent events.

Conflicts of interest

The authors have no potential conflict of interest to declare. This study is supported by the University and University Hospital of Liège, the Belgian National Funds for Scientific Research (FRS-FNRS) and the Fondation Léon Frédéricq.

References

- (1) Aubinet C, Cassol H, Bodart O, et al. (2020). The Simplified Evaluation of Consciousness Disorders in individuals with severe brain injury: A validation Study. *Annals of Physical and Rehabilitation Medicine*, 64(5), 1-7.
- (2) Sanz, L.R.D.*, Aubinet, C.*, Cassol, H. et al. (2021). Seconds administration guidelines : A fast tool to assess consciousness in brain-injured patients. *Journal of Visualized Experiments*, 168, 1-18.