

Emergency Physicians' Attitudes and Practices in Procedural Sedation and Analgesia: A National Survey

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Abstract

Objective: Procedural sedation and analgesia (PSA) is integral to emergency department (ED) practice; however, variability in protocol implementation, monitoring standards, and safety practices may compromise patient outcomes. This study aimed to comprehensively evaluate the institutional infrastructure, clinical practices, pharmacologic preferences, safety attitudes, and sedation monitoring practices of emergency medicine specialists regarding PSA in Turkish EDs.

Methods: This national cross-sectional survey was conducted among emergency medicine specialists across Türkiye, including tertiary care hospitals, training and research hospitals, and state hospitals in multiple cities, between July 1

and August 1, 2018. A structured electronic questionnaire assessed institutional PSA infrastructure (availability of written protocols, monitoring equipment, and difficult airway equipment), PSA frequency, protocol availability, monitoring practices, pharmacologic preferences, complication experiences, and use of sedation depth assessment tools. The questionnaire was distributed to emergency medicine specialists via professional association mailing lists using a convenience sampling approach. Participants' demographic characteristics, clinical attitudes, and procedural practices were analyzed descriptively.

Results: A total of 405 emergency physicians (mean age 36.1 ± 4.7 years; 53.8% male)

participated. The sampling frame targeted emergency medicine specialists actively practicing in Türkiye at the time of the survey. Of 943 specialists contacted, 405 completed the survey, yielding a response rate of 44.4%. Regarding attitudes and practices, the majority reported high procedural confidence, yet significant gaps were identified in adherence to structured protocols and objective monitoring. PSA was performed frequently, with 72.6% reporting more than five procedures per week. Despite this high procedural volume, 79.8% reported the absence of a written PSA protocol at their institution. While standard monitoring infrastructure was widely available (90.6%), adequate difficult airway equipment was reported by only 66.7% of respondents. Midazolam was the predominant sedative, and fentanyl was the leading analgesic. More than half of physicians (55.1%) reported experiencing at least one PSA-related complication, most frequently hypotension, respiratory depression/apnea, and hypoxia. Notably, 82.5% did not use any validated sedation depth assessment scale.

Conclusion: Although PSA is routinely performed in Turkish EDs and basic infrastructure appears largely sufficient, substantial deficiencies persist in protocol standardization, airway preparedness, and objective sedation assessment. These findings highlight a critical need for structured institutional PSA protocols and routine implementation of validated sedation monitoring

tools to enhance patient safety and reduce practice variability.

Keywords: Procedural sedation and analgesia, emergency department, emergency medicine specialists

INTRODUCTION

Procedural sedation and analgesia (PSA) refers to the administration of sedative and/or dissociative agents to achieve a controlled depression of consciousness while preserving spontaneous ventilation and protective airway reflexes. This approach facilitates the safe and effective performance of diagnostic and therapeutic procedures while minimizing patient discomfort and psychological distress (1). PSA has evolved into a fundamental competency in emergency medicine, supported by specialty-specific guidelines developed by organizations such as the American College of Emergency Physicians (ACEP) (2). The spectrum of sedation depth requires that clinicians possess both pharmacological expertise and the technical skills necessary to manage the full range of potential physiological responses (2).

In emergency departments (EDs), PSA is routinely performed for a wide range of interventions, including fracture and dislocation reduction, abscess drainage, synchronized cardioversion, tube thoracostomy, lumbar puncture, and complex wound management (3). Accumulating evidence indicates that PSA administered by emergency physicians demonstrates high success rates and safety profiles comparable to those achieved by anesthesiologists, provided that appropriate patient selection and monitoring standards are maintained (4).

Despite its established role in emergency care, PSA is not without risk. Potential adverse events

such as hypotension, respiratory depression, airway compromise, and hypoxemia necessitate meticulous drug selection, individualized dosing strategies, continuous physiological monitoring, and immediate access to advanced airway equipment (5). The incidence of PSA-related complications in ED settings varies by agent used, patient comorbidities, and sedation depth (5). Capnography-based end-tidal CO₂ monitoring, validated sedation depth scales such as the Ramsay Sedation Scale and the Richmond Agitation-Sedation Scale (RASS), and standardized pre-procedural checklists have been proposed as essential components of a safe PSA framework (2). Nevertheless, substantial heterogeneity persists across institutions and clinicians regarding protocol standardization, monitoring practices, and pharmacologic preferences (6).

The pharmacological armamentarium available for PSA has expanded considerably. Agents such as propofol, ketamine, etomidate, midazolam, and dexmedetomidine offer clinicians a range of options tailored to procedure type, patient age, hemodynamic status, and anticipated sedation depth (2).

Although PSA is widely integrated into emergency practice, there remains a relative paucity of data evaluating emergency physicians' attitudes, institutional preparedness, and real-world practice patterns — particularly in middle-income healthcare systems. Survey-based studies from countries such as the Netherlands have revealed considerable practice variability even

within well-resourced healthcare environments (6,7). To our knowledge, no comprehensive national survey has previously examined PSA practices and institutional infrastructure among emergency medicine specialists in Türkiye.

The present study aims to evaluate the attitudes, institutional practices, and procedural approaches of emergency medicine specialists in Türkiye regarding PSA, with a focus on protocol standardization, monitoring strategies, and patient safety measures.

MATERIALS AND METHODS

This descriptive, cross-sectional survey study was conducted among emergency medicine specialists working in the emergency departments of state hospitals, university hospitals, and training and research hospitals across Türkiye. The primary aim of the study was to evaluate current attitudes and practices regarding procedural sedation and analgesia (PSA) applied in emergency departments.

The target population consisted of emergency medicine specialists actively working in emergency departments of state hospitals, university hospitals, and training and research hospitals throughout Türkiye during the study period. Participants were recruited through professional emergency medicine associations, which distributed an invitation e-mail containing a link to the online questionnaire via their mailing lists. Participation was voluntary, and physicians who agreed to participate completed the questionnaire electronically. Therefore, a

convenience sampling approach was used rather than probability-based random sampling.

The sample size was calculated using the standard formula for estimating a population proportion in a cross-sectional study: $n = Z^2 \times p \times (1-p) / d^2$ where $Z = 1.96$ for a 95% confidence level, $p = 0.50$ (assumed prevalence), and $d = 0.05$ (margin of error). Since no previous nationwide study evaluating procedural sedation and analgesia practices among emergency medicine specialists in Türkiye was available, a prevalence of 50% was assumed. This conservative assumption maximizes the required sample size and is commonly used when prior data are lacking. Based on these assumptions, the minimum required sample size was calculated as 384 participants. To account for potential incomplete questionnaires and non-participation, the target sample size was increased to 413 participants.

The questionnaire was specifically developed by the authors for the purposes of this study, following a comprehensive review of the relevant literature on procedural sedation and analgesia practices in emergency medicine. It was not adopted from any previously published instrument. To ensure content validity and clarity, the questionnaire was reviewed by five senior emergency medicine specialists prior to implementation. Subsequently, it was pilot-tested with 20 emergency medicine specialists who were not included in the final analysis. Based on the feedback received, minor modifications were made to improve item clarity and

comprehensibility before the questionnaire was finalized.

The online questionnaire was distributed via email between July 1 and August 1, 2018. A total of 943 emails were sent, and 413 responses were received. After excluding incomplete or incorrectly completed questionnaires, 405 emergency medicine specialists were included in the final analysis.

The questionnaire collected data on participants' demographic and professional characteristics (age, gender, institution type, and years of experience), the presence of written PSA protocols, frequency and indications of PSA use, adequacy of standard and difficult airway equipment, available airway devices, frequency and methods of patient monitoring, preferred sedative and analgesic agents (and reasons for preference), drug combinations used for various procedures, occurrence and types of complications, fasting assessment, availability of opioid and benzodiazepine antagonists, and the use of sedation depth assessment scales.

As this study employed a descriptive cross-sectional design, only descriptive statistics were used. Continuous variables were expressed as mean $\pm$ standard deviation (SD) or median (interquartile range, IQR) according to the distribution of the data. Categorical variables were presented as frequencies and percentages. No inferential or comparative statistical testing was performed

RESULTS

A total of 405 emergency medicine specialists were included (53.8% male), with a mean age of 36.1 ± 4.7 years. Male physicians were slightly older than female physicians (36.6 ± 5.2 vs. 35.6 ± 4.1 years). Most participants (64.4%) had 0–5 years of professional experience. The majority (79.8%) reported the absence of a written procedural sedation and analgesia (PSA) protocol in their institutions. PSA was performed frequently, with 72.6% reporting more than five procedures per week. Orthopedic interventions (93.1%) and cardioversion (89.4%) were the leading indications for PSA, followed by imaging procedures (50.1%). Most physicians reported adequate standard monitoring infrastructure (90.6%) and availability of difficult airway equipment (66.7%) in their departments (Table 1).

Table 1. Characteristics of Emergency Medicine Providers and PSA Practices

Variable	n	%	Mean ± SD
Gender			
Male	218	53.8	
Female	187	46.2	
Age (years)			
Male			36.6 ± 5.2
Female			35.6 ± 4.1
Professional experience in emergency medicine			
0–5 years	261	64.4	
5–10 years	110	27.2	
>10 years	34	8.4	
Presence of written PSA protocol in the institution			
Available	82	20.2	
Not available	323	79.8	
Frequency of PSA procedures per week			
more than 5 times	294	72.6	
2–4 times	75	18.5	
Once	15	3.7	
Most common indications for PSA			
Orthopedic interventions	377	93.1	
Cardioversion	362	89.4	
CT/MRI imaging	203	50.1	
Availability of standard equipment			
Available	367	90.6	
Not available	38	9.4	
Availability of difficult airway equipment			
Available	270	66.7	
Not available	135	33.3	

CT = Computed tomography; MRI = Magnetic resonance imaging; PSA = Procedural sedation and analgesia; SD = Standard deviation.

Most physicians reported consistent patient monitoring during procedural sedation and analgesia (PSA), with 84.4% indicating that they always monitored patients. Among those who did not consistently monitor, the predominant barriers were insufficient staffing (79.4%) and inadequate equipment (17.5%), whereas only

3.2% considered monitoring unnecessary. Pulse oximetry was nearly universal (98.5%), followed by non-invasive blood pressure monitoring (94.4%) and ECG (88.2%) (Table 2).

Table 2. Monitoring Practices During Procedural Sedation and Analgesia in the Emergency Department

Variables	n	%
Monitoring Frequency During Procedural Sedation and Analgesia		
Always	342	84.4
Frequently	56	13.8
Occasionally	6	1.5
Rarely	1	0.2
Reasons for Not Performing Monitoring During Procedural Sedation and Analgesia		
I consider it necessary, but there is insufficient personnel.	50	79.4
I consider it necessary, but there is insufficient equipment.	11	17.5
I do not consider it necessary.	2	3.2
Timing of Monitoring		
Before, during, and after the procedure	379	93.6
Before and during the procedure	18	4.4
During the procedure only	8	2
Monitoring Equipment		
Pulse oximeter	384	98.5
Non-invasive blood pressure monitoring	368	94.4
Electrocardiography (ECG)	343	88.2
End-tidal carbon dioxide (EtCO ₂) monitoring	69	17.7

Midazolam was the predominant first-line sedative (67.4%), with propofol (24.2%) and diazepam (4.9%) used less frequently (Figure 1). For analgesia, fentanyl was most commonly preferred (65.7%), followed by morphine

(25.7%) and ketamine (8.4%) (Figure 2). Midazolam remained the leading agent for both minimal (81.5%) and moderate-to-deep sedation (61.0%).

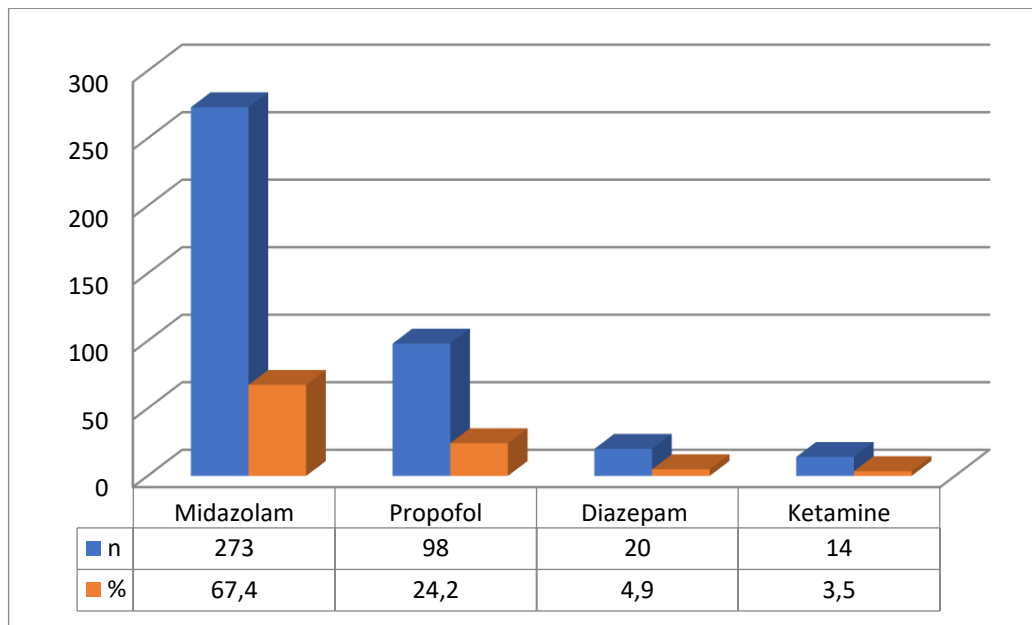


Figure 1. Distribution of First-Choice Sedative Agents Used During Procedural Sedation and Analgesia

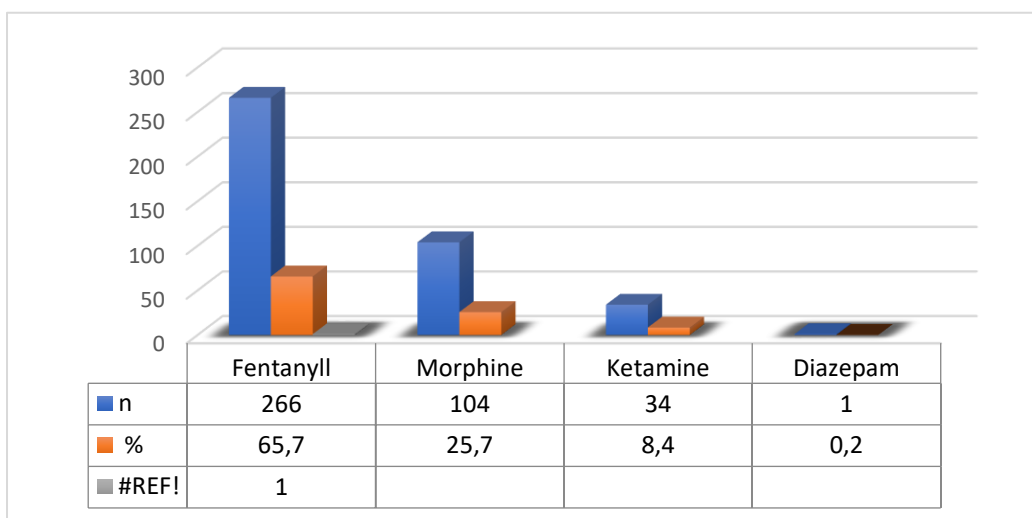


Figure 2. Distribution of First-Choice Analgesic Agents Used During Procedural Sedation and Analgesia

Table 3. Incidence and Types of Adverse Events During Procedural Sedation and Analgesia

Variables	n	%
Occurrence of Adverse Events During Procedural Sedation and Analgesia		
Yes	223	55.1
None	182	44.9
Types of Adverse Events During Procedural Sedation and Analgesia		
Hypotension	160	71.1
Respiratory depression, apnea	136	60.4
Hypoxia (SpO ₂ < 90%)	105	46.7
Nausea, vomiting	52	23.1
Respiratory arrest	33	14.7
Prolonged sedation	32	14.2
Cardiac arrest	5	2.2

When the distribution of sedoanalgesia combinations used by physicians for orthopedic procedures was analyzed, the most frequently used regimen was midazolam–fentanyl (n = 173, 42.7%), followed by midazolam–morphine (n = 71, 17.5%) and ketamine–propofol (n = 65, 16%). Similarly, when the distribution of sedoanalgesia regimens used during cardioversion was examined, midazolam–fentanyl was the most commonly preferred combination (n = 203, 50.2%), followed by midazolam–morphine (n = 114, 28.2%), while 32 physicians (7.9%) reported using midazolam alone.

More than half of physicians (55.1%) reported experiencing at least one complication during PSA. The most frequently encountered adverse events were hypotension (71.1%), respiratory

depression/apnea (60.4%), and hypoxia (46.7%) (Table 3).

Fasting status was assessed by 84.4% of physicians, and 95.3% reported the availability of opioid and benzodiazepine antagonists in their institutions. Notably, 82.5% of physicians did not use a standardized sedation scale; among scale users, AVPU was most common, followed by the Ramsay Sedation Scale and Richmond Sedation–Agitation Scale (RASS).

DISCUSSION

Procedural sedation and analgesia (PSA) is a core competency in contemporary emergency medicine, driven by the increasing volume of painful and time-sensitive interventions performed in the emergency department (ED) (1). This national survey provides the first

comprehensive overview of PSA practice patterns among emergency physicians in Türkiye and reveals a critical gap between frequent clinical use and structural standardization.

In our study, procedural sedation and analgesia (PSA) was observed to be performed very frequently in the emergency department, with approximately two-thirds of participants reporting more than five sedation procedures per week. This finding indicates that PSA is not an occasional intervention but a routine component of emergency care. However, only 20.2% of respondents reported the presence of a written PSA protocol in their department. This rate is consistent with previous reports showing limited protocol implementation in Türkiye, yet it remains substantially lower than figures reported in some other healthcare systems (8,9,10). Despite the high procedural volume, the lack of formal protocols may contribute to inter-physician variability and inconsistencies in safety practices, highlighting the clear need to strengthen standardization and a culture of safety in PSA practice.

PSA is frequently used in emergency departments for fracture and dislocation reductions, incision and drainage of abscesses, cardioversion, tube thoracostomy, lumbar puncture, complex wound repair, and imaging studies in uncooperative patients (9). In a study by Norii T. et al., PSA was most commonly performed for cardioversion (44.0%), followed by gastrointestinal endoscopy (21.4%) and reduction of joint dislocations and fractures

(17.8%) (11). Similarly, Elkhodair et al. reported that PSA was most frequently used during orthopedic procedures (89%) (9). Jacques et al. also found that PSA was commonly administered during orthopedic interventions (95.9%) (12). Consistent with the literature, our study demonstrated that PSA was most frequently performed for orthopedic procedures (93.1%), followed by cardioversion (89.4%) and imaging studies such as CT and MRI in uncooperative patients (50.1%). These findings further support the central role of PSA in managing painful and procedure-intensive conditions in emergency department settings.

Pulse oximetry, ECG, and non-invasive blood pressure monitoring have been reported as the most commonly used monitoring modalities during procedural sedation and analgesia (13). Similarly, Seo J S et al. identified pulse oximetry (97.6%) as the most frequently utilized monitoring tool (14). Consistent with the literature, our study also demonstrated that the most commonly used monitoring devices were pulse oximetry (98.5%), non-invasive blood pressure monitoring (94.4%), and ECG (88.2%), respectively. These findings suggest that fundamental monitoring modalities are well established and widely implemented in emergency departments.

Regarding capnography use, the literature reports more variable findings. In the survey conducted by Shavit I. et al., 45% of clinicians reported never using capnography, 35% reported routine use, and 20% stated that they used it only when

propofol was administered for sedation (15). In contrast, Ilko S.A. et al. reported a capnography utilization rate of 74% during procedural sedation and analgesia (16). In our study, the rate of capnography use during PSA was 17.7%. Despite growing evidence in the literature supporting capnography use during PSA in emergency departments, it appears that its adoption in our country remains insufficient.

Duncan RA et al. reported in their study including a total of 101 patients that midazolam was used for sedation in 85 patients during procedural sedoanalgesia (17). Similarly, Hodkinson PW et al., in their study evaluating procedural sedation practices in emergency departments, found that clinicians most frequently preferred midazolam (72.4%) for sedation (3). Consistent with the literature, our study also demonstrated that emergency medicine specialists most commonly preferred midazolam (67.4%) as the first-line agent for sedation during sedoanalgesia. The availability of a specific antagonist (flumazenil) and the reversibility of potential adverse effects may explain why clinicians prioritize midazolam as their first-choice agent.

In a survey conducted by Pinto et al. among emergency physicians in Southwestern Ontario, fentanyl (66%) was reported as the most frequently preferred analgesic agent for procedural sedoanalgesia (18). Consistent with the literature, our study also found that emergency medicine specialists most commonly preferred fentanyl (65.7%) for analgesia during sedoanalgesia. Fentanyl was followed by

morphine (25.7%) and ketamine (8.4%), respectively.

Mensour et al. reported that procedural sedation was performed in 660 patients, with adverse events occurring in 18% of cases. The reported adverse events included apnea (10%), inadequate sedation (3%), bradycardia (2%), desaturation (1%), and hypotension (1%), respectively (19). In the study by Pachulski et al., which included 700 patients, hypoxia was observed in 17 patients (2.4%) and hypotension in 14 patients (2.0%) (20). In a large series by Bellolio et al., encompassing 13,883 procedural sedoanalgesia applications, the most frequently reported adverse events were vomiting (55.5%), agitation (17.9%), hypoxia (14.8%), and apnea (7.1%) (21). In our study, 55.1% of participants reported encountering complications during procedural sedoanalgesia; however, this finding reflects clinician experience based on self-reported data rather than the true incidence of adverse events. This may explain why the reported rates appear higher compared with some prospective and registry-based studies in the literature. The most frequently reported complications in our study were hypotension and respiratory depression/apnea, which is consistent with the known cardiorespiratory depressant effects of benzodiazepine–opioid combinations. These findings underscore the importance of careful assessment of hemodynamic stability and respiratory reserve when selecting sedative and analgesic.

The majority of physicians (84.4%) routinely assessed fasting status prior to PSA, reflecting adherence to safe practice standards; consistent with ACEP guidance, however, fasting was not treated as an absolute contraindication in emergency settings ((2). This reflects the pragmatic nature of emergency care, where procedural urgency often outweighs elective anesthesia standards. However, the majority of respondents did not use validated sedation scales to assess depth of sedation. The absence of objective sedation assessment tools may limit reproducibility, quality assurance, and documentation standards.

Study Limitations

Several limitations of this study should be acknowledged. First, the use of a convenience sampling approach via professional association mailing lists may have introduced selection bias, as physicians who are more engaged with their professional associations or more interested in PSA practices may have been more likely to participate. Second, the response rate of 44.4% raises the possibility of non-response bias, whereby non-participating physicians may differ systematically from those who completed the survey in terms of their attitudes and practices. Third, as with all self-report surveys, the data are subject to social desirability bias, whereby respondents may have over-reported adherence to recommended practices. Fourth, the cross-sectional design of the study precludes any causal inference regarding the identified associations. Fifth, the study was conducted in 2018, and given

the dynamic nature of emergency medicine practice, some findings may not fully reflect current practice patterns. Sixth, the questionnaire was not validated against an objective measure of PSA practice, and although content validity was established through expert review and pilot testing, psychometric properties such as test-retest reliability were not formally assessed. Finally, the findings may not be generalizable beyond the Turkish emergency medicine context, as institutional infrastructure, training standards, and resource availability may differ considerably across healthcare systems.

CONCLUSIONS

Our findings suggest that PSA in Turkish EDs is widely practiced but insufficiently standardized. The combination of high procedural volume, limited written protocols, low capnography utilization, and infrequent use of sedation scales highlights opportunities for system-level improvement. National guideline development, structured training programs, and standardized monitoring policies may enhance patient safety and reduce practice variability.

Ethics

Ethics Committee Approval: Ethics committee approval has been granted by the Clinical Research and Ethics Committee of Mersin University (Decision No: 2018/284, dated July 11, 2018)

Informed Consent: Informed consent was obtained from all participants prior to their completion of the questionnaire. Participants were informed about the purpose of the study, the voluntary nature of participation, and the confidentiality of their responses.

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