Procedural Sedation Goes Utstein: The Quebec Guidelines

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During the past 2 decades, procedural sedation and analgesia practice and research have grown in a multidisciplinary fashion. Emergency physicians have interest in systemic analgesia and sedation, assuming a role at the forefront of sedation research and innovation.1

One current limitation to procedural analgesia and sedation research is obtaining an aggregate “big picture” view of key sedation issues. Current data are hampered by the boundaries of patient heterogeneity, single-center investigations, and variable measurement designs used. Adverse events are of particular concern for any sedation research; different investigators select disparate outcomes and complications. For example, emergency department (ED) studies on propofol-based regimens observe adverse events from a low range of 1.5%2 to 3.5%3 to a high range of 31%4 to 33%.5 One trial even observed an astounding 436% rate of complications in those receiving propofol with fentanyl.6 It is difficult to draw safety and effectiveness conclusions when side-by-side or aggregate study analysis is limited because of research design limits.

Important next steps in ED procedural analgesia and sedation research are to address these variations in outcomes and definition and then use a standardized set of definitions and outcomes as part of future trials. Two large consortia, Pediatric Emergency Research Canada (PERC) and the Pediatric Emergency Care Applied Research Network (PECARN), are planning large trials on procedural analgesia and sedation. To address the lack of set taxonomy, the 2 research groups created consensus uniform reporting standards. This parallels the seminal 1991 Utstein reporting standards for out-of-hospital cardiac arrest research.7 Given that the PERC and PECARN procedural sedation committee met in Mont Tremblant, Quebec, to ratify their reporting definitions, we introduce these “Quebec guidelines.”8

Although written for PERC and PECARN specifically, these Quebec definitions and general study design framework suggestions are broadly applicable to all forms of procedural analgesia and sedation research or monitoring. More directly, despite the pediatric intent, each element applies readily to adults. The approach and the principles put forth also extrapolate to any setting in which sedation is performed with appropriate personnel and monitoring.9,10

The most controversial aspect of these guidelines—and a potential threat to their ultimate adoption and success—is the decision of the committee to make their terminology intervention oriented. Rather than crafting definitions based on specific adverse event occurrences or monitoring device numeric thresholds, the authors’ fundamental premise is to focus on whether these preceding features led to any clinician rescue action. This is a novel but pragmatic approach that contrasts with the bulk of existing sedation research, in which vital sign and other thresholds alone determine many adverse events. On first glance, interventional criteria may appear less objective and reproducible, though the authors provide a compelling justification for their choice.

An example of this reorientation is the definition of “apnea” as a complication, shifting from simple transient cessation of respirations to one noting cessation plus need for 1 or more interventions (eg, vigorous tactile stimulation, assisted ventilation, others) to resolve. Airway obstruction, bradycardia, and other adverse events also stipulate lists for which at least 1 rescue intervention must be performed for the adverse event to be so coded. Most controversial of all is the “oxygen desaturation” complication, which has no specific numeric threshold (eg, <90% or decrease of 5%) but is instead defined by interventions performed to improve oxygen saturation regardless of the specific saturation value itself.

The concern is, will these definitions miss important adverse events? Consider apnea: The patient who stops breathing for 45 seconds after a bolus of propofol but resumes effective respirations without desaturation will not trigger apnea if no intervention is performed. Similarly, a child with a dexmedetomidine-induced pulse rate of 40 beats/min does not have “bradycardia” unless specific treatment is initiated. The authors argue that these are not clinically significant adverse events, but rather they are common, self-resolving, transient alerts that do not develop into legitimate adverse events.

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Critics will counter that such interventional criteria will vary according to clinicians’ individual thresholds for action. As such, they are inherently subjective and will tend to underestimate adverse events if clinicians are slow to act. If a patient responds without an intervention, then doesn’t this
acknowledge that the event itself was not serious? If the adverse event develops to the point of sufficient clinical importance, then a rescue intervention will ultimately occur, barring gross negligence. These recommendations are crafted for those who have the skills, knowledge, and monitoring commensurate with the task—no set of guidelines can effectively compensate for a lack of suitable training or experience.

The net effect of a switch from traditional event- and threshold-based reporting to a focus on interventions is that the frequencies of most adverse events will decrease substantially, yet the analysis will become clearer and comparable. Ultimately, this should be more useful to readers and researchers in that the adverse events described are limited to the clinically important ones, rather than the current dilution of a few serious events in a sea of false alarms. Some will feel uncomfortable limiting their data to such definitions, and the guidelines certainly do not prohibit investigators from also reporting event- and threshold-based outcomes if they choose. Perhaps a future iteration will incorporate a limited set of nonresponse-based yet extreme occurrences (eg, saturation decrease of more than 10% for more than 60 seconds) if feedback suggests a need; nonetheless, we believe these current suggestions are an advance and deserve use.

The Quebec guidelines are innovative in several other ways. They designate apnea, airway obstruction, and laryngospasm for separate reporting, given their differing underlying pathophysiology; previously, investigators often lumped all airway and respiratory adverse events together. The guidelines expand emesis to also include retching, an unpleasant feature ignored in most previous sedation research. The Quebec guidelines also state that a procedure cannot be classified as effective if there was active patient resistance or forceful immobilization, again in contrast with previous research in which effectiveness is often defined as the procedure being successfully completed regardless of patient toleration and comfort. Finally, the Quebec guidelines emphasize patient anxiety both before and after the procedure, factors that have with rare exception been ignored in emergency medicine sedation research. It is likely that differential sedation strategies will have varying effectiveness in patients who are at baseline calm versus those who are terrified. Recording the nature of unpleasant psychic recovery reactions may lead to ways to predict and prevent such disturbances.

No guidelines are perfect, and some challenges with this first version are evident. Most glaring, the form provided for data collection (Appendix A) is comprehensive to the point of being unwieldy. Having all of the definitions incorporated in the form is nice for beginners, but they are quickly learned and we suspect that most researchers will promptly develop abbreviated versions of the tool out of practicality.

A second downside of the guidelines is that they decline to propose a mechanism to describe depth of sedation, citing the argument that no such scale or system has been validated in the ED setting. This is an important opportunity lost. Although no ideal and validated tool exists or can likely be created, we need to create a framework to standardize the assessment of analgesia and sedation. An approach for viewing depth of sedation that is practical but detailed enough to effectively stratify the continuum would aid greatly. The most widely used scale thus far has been the Ramsay Sedation Scale11; however, this tool is awkward because its levels and definitions do not harmonize well with the Joint Commission–mandated12 concepts of minimal, moderate, and deep sedation. One of us has, with colleagues, modified the Ramsay Scale to create an 8-point tool consistent with the Joint Commission nomenclature13; this is just one of many possible starting places for standardizing the reporting of sedation depth.

A third omission centers on fasting. The guidelines make no mention of how to record the nature and timing of oral intake before procedural sedation. Future research would benefit from, at a minimum, the separate notation of time since solid or liquid ingestion.13

A final surprising but understandable aspect of these guidelines is that capnography is only briefly mentioned. Little doubt exists that respiratory depression, apnea, and airway obstruction begin with abnormalities in ventilation detectable by continuous monitoring of the exhaled carbon dioxide waveform. Thus, capnographic monitoring can provide the earliest possible warning of potential or impending airway and respiratory adverse events.1,13 However, capnographic abnormalities are commonly transient and of no clinical consequence. As capnography becomes more widespread during procedural sedation, revisions of these guidelines may wish to address the role of this monitoring modality. For example, certain carbon dioxide waveform abnormalities indicate subclinical respiratory depression and may predict subsequent intervention-based adverse events.1,14

The Quebec guidelines represent a bold and vital first step in the standardization of procedural analgesia and sedation terminology. We look forward to their use and future revision, and we anticipate that they will become the standard for such investigations regardless of patient age or clinical setting. The multidisciplinary field of procedural sedation and analgesia will benefit from this contribution from emergency medicine.

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REFERENCES


IMAGES IN EMERGENCY MEDICINE

DIAGNOSIS:

Open joint injury. The knee is the major joint most frequently involved in open joint injuries.1 In the civilian setting, gunshot wounds and motor vehicle crashes are responsible for the majority of these wounds. An open joint may result from direct penetration of the joint or by extension into the knee of a compound periarticular fracture. Knee dislocations are open in 20% to 30% of cases.1 Any deep wound in proximity to a joint should be suspected of being an open joint injury.

Detection of an open joint may be immediately evident on inspection of the wound, or it may be subtle, requiring adjunctive testing. The criteria for making the diagnosis include a visible or palpable opening into the joint, air or foreign bodies in the joint on radiographic examination, or saline solution extravasation through the wound on arthrocentesis.2 In questionable cases, methylene blue may be added to the arthrocentesis irritant. Initial treatment requires meticulous debridement of the wound and broad-spectrum antibiotics. All major open joint injuries require formal operative joint exploration and irrigation.2

REFERENCES