

Abstract

Significant psychological impacts, including post-traumatic stress disorder (PTSD), have been associated with a patients' under sedation in Intensive Care Units (ICU). It however remains undefined if and how sedation is related to post-ICU psychological outcomes. This literature review explores the relationships between sedation, the depth of sedation and psychological disorders. A review of existing literature was undertaken systematically using key terms and included peer reviewed primary research and randomised controlled trials (RCT). To ensure subject relevance pre-2006, non-English and paediatric based research were excluded. Findings highlighted that reduced sedation levels did not significantly reduce the outcome of PTSD yet reduced ICU length of stay and length of mechanical ventilation (MV) were both associated with lighter sedation. Further research is recommended in terms of more specific factual and delusional memories post-ICU in comparison to the level of sedation administration and the relationship to psychological distress.

Key words

Intensive Care

Post-Traumatic Stress Disorder (PTSD)

Sedation

Mechanical Ventilation

Psychological distress

Key Phrases

1. Negative psychological side effects are increasingly acknowledged as significant long term consequences for patients who have required intensive care management
2. Sedation administration is an essential aspect of intensive care nursing yet knowledge of its links to psychological outcomes are limited
3. The evidence is not overwhelming that levels of sedation directly link to the probability of psychological disorders occurring.
4. There is a paucity of evidence suggesting light levels of sedation decreases the risk of Post-Traumatic Stress Disorder (PTSD).
5. Shorter stays in ICU are linked to lighter sedation whilst undergoing mechanical ventilation.
6. Nurses in critical care areas should be aware of the good practice of assessing patients using a validated sedation score tool and keeping their patients minimally sedated where safe and applicable.

What is known about this topic:

- It is acknowledged that there is a risk of PTSD associated with sedation and mechanical ventilation for patients following ICU treatment.
- Sedation levels are varied within prescribed limits by nursing staff.

Introduction

It is estimated that 100,000 people across the UK are admitted to an Intensive Care Unit (ICU) each year (Intensive Care Society (ICS), 2011a). Of these critically ill patients the majority are cared for in an ICU because of their need for assisted mechanical ventilation (MV) and sedation to relieve the anxiety and physical distress that may result from the ICU environment and associated interventions (Woodrow, 2011). Sedation is indeed vital in enabling MV and uncomfortable treatments and procedures to be tolerated by patients in ICUs as well as to ease pain and anguish (ICS, 2011a; Gurudatt, 2011). Due to the nature of treatments, a stay in ICU can be a distressing experience. Psychological and emotional issues after discharge are not uncommon (Rattray & Hull, 2008).

Background

ICU therapy's impact on psychological well-being was recognised over three decades ago; Ashworth (1980) investigated nurse-patient communication in ICUs, thus reporting that effective communication during the ICU stay was paramount in promoting long term psychological well-being. A more recent Australian study focused specifically on the long term well-being of ICU patients' quality of life, one year after discharge. The results highlighted increased rates of depression and anxiety related illness, whilst ICU patients were more dependent on others than general members of the community (Brooks *et al.*, 1997).

More recent studies focused specifically on long-term psychological effects and more specifically incidences of PTSD following ICU discharge (Corrigan *et al.*, 2007; Davydow *et al.*, 2008). Scott & Palmer (2000) argued that PTSD can be diagnosed in an individual who, following a stressful event, presents with symptoms of intrusion, avoidance and disordered arousal. Taylor (2006) expanded further this definition stating the intrusion component is also referred to as 're-experiencing' the stressful event, possibly through dreams or intrusive recollections, whilst the avoidance component is evident when a sufferer avoids not only similar situations to the initial trauma but also conversations regarding it. Disordered arousal

may also be known as hyper-arousal; here symptoms of insomnia, hyper-vigilance, irritability and anger may be evident, as well as displaying evidence of being overly startled and difficulty concentrating (Taylor, 2006). If these symptoms were not present prior to the initial traumatic experience and persist beyond four weeks then PTSD can be diagnosed (Scott & Palmer, 2000). The National Institute of Clinical Excellence (NICE) in the UK concur with this definition yet there appears to be a lack of internationally used tools used for assessment to aid specific diagnosis (NICE, 2005.).

Jubran *et al.* (2010) studied 42 patients from ICUs who were successfully weaned from MV. After 3 months 12% of them were suffering with PTSD. Jones *et al.*, (2007) concur yet suggest that the care given in ICUs affects these results and recommends further research investigating sedation and subsequent occurrences of PTSD. It is common practice in ICUs that doctors prescribe limits of sedation and nurses may increase or decrease the medication within these limits in response to patients' requirements (ICS, 2011b). The uncertainty however, is if altered sedation relates to psychological distress and possible incidents of PTSD. This review critically appraises any relationships between sedation and psychological disorders in adults and considers how these findings may be implemented in care protocols to provide optimal treatment for patients in ICUs.

Search Strategy

A systematic review of quality research was undertaken in spring 2013 to meet the aims of the study. It is of utmost importance to define exclusion and inclusion criteria prior to commencing (Aveyard, 2010). It was decided using academic search engines to define the language used therefore the results were limited to research written in English (Bell, 2010). Research published prior to 2006 was not included to ensure only contemporary information was reviewed. Furthermore only research published in peer reviewed journals was included. Due to their specialist nature, research titled paediatric or adolescent were excluded to maintain the required adult patient focus. Using electronic databases, the search was

undertaken using the following variations of the key words. This resulted in 42 papers of which four were duplicated, three were editorial letters, four were literature reviews and two were conference proceedings. Of the remainder 14 were not specifically concerned with sedation in ICUs, two focused mainly on paralysis and two focused on protocols and policies. A further article focused on product quality in ICUs and two more were concerned with predicating PTSD in ICU patients. This left eight relevant research papers which were evaluated for methodological quality using the Critical Appraisal Skill Programme tool (CASP, 2013) which have been summarised in table 1.0.

Author & Year	Country & Setting	Method	Key Findings
Ethier <i>et al.</i> (2011)	Canada Multi centre ICUs	Questionnaire (sub-study of an Randomised control pilot study) Small sample n=26 Short follow up period of 6 days	No difference in recall of the ICU experience between patients managed with continuous sedation and those managed with daily sedation interruption.
Jackson <i>et al.</i> (2010)	USA Single centre ICU	Randomised control study Sample n=187 Follow up period at 3 and 12 months	Very similar levels of PTSD shown 12 months post-discharge in patients whose sedation was stopped when weaning from the ventilator compared to those whose sedation continued.
Salgado <i>et al.</i> (2011)	Belgium Single centre medical/surgical ICU university hospital	Observational cohort study Sample n=335 Broad focus	Both reduced length of stay and mortality associated with less sedation.
Samuelson <i>et al.</i> (2007)	Sweden Two general ICUs	Questionnaire Sample n=313 Short follow up of 3-5 days	Patients receiving light sedation perceive their experience of the ICU to have been more stressful than patients who were heavily sedated.
Samuelson <i>et al.</i> (2008)	Sweden Single centre ICU at a university hospital	Randomised control trial (pilot study) Sample n=36 Follow up period at 2 and 6 months Single centre	Lighter sedation during mechanical ventilation post-op did not seem to increase the likelihood of stressful memories of the experience, similar levels of PTSD in both groups.
Tøien <i>et al.</i> (2011)	Norway Single centre ICU in a specialist trauma hospital	Cohort study Sample n=393 Follow up period at 3 and 12 months	ICU trauma patients compared to non-ICU traumas patients 12 months post-discharge did not report higher levels of PTSD or

		Single centre	depression.
Treggiari <i>et al.</i> (2009)	USA Single centre ICU in one university hospital	Randomised control trial Sample n=137 Follow up period at 4 weeks	No significant difference in levels of PTSD post-ICU in patients who were lightly sedated compared to those who were deeply sedated.
Weinert & Sprenkle (2008)	USA, Single centre ICU in a teaching hospital	Observational cohort study Sample n=277 Follow up period of 2 and 6 months	Patients at the most extreme ends of the sedation scale (most unresponsive and most awake) are least likely to experience PTSD compared to those in between. No association between depth of sedation and PTSD.

Table 1.0 Summary of characteristics and findings.

Findings

A thematic analysis was used to summarise and synthesise the findings of the review (Braun and Clark 2006). The approach to synthesis began with codes given to sections of relevance. Codes were then reviewed, analysed and grouped into significant themes which were extracted and given titles. Results were scrutinised for significance in order to draw conclusions and make recommendations for clinical practice. Themes are presented as follows:

Deep sedation versus light sedation

Weinert and Sprenkle's (2008) highlight that 17% and 15% of their participants (ICU patients ventilated above 36 hours) could be formally diagnosed with PTSD at both two and six months post ICU respectively, using a Posttraumatic Stress Diagnostic Scale advocated by the American Psychiatric Association. However their findings do not indicate any association between the intensity of sedation and PTSD or psychological symptoms. They do instead highlight that the most awake and least awake patients showed less symptoms than the mid-range patient group. A sample from Samuelson *et al.*'s (2007) 36 ICU patients who had been mechanically ventilated for 24 hours or more suggests that patients who were more lightly sedated reported their ICU experience as more stressful than others that were deeply sedated. Similarly Treggiari *et al.* (2009) demonstrated a modest indication that a method of

lighter sedation in ICUs may lead to protection from adverse psychological issues afterwards. Jackson *et al.* (2010) identified similar levels of PTSD in the control and intervention groups at three months, 10% and 14% respectively. An increase at 12 month assessment is shown, with both groups reporting 24% of patients were suffering from PTSD and, interestingly, levels of depression increased with time, 58% and 64% in the control and intervention groups respectively. The researchers conclude interrupting sedation and giving patients spontaneous breathing trials (SBT) does not have a negative impact on the patients' psychological outcomes or indeed their cognitive functioning.

Quality of life and Depression

Tøien *et al.* (2011) explored the difference in health-related quality of life (HRQOL) 12 months post-trauma comparing sedated ICU and non-ICU patients. Both reported a lower HRQOL than the general population, yet the study argued there was no significant difference in terms of psychological disorders. Jackson *et al.* (2010) suggested that using less sedation within an ICU environment can be as beneficial as never being admitted to an ICU in terms of quality of life and functional ability illness. However, it is worth noting that 62% of patients were discharged home in the intervention group and only 51% in the control group so this may account for these results as more patients were able to give data and have their results interpreted from the intervention group. Treggiari *et al.* (2009) reported similar levels of depression at four weeks assessments for both the deeply and lightly sedated groups, as did Jackson *et al.* (2010) at three and 12 month assessments.

Memories from the period of sedation and MV

Ethier *et al.* (2011) demonstrated no difference between the Normal Protocol Standards (PS) and PS plus Daily Sedation Interruption (DSI) in the recall of pain, fear or anxiety whilst sedated and mechanically ventilated. Samuelson *et al.* (2008) results indicated patients in the lighter sedated group were more likely to remember the ICU experience as less stressful than the patients in the deeper sedation group, and the patients in the deeper sedation group reported more hallucinations and nightmares thus remembering the experience as more stressful. Samuelson *et al.* (2007) further explained deeply sedated ICU patients

reported nightmares whilst the patients who were more lightly sedated reported the actual memories as more stressful.

Treggiari *et al.* (2009) reported conflicting results arguing that patients in the deeper sedation group have more trouble remembering the period of sedation and MV compared to the lighter sedated group. However it is also the deeper sedated group of patients who were more likely to report intrusive memories of the sedation and MV. Weinert and Sprenkle (2008) showed that lightly sedated patients had more factual memories from the period of sedation and MV. Patients who reported delirious memories from this period were more likely to be positive for psychological symptoms.

Length of stay and length of MV.

Salgado *et al.* (2011) results argued that less sedation did not have an adverse effect on patient mortality and length of stay whilst Treggiari *et al.* (2009) and Samuelson *et al.* (2008) both reported lighter sedation reducing the ICU length of stay without having a negative effect on patients' psychological well-being. Samuelson *et al.* (2007) reported more 'agitated' patients had a longer length of stay in the ICU being sedated and mechanically ventilated.

Discussion

In contrast to expectations Treggiari *et al.* (2009) and Jackson *et al.* (2010) both indicated that there was no significant difference in levels of psychological symptoms or diagnosis in lightly or deeper sedated patients whereas Tøien *et al.* (2011) argued there is no difference between ICU trauma populations and non-ICU trauma populations. It seems that lighter sedated patients are more aware of the experience thus remember it factually and therefore have reduced levels of psychological symptoms and that an ICU population would have more symptoms than a non-ICU population. Weinert & Sprenkle's (2008) findings, however, support the expected outcome that more awake patients report more factual memories from the period of sedation and MV. Factual memories were in turn less associated with psychological symptoms than delusional memories. Ethier *et al.* (2011) findings conflict with this idea, in that patients in both deep and lightly sedated groups reported no significant

difference in terms of having stressful memories of the ICU, indicating sedation depth does not have any effect on memories being interpreted as stressful. When assessing this in terms of Samuelson *et al.* (2007) results, which state that 97% of all ICU patients have at least one stressful memory of the ICU it becomes clear that the relationship between memory and sedation in ICU's is a complex one. This is especially shown when considering the Treggiari *et al.* (2009) study in which deeply sedated patients reported having more trouble remembering the period of sedation and MV compared to lightly sedated patients yet they also reported more intrusive memories of this period. More research regarding factual and delusional memories from ICUs in relation to sedation depth is clearly required.

Samuelson *et al.* (2008) also report similar levels specific to PTSD in deeply sedated patients compared to lightly sedated patients; however their sample size was too small to give any significance to this finding. They do however show, in contrast to previously mentioned findings, that only 6% of patients in the lightly sedated group report distressing memories compared to 33% in the deeper sedated group. Samuelson *et al.* (2008) do report that patients in the lighter sedated group have a decreased length of stay and give credibility to this statement with a *p.* value of 0.08. Samuelson *et al.* (2007) and Salgado *et al.* (2011) support less sedation decreasing the length of stay in ICUs. Treggiari *et al.* (2008) further support this concept by stating patient in the lighter sedated group in their study had their ICU stay reduced by one day less than deeper sedated patients whilst also requiring MV for a day and a half less. In the modern health service this can only be a positive, both from a financial and holistic perspective.

Jackson *et al.* (2010) and Treggiari *et al.* (2009) both report slightly increased rates of depression at scheduled assessments in patients who were in the deeper sedation groups (three months and four weeks respectively). However Jackson *et al.* (2010) reports that these results reverse at 12 month assessment where depression becomes higher in the lightly sedated group. Only Jackson *et al.* (2010) follows patients up to one year in terms of depression so there are no other results to compare this to. Tøien *et al.* (2011) argues that

rates of depression appear dependent on symptoms of depression prior to illness and ICU admission as patients who had not suffered with depression previously in life were less likely to develop it post-ICU. Therefore depression rates in Jackson *et al* (2011) and Treggiari *et al.* (2009) studies are not as significant without an awareness of patients' psychological status beforehand.

Follow-up times are problematic in this literature review. Ethier *et al.* (2010) followed patients up between 3-6 days, Samuelson *et al.* (2007) chose three to five days and Treggiari *et al.* (2009) followed up after four weeks. It is worth revisiting here Scott & Palmer's (2000) earlier statement that PTSD can only be defined if symptoms persist past four weeks. Only the Tøien *et al.* (2011) study follows patients up to one year post-ICU and their study is not sedation or PTSD specific. Treggiari *et al.* (2009) also only use a presumptive diagnosis of PTSD based on the answer participants gave to questionnaires. In future research it would be beneficial to involve expert clinicians to diagnose PTSD and have studies with longer follow-up times.

The Salgado *et al.* (2011) observational study was included in this literature review as the overall effects of reducing sedation needed to be explored as making a conclusion and recommendations regarding improving psychological implications would be ineffective if they inversely affected other factors of patients recovery and health. Salgado *et al.* (2011) conclude that there are no adverse reactions from reducing continuous sedation infusions in ICU. Treggiari *et al.* (2009) state in their study the number of accidental self-extubations was actually higher in the deeper sedation group compared to the lightly sedated group. This furthers strengthens the argument that lightening sedation in ICUs does not adversely affect patient safety or recovery. Samuelson *et al.* (2007) reports that more awake patients report a reduced length of stay, however agitated patients report longer lengths of stay. This again highlights that it is not sufficient to state that patients should receive lighter sedation regardless of any other issues and if patients are to have lighter sedation they should be kept calm and cooperative.

Limitations and strengths

Although recurrent searches were undertaken it is acknowledged that some studies may not have been identified due to inaccessibility. Only primary research was included, if secondary research was included the findings might have been more generalisable, however this would have detracted from the nature and quality of the review data.

Conclusion

Psychological disorders including PTSD are a significant issue for many ICU patients highlighting the need for research into possible ways to reduce and manage this group effectively. The results of this study show that interrupting sedation or continuous light sedation at such a level that allows patients to be judged as calm, cooperative and awake (using a validated sedation scoring tool) does not increase the probability of PTSD developing, in fact a slight reduction in levels of PTSD has been shown. Reducing patients' sedation levels has been shown to be beneficial in terms of length of days MV is required and time spent in the ICU whilst not compromising patient safety.

This literature review has not been conclusive in demonstrating links between depth of sedation in ICUs and stressful memories. Further research on this would lead to increased understanding of the psychological consequences of sedation and its depth in ICUs. In this literature review only three RCTs assessed the effects of light and deep sedation in ICUs in relation to PTSD and psychological outcomes. Further experimental trials are required to further define the relationship between depth of sedation in ICUs and PTSD, preferably with larger sample sizes, longer follow-up times and clear diagnosis of PTSD from a specialist clinician.

Although further research is required there is enough evidence to recommend that, where possible, patients in ICUs should be lightly sedated in order to reduce, all be it slightly, the chances of negative psychological reactions occurring post-ICU discharge. Assessments

should be undertaken using a validated tool to measure sedation levels and, where possible, patients should be kept at a sedation level that reflects a calm, cooperative patient. As a result length of stay in ICUs and time on MV will also be reduced.

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