

# Nurses Assessing Pain with the Nociception Coma Scale: Interrater Reliability and Validity

■ ■ ■ Peter Vink, RN, MSc,<sup>\*,†</sup> Anne Maria Eskes, RN, PhD,<sup>‡,§</sup>  
 Robert Lindeboom, PhD,<sup>||</sup>  
 Pepijn van den Munckhof, MD, PhD,<sup>†</sup>  
 and Hester Vermeulen, RN, PhD<sup>‡,¶,♯</sup>

From the <sup>\*</sup>Department of Neurosensory Specialties and Psychiatry, Academic Medical Center, Amsterdam, The Netherlands; <sup>†</sup>Department of Neurosurgery, Academic Medical Center, Amsterdam, The Netherlands; <sup>‡</sup>Amsterdam School of Health Professions, Amsterdam, The Netherlands; <sup>§</sup>Research Center Linnaeus Institute, Spaarne Hospital and Kennemer Gasthuis, Haarlem, The Netherlands; <sup>||</sup>Department of Clinical Epidemiology, Biostatistics and Bioinformatics, University of Amsterdam, Faculty of Medicine, Amsterdam, The Netherlands; <sup>¶</sup>Department of Quality and Process Innovation, Academic Medical Center, Amsterdam, The Netherlands; <sup>♯</sup>Department of Surgery, Academic Medical Center, Amsterdam, The Netherlands.

Address correspondence to Peter Vink, RN, MSc, Department of Neurosensory Specialization and Psychiatry, "Neurocentrum AMC", Meibergdreef 9, 1105 AZ Amsterdam, The Netherlands. E-mail: [p.vink@amc.uva.nl](mailto:p.vink@amc.uva.nl)

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## ■ ABSTRACT:

The Nociception Coma Scale (NCS) is a pain observation tool, developed for patients with disorders of consciousness (DOC) due to acquired brain injury (ABI). The aim of this study was to assess the interrater reliability of the NCS and NCS-R among nurses for the assessment of pain in ABI patients with DOC. A secondary aim was further validation of both scales by assessing its discriminating abilities for the presence or absence of pain. Hospitalized patients with ABI ( $n = 10$ ) were recorded on film during three conditions: baseline, after tactile stimulation, and after noxious stimulation. All stimulations were part of daily treatment for these patients. The 30 recordings were assessed with the NCS and NCS-R by 27 nurses from three university hospitals in the Netherlands. Each nurse viewed 9 to 12 recordings, totaling 270 assessments. Interrater reliability of the NCS/NCS-R items and total scores were estimated by intraclass correlations (ICC), which showed excellent and equal average measures reliability for the NCS and NCS-R total scores (ICC 0.95), and item scores (range 0.87-0.95). Secondary analysis was performed to assess differences in ICCs among nurses' education and experience and to assess the scales discriminating properties for the presence of pain. The NCS and NCS-R are valid and reproducible scales that can be used by nurses with an associate (of science) in nursing degree or baccalaureate (of science) in nursing degree. It seems that more experience with ABI patients is not a predictor for good agreement in the assessment of the NCS(-R). © 2014 by the American Society for Pain Management Nursing

## BACKGROUND

The assessment and early diagnosis of pain is of great importance for proper diagnosis and adequate pain management. However, self-assessment tools are inapplicable to patients with disorders of consciousness (DOC) by acquired brain injury (ABI), causing them to fully rely on the clinical expertise and judgment

of nurses and physicians. This may cause great variation in pain assessment and possibly inadequate pain management.

ABI is defined as any brain damage that occurs after birth from a traumatic or nontraumatic event (Ontario Brain Injury Association, 2013) and can result in cognitive, communicative, physical, emotional, or behavioral impairments such as DOC (i.e., vegetative state/unresponsive wakefulness syndrome or minimally conscious state). Previous research has shown that, despite their sometimes fluctuant behavioral patterns, patients with DOC could experience pain (Schnakers, Chatelle, Majerus, et al., 2010). Pain observation tools have been developed to assess pain in different noncommunicative patient categories, such as intubated or sedated patients, children and patients with severe dementia (Roulin & Ramelet, 2012; Schnakers, Chatelle, Majerus, et al., 2010). However, for noncommunicative patients with ABI (due to DOC) only one instrument is available; the Nociception Coma Scale (NCS). The NCS rates four behavioral responses to pain on a 4-point-scale: motor response, verbal response, visual response, and facial expression (Roulin & Ramelet, 2012; see Table 1). The validity of the NCS previously has been studied and showed promising clinimetric properties (Chatelle, Majerus, Whyte, Laureys, & Schnakers, 2012; Schnakers, Chatelle, Demertzi, Majerus, & Laureys, 2012; Schnakers, Chatelle, Majerus, et al., 2010;

Schnakers Chatelle, Vanhaudenhuyse, et al., 2010). In 2012, the researchers showed that exclusion of the visual response item significantly increased the cutoff sensitivity of the scale, and therefore proposed to revise the NCS (NCS-R) (Chatelle et al., 2012).

In the work of Schnakers et al., the interrater reliability of the NCS and NCS-R was assessed by two experienced neuropsychologists. However, the NCR scales are particularly relevant for everyday nursing practice in (university) hospitals, rehabilitation centers and nursing homes. If empirical research would conclude that nurses could use the NCS/NCS-R in a reproducible manner, improvement of pain management could be initiated by implementing these scales in daily care. The primary aim of this study was to assess the interrater reliability among nurses for the assessment of pain in noncommunicative ABI patients with the NCS and NCS-R. We also assessed the internal consistency and examined whether the nurses education level and years of experience with ABI patients affected the reliability. The secondary aim was to assess discriminating abilities for the presence of pain.

## METHODS

### Design

This prospective reliability study was designed and reported according to the Consensus-based Standards for the Selection of Health Status Measurement Instruments (COSMIN) checklist (Mokkink et al., 2012), Box B (reliability), and the Guidelines for Reporting Reliability and Agreement Studies (Kottner et al., 2011).

One of the authors (PV), with Dutch as mother tongue and a Cambridge Proficiency Level C2, performed a forward translation of the NCS's items (English to Dutch) (World Health Organization, 2013). A nurse with UK English as mother tongue and proficient knowledge of Dutch performed a backward translation. Any discrepancies were quickly resolved by consensus. Because the NCS consists of observational items based on visual ratings of behavior that are reported with common terminology in neurologic care, the authors decided that further research on Box G (cross-cultural validation) of the COSMIN checklist was not necessary in this study (Beaton, Bombardier, Guillemin, & Ferraz, 2000; Mokkink et al., 2012).

### Ethics

The study design was presented to the medical ethics committee of the Academic Medical Center (AMC) and University of Amsterdam, the Netherlands and a waiver of authorization was granted.

**TABLE 1.**  
**Nociception Coma Scale**

Motor response	
3	Localization to painful stimulation
2	Flexion/withdrawal
1	Abnormal posturing
0	None/flaccid
Verbal response	
3	Verbalization (intelligible)
2	Vocalization
1	Groaning
0	None
Visual response	
3	Fixation
2	Eye movements
1	Startle
0	None
Facial expression	
3	Cry
2	Grimace
1	Oral reflexive movement/startle response
0	None

The original Nociception Coma Scale (NCS) as developed by Schnakers, Chatelle, Vanhaudenhuyse, et al. (2010). The NCS-R omits the visual response item (Chatelle et al., 2012).

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