

A retrospective cohort study investigating frightening memories in adult ICU survivors and their association with deep sedation; plus, a prospective investigation of factors influencing ICU nurses' selection of deep sedation strategies

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Background

Psychological effects are an important aspect of post-ICU outcomes, with significant potential to impact quality of life of survivors(1). Treatment in ICU is invasive; the environment can be frightening; and the patient often lacks autonomy. The psychological impact of ICU survival is therefore unsurprisingly large. Recalling frightening memories shortly after discharge is an important risk factor for poor long-term outcomes including Post Traumatic Stress Disorder (PTSD)(2). However, understanding is limited regarding prevalence, nature and causality of frightening memories(3). Potentially, varying ICU exposures, particularly deep sedation, plus patient risk factors, may influence the likelihood of developing frightening memories(3).

Despite heterogeneity in cause and treatment of critical illnesses, sedation to enable tolerance of stressful ICU environments is common to the vast majority. Guidelines recommend avoiding unnecessary deep sedation of critically ill patients due to increased risk of pneumonia(4), delirium(5) and mortality(6,7), amongst many others. Although historically utilised to reduce unpleasant awareness(8), deep sedation may be implicated in development of post-ICU frightening memories(3). Sub-optimal sedation is common(9), and practice doesn't always reflect up-to-date research(10). Sedation is typically titrated by the bedside nurse; their decisions are therefore pertinent.

It is hypothesised greater deep sedation exposure in ICU is associated with more frightening memories recalled afterwards. It is predicted that there are multiple factors that determine sedation depth in practice. Two studies performed in parallel were used to address these hypotheses:

Study 1.

1. Does greater exposure to periods of deep sedation lead to differences in the magnitude of frightening memories recalled shortly after discharge in adult ICU survivors?

Study 2.

2. What factors influence ICU nurses' selection of deep sedation strategies for adult ICU patients?

Methods

Study 1:

A retrospective cohort study of a recent sedation trial (DESIST)(11) was undertaken to assess prevalence of frightening memories and association with deep sedation in 517 Scottish, adult ICU survivors. The Intensive Care Experience Questionnaire (ICE-Q)(12) and the Impact of Event Scale-Revised (IES-R)(13), a PTSD symptom measure, were administered to DESIST participants 1-2 weeks post ICU discharge. The ICE-Q frightening experiences sub-score and the IES-R total score were co-primary outcomes for this study. Sedation depth was measured each 12-hour 'care-period' of mechanical ventilation during the DESIST trial using a pre-validated tool. Three representations of 'deep sedation' exposure were created and assessed: total number of 12-hour periods deeply sedated; maximum consecutive number of care periods; and proportion of mechanical ventilation duration in ICU that was spent deeply sedated. Correlation was assessed between each primary outcome score and each deep sedation variable. Other risk factors were also assessed for association with the primary outcomes.

Study 2:

Semi-structured interviews with seventeen ICU nurses at the Royal Infirmary of Edinburgh (RIE) were conducted to gain insight into sedation decisions in practice. From the results of these interviews, a questionnaire regarding deep sedation decisions was developed, piloted and administered to the ICU nurses at RIE. The anonymous results were collected and analysed.

Results

Study 1:

From 517 DESIST participants with ICE-Q and IES-R data, 491 and 487 had total scores available, respectively. 34.4% and 25.1% of participants had ICE-Q frightening experience scores and IES-R totals above pre-defined cut-offs, respectively, representing substantial frightening memories. There was no convincing association between any of the three deep sedation variables and either outcome measure: Spearman's rho correlation coefficient ranged: -.016 to .053. No other risk factors assessed (age, illness severity, ventilation duration, length of ICU and hospital stays) were strongly correlated ($r > .2$) with each

primary outcome. Additionally, Man Whitney U tests of differences in gender and case mix were also insignificant.

Study 2:

With a response rate of 76% (n=84), the survey found the clinical condition of the patient the most important factor for nurses' sedation decision making, as anticipated. However, other important factors included doctor and nurse staffing levels, staff safety and time of day. Discrepancy was found in nurses' interpretation of the meaning of deep sedation: 43.4% of the cohort defined deep sedation as a patient responsive to physical stimulation whilst 55.4% defined it as a patient completely unresponsive to any stimulation. The largest barriers to nurses' optimal sedation practice were safety concerns, both patient and staff safety, followed by stretched nursing staffing levels.

Discussion

Deep sedation, in any of the representations, did not appear to influence the extent of frightening memories. Additionally, no other potential risk factor showed strong association with either primary outcome. Frightening memories were common as assessed by both measures, and also seemingly unpredictable. The implication of this study is that all critical illness survivors are at high risk of developing frightening memories; care-givers therefore need to be conscious of this. Routine early follow-up using the ICE-Q or IES-R could be used to identify patients at greatest risk of longer term psychological outcomes, enabling early management.

Deep sedation was also prevalent, particularly towards the beginning of patients' ICU stay. Many factors were identified as influencing nurses' selection of deep sedation for a patient, some extending beyond the patient. Unexpected findings highlight new areas to focus quality improvement projects, such as concerns regarding staff safety. Predominantly, clarity of sedation definitions and addressing safety concerns seem most important to nurses in the unit investigated.

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