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Dr. Ehab AbouAlazayem Abdelsalam Mohamed Shalaby
Specialist Physician Critical Care Medicine, Salma Rehabilitation Hospital Abu Dhabi Health Services Company (SEHA), Abu Dhabi, United Arab Emirates

Corresponding Author:
Dr. Ehab AbouAlazayem Abdelsalam Mohamed Shalaby
Specialist Physician Critical Care Medicine, Salma Rehabilitation Hospital Abu Dhabi Health Services Company (SEHA), Abu Dhabi, United Arab Emirates

Sedation treatment in critical care unit evolved over time

Dr. Ehab AbouAlazayem Abdelsalam Mohamed Shalaby

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Abstract
The utilization of sedation in critical care units has advanced considerably over time. This abstract provides a summary of the progression of sedative treatment in the critical care profession. The management of sedative in the critical care unit (ICU) has gained significant importance as healthcare providers strive to enhance patient outcomes. The management of sedation in critical care has typically relied on a combination of empirical methods, which might result in either insufficient or excessive sedation. However, as our understanding of critical care management expanded, our approaches to sedation also advanced. The implementation of sedation protocols, based on thorough research and clinical expertise, has revolutionized the sedation practises for patients in the critical care unit. This abstract examines the significant milestones in the development of sedation therapy, including the shift towards a more patient-focused approach, the establishment of sedation scales for evaluation, and the adoption of target-based sedation strategies. The research explores the potential benefits of advanced monitoring methods such as bispectral index (BIS) and electroencephalography (EEG) in improving sedation control and minimizing the likelihood of problems. The emergence of novel sedative techniques demonstrates the dedication of medical practitioners and researchers to improving the standard of patient care and results in critical care medicine. The proficiency of present and prospective critical care practitioners in enhancing patient care and attaining optimal results in this challenging and evolving environment relies on their knowledge of the historical background and progression of sedative treatment.

Keywords: Sedation, ICU, critical, ventilator, workforce

Introduction
The sedative protocols utilized in the intensive care unit (ICU) have undergone substantial modifications during the last twenty years [1-4]. Historically, patients were commonly given powerful sedatives to create a state of profound relaxation and facilitate slumber [4]. Convincing research indicates that these practices carry a substantial risk and are associated with poor outcomes [5, 6]. The prevailing practice involves administering minimal sedation and regularly arousing patients, while prioritizing their comfort [2] (refer to Supplementary Figure 1). The administration of sedation in the Intensive Care Unit (ICU) has seen changes and advancements over the course of time, as depicted in Figure 1.The first set of guidelines on sedative administration was published in 1995. The guidelines recommend the administration propofol as short-term sedatives, and lorazepam for long-term sedation [4]. The Prolonged Utilization of Sedatives with Painkillers in the Seriously Ill Adult (SAG) Medical Guideline Recommendations [3] were published in 2002. The sedation guidelines were determined using the data (Brook *et al*., 1999), which demonstrated that implementing a protocol-driven strategy to sedation resulted in a decrease in the duration of mechanical ventilation [3]. SAG suggested the implementation of a daily sedation aim or the implementation of daily sedation interruption. The recommendation was based on research by Kress *et al*., that showed that instituting a spontaneously awaken test in a decrease in the time of mechanical ventilation [3]. The SAG recommended using propofol for immediate neurological assessments and midazolam as for extended sedation as the preferred pharmacological choices. It was recommended to provide lorazepam to sedate most patients, without the need to progressively alter the dosage to produce mild drowsiness. The inclusion criteria consisted of statements that suggested paradoxical agitation and post-traumatic anxiety syndrome whilst undergoing light sedation.

The Professional Practise Recommendations for the Treatment of Pain, Agitation, and Delirium in Adults Intensive Patients were published in 2013 [1]. PAD recommended modifying the sedative dosage to attain a moderate state of sleepiness, unless there are explicit justifications against doing so. This recommendation was based on research studies such as Girard *et al*., which demonstrated that the combination of every day coordinated intermittent mandatory ventilation (SIMV) and daily spontaneity breathing trial (SBT) resulted in enhanced clinical outcomes [1], and Treggiari *et al*., which found that patients who received heavy sedation were more susceptible to creating post-traumatic anxiety illness (PTSD) [1]. The term "analgosedation" was coined in the late 2000s by Muellejans *et al*. [1], which employed remifentanil for the purpose of sedation. Meanwhile, Strom *et al*. implemented a technique of "no sedation" by delivering intermittent morphine [1]. The RASS as well as SAS are considered the most accurate tools for evaluating the level of arousal. PAD suggested the utilisation of non-benzodiazepines as a feasible choice for improving clinical results. Carson *et al*. found that individuals who were arbitrarily allocated to receive propofol had a shorter period of duration on ventilation relative to patients who were administered intermittent lorazepam [1]. The MENDS trial demonstrated that individuals who were given dexmedetomidine had a lower incidence of delirium and coma, and were considerably more likely to achieve a target RASS score within 1 point, relative to those who were provided lorazepam [1]. The SEDCOM study revealed that subjects who received dexmedetomidine experienced shorter periods of breathing and a decreased occurrence of delirium in comparison to those who were administered midazolam [1]. The ICU Liberation Bundle, commonly referred to as ABCDEF, is a collection of interventions designed to enhance results for individuals in in critical care section. The PAD protocol, which stands for Pain Evaluation, Preventive Medicine, and Administration; Both Unplanned Rising Investigations and Random Inhaling Trials; Decision-making of Painkillers and Sedation; Delirium Evaluation, Preventive Medicine, and Management; Early Movement and Exercise; and Family Involvement and Empowerment, was developed to implement the PAD approach [7]. The therapeutic outcomes of ABCDEF have been assessed in a cohort of over 25,000 patients, revealing significant enhancement. In 2012, PICS was defined as the occurrence of physical, cognitive, and/or psychosocial disabilities that occur after a severe illness, usually caused by delirium and an extended period of time spent in the intensive care unit (ICU). Shehabi *et al*. (2012) found that early administration of strong sedation resulted in prolonged times of breathing and increased mortality rates [5]. Chanques *et al*. discovered that ceasing sedation quickly in postoperative patients without severe acute respiratory distress syndrome (ARDS) was associated with better clinical results comparing to prolonging moderate sedation [8]. The PADIS guidelines, which include suggestions for the prevention and treatment of pain, agitation/sedation, delirium, a lack of activity and sleeplessness disruption in adult ICU patients, were released in 2018 [2]. PADIS advised the use of gentle sedation. PADIS advised the use of propofol in patients with cardiac problems, and preferably propofol or dexmedetomidine for patients having medical operations or non-cardiac surgery. After the introduction of PADIS, two studies, known as SPICE 3 [9] and Maximising the Effectiveness of Sedation and reducing Neurological Dysfunction and the death rate in Sepsis (MENDS 2) [10], have been published. These trials indicate that there is no substantial difference in medical results among dexmedetomidine and standard treatment (SPICE III) or propofol (MENDS 2). The NONSEDA trial employed random assignment to allocate critically sick patients undergoing mechanical ventilation into two groups: one receiving no sedative and the other receiving light sedation. The investigation revealed that there was no notable disparity in 90-day fatality or the duration of ventilator usage or ICU hospitalization among the two groups [11]. As of April 2022, there have been over 503 million documented cases of coronavirus illness 2019 (COVID-19).

Discussion

Patients with severe COVID-19 may require deep sedation if they develop symptoms of acute respiratory distress syndrome (ARDS). However, delirium and coma are possibilities when this level of sedation is used. 64% of patients were given benzodiazepines, whereas 71% were given propofol, according to the COVID-D research. Benzodiazepines were taken for a median of 7 days [12]. Patients with ARDS should have the choice of the greatest appropriate ventilator configuration given higher priority than the improvement of analgosedation [13]. However, it is obvious that people with severe ARDS or those receiving neuromuscular blockade are unable to be given mild sedation. This highlights the need for consistent interprofessional communication about the ABCDEF Package to provide a tailored approach to sedation administration and the reinstatement of light sedation wherever possible. Inconsistent data and resistance to change have contributed to a lack of trustworthy evidence in the field of sedative research. Future options may include adopting a standardised method that paves the way for reliable comparisons between studies [14]. In addition, there is promising promise in the use of breathed anaesthetics to provide sedative for critically ill patients [15]. This study includes a systematic review of the literature on the evolution of intensive care unit (ICU) sedation practises throughout the last two decades. Sedation practises in today's intensive care units (ICUs) emphasise the use of non-benzodiazepine drugs, low doses of sedatives, and sedation awakening trials (SAT). New requirements for sedation practises have emerged in the face of the current COVID-19 pandemic [13]. For patients to be able to go off the ventilator and improve their chances of survival and recovery, clinicians must reintroduce bundled-based procedures like the ABCDEF Bundle.

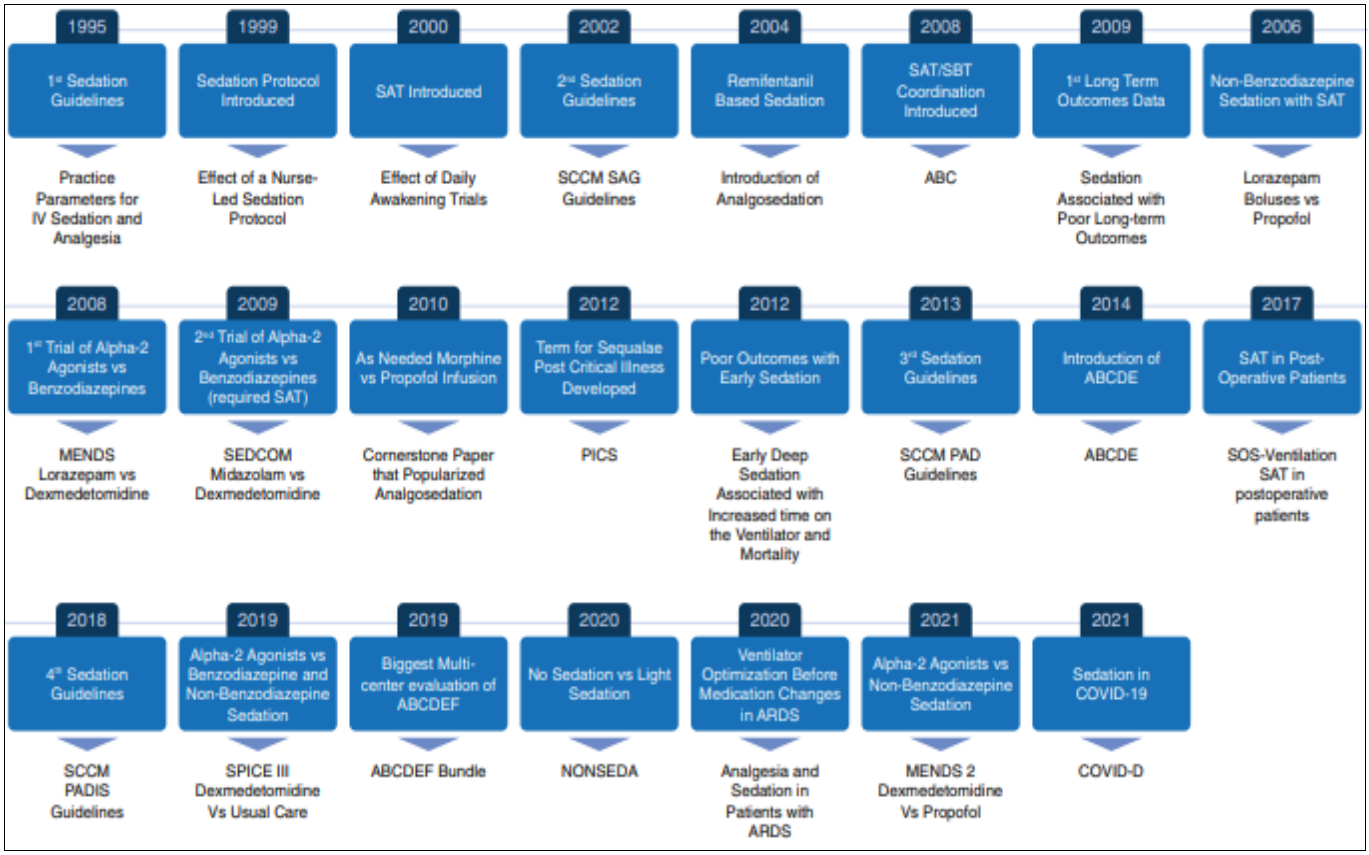

Fig 1: Timeline of selected landmark trials involved in the evolution of sedation in the ICU

Conclusion

This article summarised the changes that have occurred in intensive care unit sedative methods within the past two decades. Modern methods of sedation in the intensive care unit (ICU) include SAT, non-benzodiazepine sedation, and mild sedation. The pandemic has tested sedation methods and put an unprecedented strain on intensive care unit staff. In order to encourage patients to get off the ventilator and recover or survive, practitioners must immediately return to using bundled based tactics like the ABCDEF Bundle.

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