Using and understanding sedation scoring systems: a systematic review

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Authors' objectives
To review instruments for measuring the effectiveness of sedation in adult and paediatric intensive care unit (ICU) patients.

Searching
MEDLINE and EMBASE were searched from 1966 to 1999 using the following text and keywords: 'sedation', 'stress', 'anxiety' or 'agitation'; 'ICU', 'intensive care unit', 'critically ill' or 'artificial ventilation'; 'score', 'scale' or 'assessment'. Other sources searched included the Cochrane Database of Systematic Reviews, the Cochrane Controlled Trials Register, the reference lists of all primary studies and review articles, and the authors' personal files. Studies published in full text or abstract form in any language were eligible.

Study selection
Study designs of evaluations included in the review
The inclusion criteria were not defined in terms of study design. Primary studies included randomised controlled trials (RCTs), case series, and scale development and validation studies.

Specific interventions included in the review
Bedside clinical instruments measuring the effect of sedation by ICU health workers were eligible if they evaluated items relating to consciousness, and one or more items relating to domains targeted by sedation or to sedation side-effects. Studies that evaluated two different domains at different times in the ICU were excluded, as were those that did not provide a comprehensive description of the instrument or information on its clinical use. Instruments were excluded if they only described consciousness, did not include a categorical scale or involved patient-self evaluation, or consisted of paraclinical tests.

The instruments evaluated (see Other Publications of Related Interest nos. 1-4) were: the Ramsay scale; the GCS modified by Cook and Palma; the Comfort Scale; the Vancouver Sedative Recovery Scale; the New Sheffield Scale; the Sedation-Agitation Scale; the paediatric sedation scale described by Hughes and by Parkinson; and the Motor Activity Assessment Scale. All the instruments evaluated consciousness, and most instruments evaluated agitation and/or ventilatory support. Other items evaluated included: pain, anxiety, reactions to endotracheal aspiration and muscle tone. Most instruments consisted of a single categorical item though some used several items.

Participants included in the review
Adult or paediatric ICU patients were eligible. Studies set primarily in the recovery room or day-surgery units were excluded. Most primary studies involved ventilated post-operative or post-trauma adult patients.

Outcomes assessed in the review
Studies providing either the original description of the instruments, or data about internal consistency, validity, reliability and/or responsiveness of a published instrument were eligible. These terms were all defined in the review. The validity of the instrument was assessed by comparing the index instrument with another instrument designed to measure sedation effectiveness.

How were decisions on the relevance of primary studies made?
Titles and abstracts (when available) were reviewed independently in duplicate, and two reviewers independently applied the inclusion criteria.

Assessment of study quality
The validity assessment was limited to a discussion of the methods used to assess measurement properties of the
instrument examined.

**Data extraction**
Two reviewers extracted the following data: population details; study design; domains of sedation effectiveness and/or side-effects; and the internal consistency, reliability, validity and responsiveness of the instruments. Any disagreements were resolved by discussion and consensus.

**Methods of synthesis**
How were the studies combined?
The studies were combined in a narrative review.

How were differences between studies investigated?
Differences between the studies were discussed within the text of the review.

**Results of the review**
Twenty-five studies involving over 900 patients were included: 10 RCTs, 8 case series, and 7 studies that developed or assessed an instrument.

In addition to consciousness, most scales included items evaluating agitation, and/or ventilator synchrony. Pain, anxiety, reaction to endotracheal aspiration, and muscle tone were frequently measured. None of the studies evaluated the ability of the instrument to detect change in responsiveness over time, and there were several problems evident, such as the use of reference instruments that had not themselves been independently validated.

The Ramsay Scale: inter-rater reliability was high and scores were highly correlated with the GCS and the Sedation Agitation Scale. However, the instruments included items that were similar in content and structure.

The Comfort Scale was developed in a paediatric population and was comprised of 8 items. Good inter-rater reliability (0.84) and good correlation with a visual analogue score (0.75) was found. The validation of the instrument could have been strengthened by comparing a number of alternative measures of sedation.

The Sedation Agitation Scale was comprised of one item. There was very good inter-rater reliability (0.92) and high construct validity against the Ramsay Scale (0.91) and the Harris Scale (0.93). The Motor Activity Assessment Scale was comprised of one item. Good inter-rater reliability (0.83) and high correlation with a visual analogue scale was found.

**Authors’ conclusions**
Many instruments have been used to measure sedation effectiveness in ICU patients. However, few of them exhibit satisfactory clinimetric properties. Additional information on the measuring properties of sedation effectiveness instruments is needed to help clinicians assess sedation at the bedside, to aid readers critically appraise the growing number of sedation studies in ICU literature, and to inform the design of future investigations.

**CRD commentary**
The aims were stated and the inclusion criteria were defined in terms of the participants, intervention and outcomes. Several relevant sources were searched, full details of the literature search were provided, no language restrictions were applied, and methods used to select studies were reported. Relevant information was presented in tabular format, and the methods used to extract data were described. Given the heterogeneity among studies, a narrative review was appropriate. Study characteristics were summarised, and the properties of the instruments were commented upon, although better quality sources of evidence were not highlighted. The authors drew attention to the use of inadequately validated instruments as the ‘gold’ standard. For ease of comparison, in reviewing the evidence it would have been simpler to group the studies by the instrument assessed.
The evidence presented supports the authors' conclusions.

**Implications of the review for practice and research**

**Practice:** The authors suggest that sedation at one point in time can be adequately measured in adults using the Ramsay Scale, the Sedation Agitation Scale and the Motor Activity Assessment Scale, and in children using the Comfort Scale.

**Research:** The authors state that additional information about the measuring properties of sedation effectiveness instruments is needed.

**Bibliographic details**


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**Other publications of related interest**


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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.