Table 1. Nursing instrument for the communication of sedation (NICS)

Score	Response
+3	Dangerously agitated: Physical risk to patient and others. Attempting to pull, or pulling on invasive devices. Actively fighting restraints.
+2	Agitated. Frequent or constant motor activity; requiring restraints. Not controlled with verbal reminders.
+1	Anxious. Fidgety. Calms with reassurances and instruction.
0	Awake, cooperative, calm.
−1	Lethargic but arouses easily to voice or gentle tactile stimulation. Attentive, purposeful motor examination. Eyes closed when not stimulated.
−2	Deeply sedated. Requires loud voice or deep stimulation to arouse. Will follow commands briefly only when stimulated. Rapidly returns to deep sedated level. Purposeful movements during stimulation.
−3	Unresponsive to deep stimulation—no command following or purposeful motor.

Table 2. Level of arousal (LOA)

LOA	Response
Restless	Severely distressed endangering the safety of the patient or others. Exhibits discomfort that is not calmed with verbal reassurance.
Anxious	Exhibits verbal or physical activity that suggests discomfort with current situation. However, calms with verbal reassurance.
Calm and alert	Meaningful interactive state (correctly responding to orientation questions) without need for stimulation.
Lethargic	Not fully alert but with minimal stimulation (soft voice or modest tactile stimulation, such as shoulder tap) improves to meaningful interactive state.
Obtunded	Requiring moderate-to-severe stimulation (loud voice or body shake) to return to meaningful interactive state.
Stuporous	Awake, eyes open to stimulation. May groan or mumble incoherently. Regardless of severe stimulation, however, will not improve to meaningful interactive state.
Coma	Not awake or cognitively interactive with environment, regardless of level of stimulation.

Table 3. Richmond Agitation Sedation Scale (RASS)

Score	Response
+4	Combative. Overtly combative or violent; immediate danger to staff.
+3	Very agitated. Pulls on or removes tube(s) or catheter(s) or has aggressive behavior toward staff.
+2	Agitated. Frequent nonpurposeful movement or patient-ventilator dyssynchrony.
+1	Restless. Anxious or apprehensive but movements not aggressive or vigorous.
0	Alert and cooperative.
−1	Drowsy. Not fully alert, but has sustained (>10 secs) awakening, with eye contact, to voice.
−2	Light sedation. Briefly (<10 secs) awakens with eye contact to voice.
−3	Moderate sedation. Any movement (but no eye contact) to voice.
−4	Deep sedation. No response to voice, but any movement to physical stimulation.
−5	Unarousable. No response to voice or physical stimulation.

MATERIALS AND METHODS

Overall Strategy

Patients were evaluated to assess the validity and reliability of the NICS scoring tool across the clinical spectrum of anxiety-agitation to lethargy-unresponsiveness (Tables 1–3). A prospectively derived comparison was made between intubated (INT) and nonintubated (non-INT) patients. The NICS Scale was devised based on the intuitive rhetorical metric of "threes" (good-better-best) (15, 16) in a symmetrical construct centered about an optimal calm, cooperative state (0); near optimal, can watch and wait (−1 or 1); patient is undersedated or overly sedated, acute attention is required, but condition is nonthreatening (−2 or 2); condition requires immediate attention, unsafe— severely agitated or unresponsive (−3 or 3).

Validation of the NICS Scale:

A. Validity was evaluated incorporating the following key elements:
   1. Criterion Validity—How an instrument relates to external derived criteria. We introduced a senior neurointensivist as the expert to provide experienced patient assessment based on LOA criteria (9) (Table 2).
   2. Construct Validity—How a measure relates to other measures that support the concept. We compared the NICS Scale with RASS (Table 3) and the other three scales.
   3. Face Validity—How well an instrument measures what it is intended to measure. We surveyed nurses who rated their patients using the deidentified scales, NICS, RASS, as well as SAS, Ramsay, and MAAS to select their favorite in response to a preset questionnaire.

B. Interrater Reliability Over Time—We evaluated all of the five scales for reliability across three time points (0, 20, 40 mins) in each patient to assess the tools not at a single moment but over an epoch in time, and during which titration of sedation in anxious/agitated may have been administered to patients.

Study Methodology

This study was approved by the Johns Hopkins Institutional Review Board. Applicable ICU patients for study (inclusion criteria) included any patient receiving frequent nursing LOA assessments. The only exclusion criterion was neuromuscular paralysis.

A total of 104 ICU patients were consecutively selected, using a convenience sampling strategy in the Neuroscience, Medical, and Surgical ICUs over a 3-month time period. Patient records were deidentified through use of numeric designation. A total of four healthcare professionals (physicians, nurses, pharmacists) from a pool of study team members were used as examiners to evaluate each patient. The nurses from the ICUs participating in the study had previously been trained on using the RASS scale, but none had committed to memory the specific ordinal criteria. To address the simplicity and communicability of each scale among a broad group of health professionals, no acute training on the five sedation scoring tools [NICS, RASS, Ramsay, SAS, and MAAS was provided (Appendix 1).

Examination

A designated senior expert, a neurointensivist with experience in neurologic patient assessment, was present and scored the patients' behavioral status, using the five scales along with LOA. Together with the

APPENDIX 1. RAMSAY-SAS-MAAS SEDATION SCALES

Ramsay Sedation Scale

Score	Response
1	Anxious or restless or both
2	Cooperative, orientated and tranquil
3	Responding to commands
4	Brisk response to stimulus
5	Sluggish response to stimulus
6	No response to stimulus

Riker Sedation-Agitation Scale (SAS)

Score	Explanation
7 Dangerous agitation	Tries to remove monitors and devices or climb out of bed; tosses and turns; lashes out at staff
6 Very agitated	Remains restless despite frequent verbal reassurance; bites endotracheal tube; requires restraint
5 Agitated	Anxious or restless; attempts to move; calms down with reassurance
4 Calm and cooperative	Calm; easy to arouse; able to follow instructions
3 Sedated	Difficult to awaken; responds to verbal prompts or gentle shaking but drifts off again
2 Very sedated	Incommunicative; responds to physical stimuli but not verbal instructions; may move spontaneously
1 Unarousable	Incommunicative; little or no response to painful stimuli

Motor Activity Assessment Scale (MAAS)

Score	Level of Sedation	Response to Stimulation	Response to Command	Examples of Type of Complex Motor Activity
6	Dangerously agitated and uncooperative	No external stimulus required to elicit movement	Does not calm down when asked	Patient pulling at tubes or catheters or thrashing from side to side or striking at staff or trying to climb out of bed.
5	Agitated	No external stimulus required to elicit movement	Does not consistently obey commands (e.g., will lie down when asked but soon reverts to attempts to sit up)	Patient attempts to sit up and moves limbs out of bed.
4	Restless but cooperative	No external stimulus required to elicit movement	Obeys commands	Patient is picking at sheets or tubes or uncovering self.
3	Calm and cooperative	No external stimulus required to elicit movement	Obeys commands	Patient adjusts sheets or clothes purposefully.
2	Responsive to touch or name	Opens eyes or raises eyebrows or turns head toward stimulus or moves limbs when touched or name is loudly spoken		
1	Responsive only to noxious stimuli	Opens eyes or raises eyebrows or turns head toward stimulus or moves limbs in response to noxious stimulus (tracheal suctioning or 5 secs of vigorous orbital, sternal or nailbed pressure)		
0	Unresponsive	Does not move with noxious stimulus		