Sedation monitoring: an end to sedation holds?

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Overview

* Evidence for current sedation changes and a more wakeful ICU population
* Implications of changes for ICU care
* Sedation monitoring
* Perceptions of a novel sedation monitor for practice
* Future considerations/thoughts

Sedation Practice

- Sedation practice affects patient outcomes
- Over sedation linked to prolonged mechanical ventilation, ICU stay, higher complication rates & mortality
- Daily sedation breaks associated with reduced ICU stay, hospital stay & length of mechanical ventilation (Kress et al 2000, Girard et al 2009)
- National patient safety programmes incorporate sedation holds within their targets now
- Sedation managed using clinical scoring systems, linked to protocols (Brook et al 1999, Brattebo et al 2002, DeJonghe et al 2005, Quenot et al 2007)

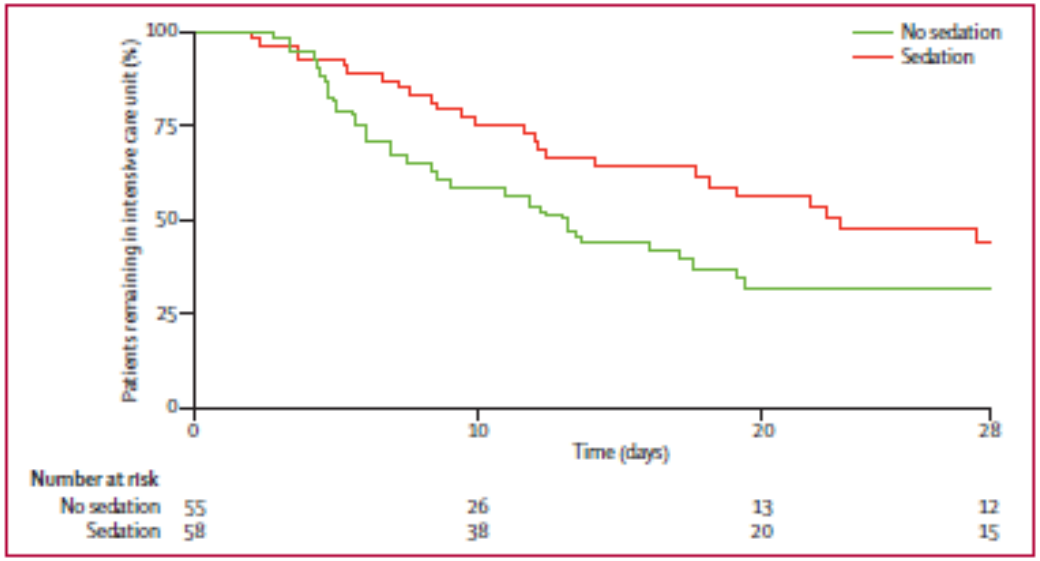
Sedation scales

* Rely on team "buy in"
* Insensitive during deep sedation (usually early in ICU stay or during most acute period)
* Need to be linked to a protocol supported by education and clinical leadership
* Lack of consensus in what constitutes "optimum sedation"
* Every patient is an individual…..

A protocol of no sedation for critically ill patients receiving mechanical ventilation: a randomised trial

Thomas Strøm, Torben Martinussen, Palle Toft

Lancet 2010; 375: 475–80



Trend to lower mortality
Lower ventilation days
Higher nursing resource use
Higher rates of agitation in non-sedated group
No patient-based psychological/experience measure

Implications for ICU nursing practice

* PhD work
  * To explore ICU nurses views of sedation, reduction in sedation use (wakefulness) and technology within an ICU environment

* Emerging themes
  * Agitation
  * Adverse events – guilt, blame, failure
  * Apprehension
  * Obligation
  * Loss of autonomy
  * Resentment

A place for sedation monitoring?

* There appears lots of uncertainty in the world of sedation for ICU nurses
* A high proportion of patients receive sedation in ICU
* No sedation monitoring devices in widespread use in ICUs plus no device has been subjected to rigorous controlled trials.

Sedation technologies

* Currently available technologies:
  * Bispectral Index Scale (BIS)
    * Marketed for use in anaesthesia
  * Entropy
    * Marketed for use in anaesthesia
    * Compared favourably with BIS

* Future technology?:
  * Responsiveness (GE Healthcare)
    * Been developed entirely with ICU patients in mind

Responsiveness monitoring

* Developed over past 6 years in Edinburgh and Helsinki
* Principally designed to *continuously* and *objectively* detect and alert clinicians/nurses to "over-sedation" by recognising the "unresponsive" patients
* Based on acquisition and processing of facial EMG from forehead electrodes

Responsiveness Measurement

* Measurement is based on the frontal muscle activity (EMG)
* Sedated patients' reactions to various stimuli (pain, noise, care procedures) are displayed as rises in the EMG activity
* Responsiveness Index (RI) quantifies the amount of rises in the EMG power in the previous 60 minutes
  * RI = 100 indicates full responsiveness of the patient
  * RI = 0 indicates no responsiveness

* Both EMG and RI are shown in the monitor screen
  * EMG rises immediately when the patient responses to stimuli and decreases when the patient is calm
  * RI increases and decreases more slowly
  * RI indicates the state of the patient on a longer time scale
  * EMG indicates the momentary activity of the patient

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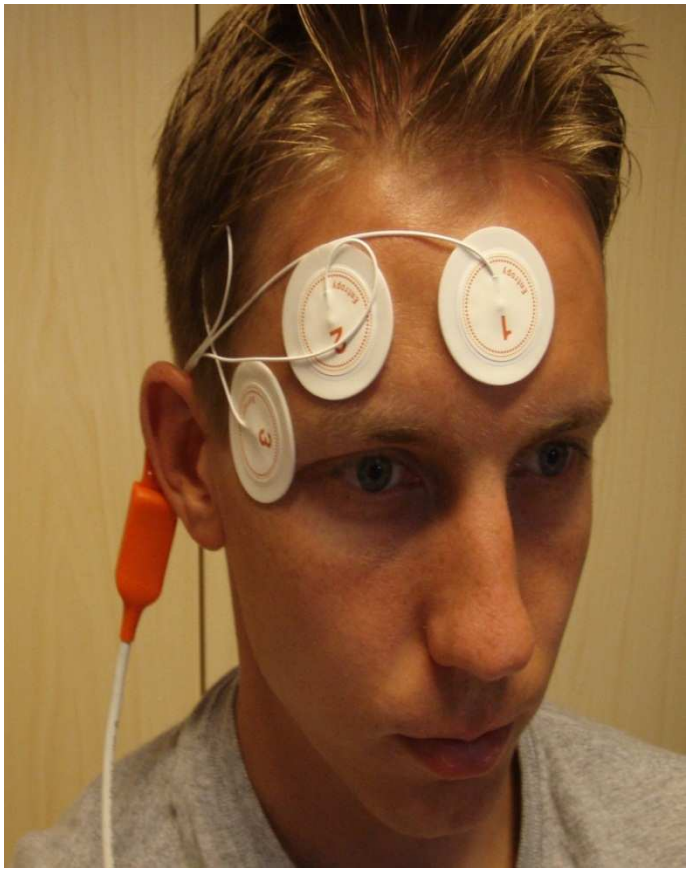
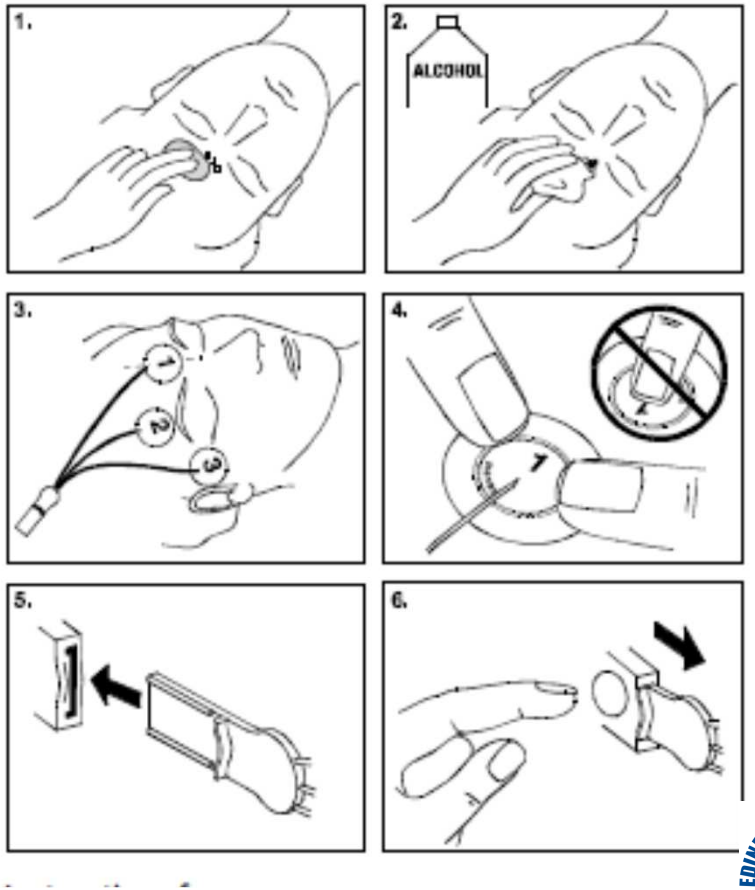
Electrode placement

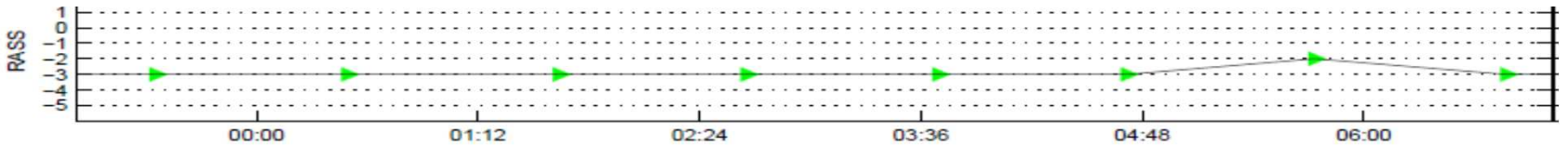


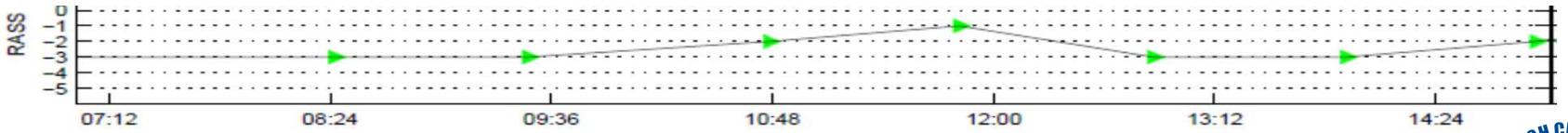


Reasons for an "unresponsive" patient based on fEMG activity

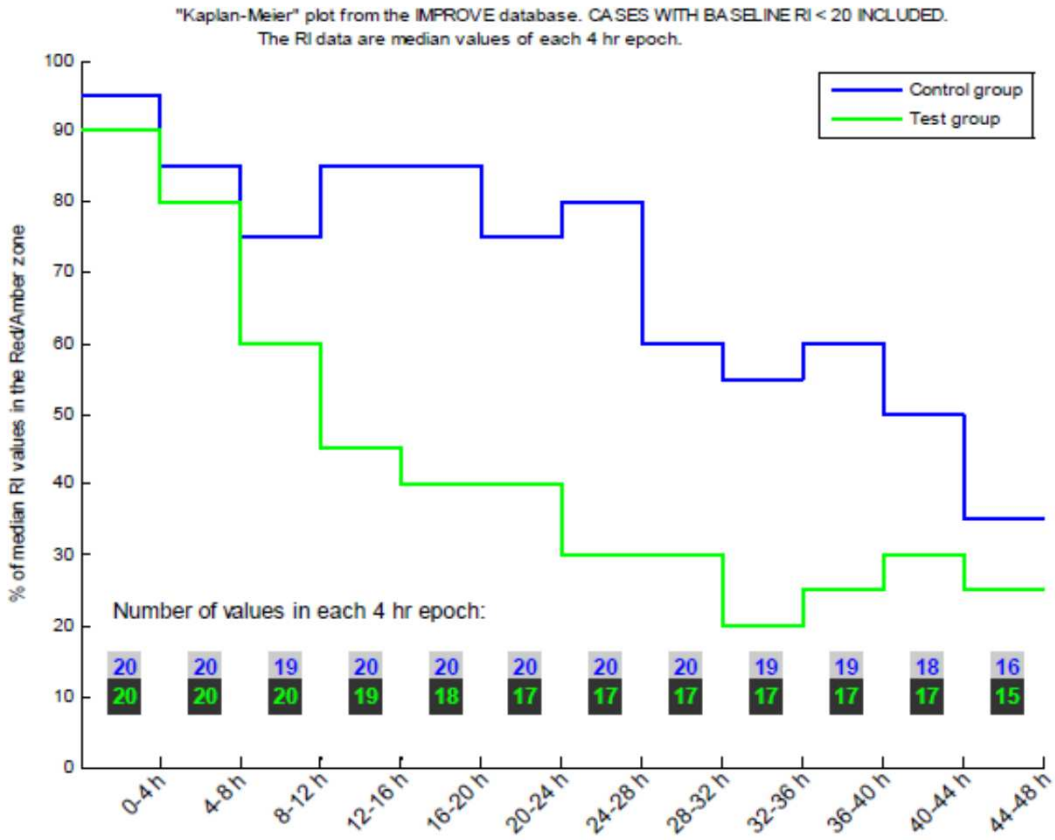
* Muscle paralysis
* Normal sleep
* Illness associated coma
  * Liver failure
  * Hypoxic brain injury
  * Traumatic brain injury
  * Severe metabolic encephalopathy
* Drug-induced coma
  * Excessive dosing of sedative drugs
  * Accumulation of sedative drugs
* Decreased levels of patient stimulation

Night & day-time effects: the impact of reducing “therapeutic” stimulation





Preliminary findings



Nurses' thoughts about responsiveness

* Prepares you
* Provides guidance
* Instils confidence
* Increased awareness
* Reduce sedation quicker
* Objective, tackles complacency

‘Prepares you’

* *“I just think that people waking up is one of the hardest, one of the hardest things we have to witness here, because people are uncomfortable, they get a fright, you know it is quite nerve racking sometimes because you don't know what is going to happen and I think anything that is preparing you more to be prepared for things is good”* (004)

‘Provides guidance’

* *“…give the nurses a more specific range, instead of just ‘wean back that sedation please’, they* [doctors] *will say can we have this patient in the green zone which will be easier because then they won’t have to shout at us and say why haven’t you weaned back that sedation”* (012)

‘Instils confidence’

* *“I am still doing the RASS every time and then checking myself with the number as well, so it is helping me, it is giving me confidence in the decisions that I am making”* (001)

* *“It’s a guide…it gives you a bit more confidence in what you’re doing in terms of lightening the patient and maybe giving them more sedation, it might kind of help you decide what to do I think”* (005)

‘Increases awareness’

* *“…it just spurs you on to think about the patient’s sedation level a bit more, whether they are appropriately sedated”* (005)

* *“Sometimes you can be so busy….and it will amaze you that within 5 minutes it has dropped into the red zone, so I think if you were very busy, it was something just to alert you…”* (002)

‘Increases awareness’

* *“I think it is much more of a reminder and I can say that I, you know you don’t necessarily do your RASS every single hour of your observations, yet I look at the monitor, I have been seeing the trace on the monitor a lot more than I would actually have done the RASS”* (001)

‘Objective’

* *“I think it will help everybody because I think that, maybe when you’re more experienced you get complacent about things like that and that you think that you’re patient is less or more sedated than it really is”* (012)

The ‘cons’

* Technology malfunctions
* Education and training in its use essential
* The responsiveness monitor has not been widely trialled yet
* Another technology to dehumanise ICU patients?
* Cost
* More awake patients = more staff required?

Summary

* Optimisation of sedation is essential
* Decision making regarding sedation is complex
* Team approach to sedation management required
* A novel technology could bridge the gap??
* Potential to detect “unresponsive” patients, investigate cause, and make continuous dynamic adjustments to sedation
* Potential to bring the patient’s status “alive”
* Potential to improve quality of patients management, and improve patient treatments and outcomes

Any thoughts or questions??