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Original research article

SEDATION DEPTH DURING CRITICAL CARE TRANSPORT AND HOSPITALIZATION

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Abstract: *The purpose of this study was to determine the differences in attained levels of sedation both within intensive care units and collectively regarding overall outcomes when patients were transported outside a hospital either pre-hospital or while being inter-facility transfer by different critical care agencies, having been exposed to light versus deep quality of anaesthesia. After the ethical approval from the institutional review board, this cross-sectional study was conducted at Khyber Teaching Hospital from 01/06/22 to 31/12/22. The primary outcome measure was the relation of starting deep sedation during transport to deep sedation in the first 48 hours after admission (defined as RASS -3 and less). Secondary outcomes included mechanical ventilation duration, inpatient mortality, total hospital stay length of ICU, and delirium within 48 h; coma may also be observed. Final transport RASS in both the study groups was-4.43±0.49 and-1.5±0.5 (p <0.0001). Mean Hospital duration in both study groups was 13.01±4.8 and 35±5.9 days (p<0.0001). A high percentage of inpatient mortality, delirium, and coma cases was seen in the deep sedation group (p<0.0001). The transfer of patient care from the transport team to the hospital team presents a chance to potentially interrupt the progress of treatment and reassess decisions regarding sedation.*

Keywords: RASS, Deep sedation, critically ill patients, transport

Introduction

Previous studies have approximated that inadvertent over-sedation affects approximately 40% to 60% of patients in the critical care unit (CCU) (Ceric et al., 2022). The current guidelines for sedating mechanically ventilated patients recommend aiming for mild degrees of sedation. Light sedation lacks a broadly agreed-upon definition. However, most published literature defines it as a Richmond Agitation Sedation Scale (RASS) score ranging from -2 to 1 (Celis-Rodríguez et al., 2020). Recent evidence emphasizes the correlation between profound sedation and higher mortality rates, longer stays in the intensive care unit (ICU), and extended periods of mechanical breathing (Aragón et al., 2019; Stephens et al., 2022). When compared to other sedative drugs that are given continuously, benzodiazepines are more commonly linked to profound sedation, higher rates of delirium, and longer stays in the ICU and hospital. Current guidelines advise the use of other sedatives, such as dexmedetomidine or propofol, instead of benzodiazepines due to the associated dangers (Freeman et al., 2020). Moreover, the use of analagosedation or analgesia-first sedation has been associated with decreased degrees of profound sedation, shorter periods of mechanical ventilation, and reduced exposure to sedative drugs. As a result, this technique is considered a favorable method of sedation for critically sick patients (Freeman et al., 2020).
A subset of severely ill patients initiates their critical care journey in the emergency department (ED), referral facilities, and operating room through critical care transport. The transitions of care originating from these sites are frequently overlooked and can impact the initial treatment provided in the ICU. For instance, the introduction of profound sedation in the emergency department has been demonstrated to lead to more profound sedation in the intensive care unit and higher death rates. It stays in the ICU longer (Fuller et al., 2019). This underscores the significance of therapeutic momentum. Recently, literature in the field of critical care transport has reflected these findings, showing similarly elevated rates of patients who are heavily sedated and highlighting the detrimental effects on long-term outcomes (Moy et al., 2021). To fully comprehend the influence of therapeutic momentum, it is crucial to assess the ramifications of admitting heavily sedated patients to the ICU on medical practices and patient outcomes (George et al., 2020). The purpose of this study was to determine the differences in attained levels of sedation both within intensive care units and collectively regarding overall outcomes when patients were transported outside a hospital either pre-hospital or while being inter-facility transfer by different critical care agencies, having been exposed to light versus deep quality of anaesthesia.

Methodology

After the ethical approval from the institutional review board, this cross-sectional study was conducted at Khyber Teaching Hospital from 01/06/22 to 31/12/22. Through non-probability sampling, 130 critically ill patients aged above 18 years, of both genders, who underwent invasive positive pressure ventilation using either a supraglottic airway or an endotracheal tube were transported through hospital-affiliated critical care transport team using either a land ambulance or a rotor wing aircraft for both pre-hospital and inter-hospital transportation. Patients who died within the first 48 hours of admission or had a duration of mechanical breathing less than 48 hours were eliminated. Data abstraction was conducted by examining scanned critical care team transport forms, inpatient medication administration records, and flowsheets that provided detailed information on CAM-ICU scores and RASS. The term "deep sedation" was used to describe a Richmond Agitation-Sedation Scale (RASS) score ranging from -3 to -5, whereas "light sedation" referred to an RASS score ranging from 1 to -2. Patients were randomly allocated into Group A-Deep sedation n=100 and Group B-Light sedation n=30. The indications for mechanical ventilation were categorized by the transport team documentation into the following groups: cardiac arrest, trauma, asthma, chronic obstructive pulmonary disease (COPD), neurological conditions, congestive heart failure (CHF), sepsis, and others. Traumatic brain injury was categorized as a traumatic injury rather than a neurological condition warranting the use of artificial breathing. Prehospital drugs were documented if the transport team gave them. The medications given before the arrival of the transport crew were not recorded. The total amounts of continuous infusion drugs administered were estimated by extrapolating from the final infusion rate and the overall duration of transport. The overall infusion quantity during travel was estimated using extrapolated values due to the logistical complexity of the setting and the unavailability of tracking medication titrations in real-time. The transport time was defined as when the crew arrived at the patient's bedside from the referral agency/hospital and handed off the patient to the receiving hospital. The hospitals that were mentioned were categorized based on their bed capacity into critical access (≤25 beds), small (26-100 beds), medium (100-400 beds), or academic medical centers. The statistical analysis was conducted using SPSS version 21. The continuous variables were displayed as Mean± S.D. The categorical variables were displayed as counts accompanied by their corresponding percentages. A T-test was used to compare the variables between the groups. A P-value below 0.05 was deemed to be statistically significant.

Results

A total of 130 critically ill patients were included in the analysis. The baseline demographic and clinical parameters of the study participants are represented in Table 1. There is no difference in the patient's age, gender, and weight among the two studied groups. In both studies, the majority of participants were transported through an ambulance facility. In the deep sedation group, 80% of the patients were received in the ICU, while in the light sedation group, most were received in the emergency department. The final transport tidal volume in both the study groups was 469.75±24.03 and 436.56±27.7 mL ($p < 0.0001$). Final transport RASS in both the study groups was-4.43±0.49 and-1.5±0.5 ($p < 0.0001$). Table 2 shows the patient's outcome in both study groups. Deep sedation during transport correlated with the hospital's length of stay. Mean Hospital duration in both study groups was 13.01±4.8 and 35±5.9 days ($p<0.0001$). A high percentage of inpatient mortality, delirium, and coma cases was seen in the deep sedation group ($p<0.0001$).

Table 1: Baseline characteristics of the study participants

Characteristic	Deep sedation (n = 100)	Light sedation (n = 30)	*P*-value
Age (years)	67.93±12.95	69.3±11.13	1
Male(%)	59 (59%)	19 (63.3%)	1
Admission weight (kg)	81.5±11.5	82.3±10.3	0.943
Transport			
Ground	86 (86%)	28(93%)	0.432
Rotor wing	14 (14%)	2 (7%)	
Referral agency type			
Scene	9 (9%)	4 (135)	<0.0001
Critical access hospital	17 (17%)	5 (17%)	
Small hospital	23 (23%)	3 (10%	
Medium hospital	48 (48%)	18 (60%)	
Academic medical center	3 3%)	–	
Receiving unit			
ED	18 (18%)	18 (60%)	0.006
Cardiac catheterization laboratory	4 (4%)	4 (13.3%)	
ICU	80 (80%)	8 (27%)	
Transport time (minutes)	65.7±15.9	54±12.3	0.009
Reason for intubation			
Sepsis	9 (9%)	–	<0.0001
Neurological	14 (14%)	8 (27%)	
CHF	5 (5%)	10 (33.3%)	
Asthma	25 (25%)	2 (7%)	
COPD	16 (16%)	–	
Trauma	9 (9%)	8 (27%)	
Cardiac arrest	10 (10%)	2 (7%)	

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Other	12 (12%)	–	
Final transport tidal volume (mL)	469.75±24.03	436.56±27.7	<0.0001
Final transport PEEP (cmH2O)	7.21±1.29	5	<0.0001
Final transport systolic BP (mmHg)	114.49±8.21	108±7.7	<0.0001
Final transport diastolic BP (mmHg)	72.23±6.8	69.6±8.3	<0.0001
Final transport GCS	3	3.9±1.04	<0.0001
Final transport RASS	-4.43±0.49	-1.5±0.5	<0.0001
First admission serum creatinine (mg/dL)	1.03±0.23	1.44±0.5	<0.0001
First admission serum lactate (mmol/L)	1.31±0.25	1.24±0.2	0.193

Table 2: Patient outcomes in the study groups

Outcome	Deep sedation (n = 100)	Light sedation (n = 30)	*P*-value
Duration of mechanical ventilation (days)	3.82±1.34	3.4±0.9	<0.0001
Hospital length of stay (days)	13.01±4.8	35±5.9	<0.0001
ICU length of stay (days)	9.7±4.2	15.8±3.7	<0.0001
Inpatient mortality	65 (65%)	5 (17%)	<0.0001
Delirium within 48 h	51 (51%)	5 (17%)	<0.0001
Coma within 48 h	76 (76%)	7 (23%)	<0.0001

Discussion

There was a link between the use of deep sedation during transport and the length of stay in the hospital. The mean hospital time in both study groups was 13.01±4.8 and 35±5.9 days, respectively (p<0.0001). A significant proportion of inpatient mortality, delirium, and coma cases were observed in the deep sedation group (p<0.0001). Previous literature shows that critical care transport patients often experience deep sedation (George et al., 2020; Moy et al., 2021). Handoff from the transport team is an occasion to reevaluate and readjust their regimens of sedatives and infusion amounts. Though we haven't found the literature about transport to inpatient transition, it appears to be one more occasion for breaking any therapeutic flow (Olfson et al., 2015). Hospital admission to a critical care service is usually a time when the medical staff collects data and tries to define pathological processes, with many aspects left unclear. Nevertheless, this transition might also present an opportunity for conducting a spontaneous awakening trial in eligible patient groups. Literature on implementing a daily spontaneous awakening trial has shown to be beneficial in morbidity and mortality outcomes (Girard et al., 2008). Adopting such an approach would necessitate having this multidisciplinary team at handoff to ensure appropriate patients are selected, again ensuring that safety concerns for patients and staff are considered. Further assessment includes the identification of patients at risk for developing complications that might be disastrous as a result of ongoing deep sedation or benzodiazepine exposure, like those who have undergone a post-cardiac arrest case, to facilitate better and more efficient management of the patients (Levito et al., 2021). It is when the surgeon notices an indication that his work is going on more slowly. Although sedation management and recommendations continue to change, the additional focus on pause to re-evaluate treatment goals and trajectories could help increase the time spent under light sedation during ICU care (Roginski et al., 2023).

Conclusion

Deep sedation was commonly reported during the transportation of critically ill patients in this study, and it was found to be associated with deep sedation within the initial 48 hours of hospitalization. Significant difference was observed in the duration of hospital and ICU stays, the length of time mechanical breathing was required, the rate of inpatient mortality, or the occurrence of delirium and coma during the first 48 hours. The transfer of patient care from the transport team to the hospital team presents a chance to potentially interrupt the progress of treatment and reassess decisions regarding sedation.

Declarations

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate.

Approved by the department Concerned.

Consent for publication

Approved

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Conflict of interest

The authors declared an absence of conflict of interest.

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Conception of Study, Development of Research Methodology Design, Study Design, Review of manuscript, final approval of manuscript
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Data entry and Data analysis, drafting article.
Data acquisition and analysis.
SHOAIB MALIK (Associate Professor)
Conception of Study, Development of Research Methodology Design, Study Design, Review of manuscript,

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