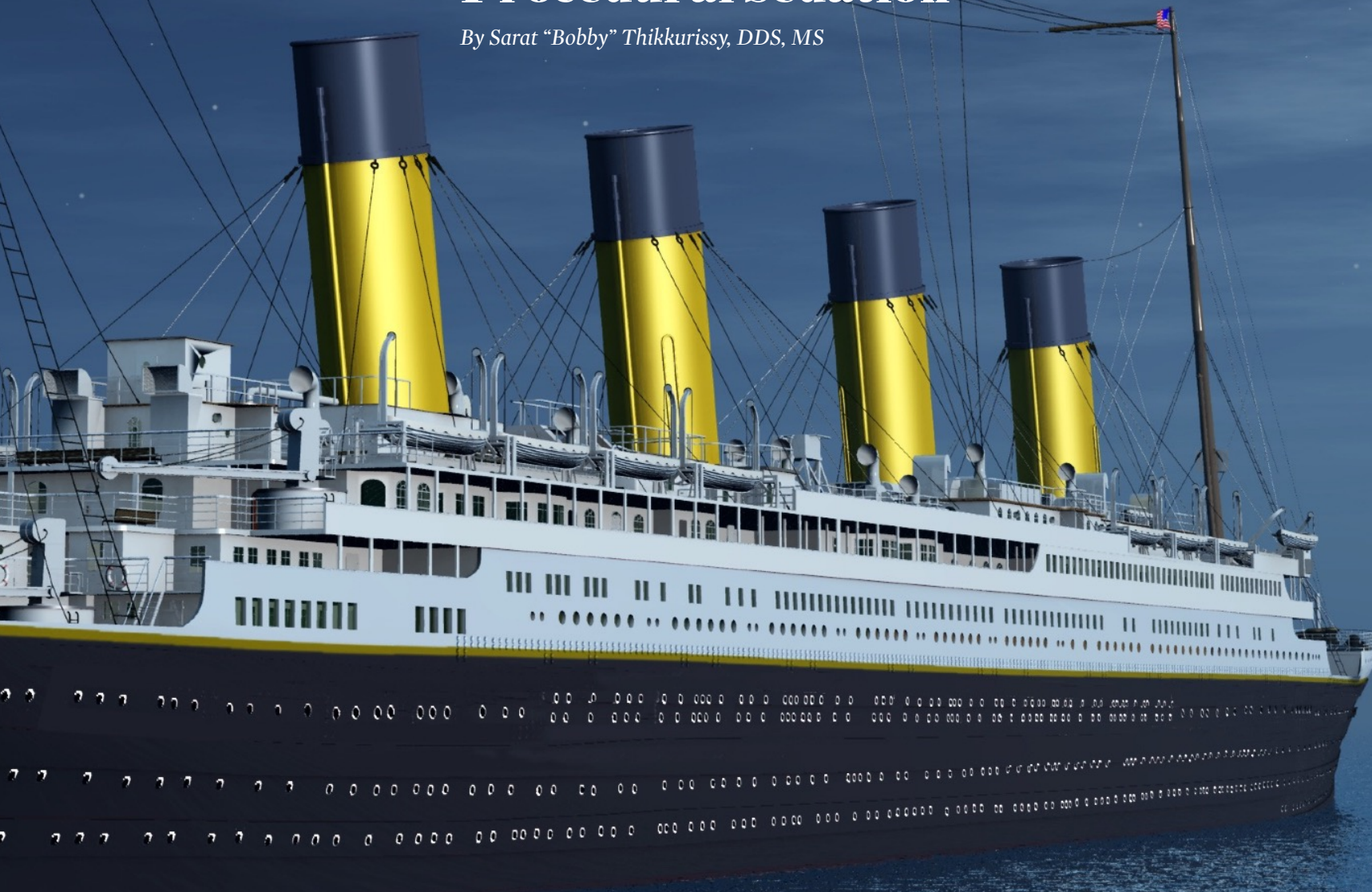


Navigating Icebergs

Safety in Pediatric Procedural Sedation

By Sarat "Bobby" Thikkurissy, DDS, MS



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When any one asks me how I can best describe my experiences of nearly forty years at sea, I merely say uneventful. Of course, there have been winter gales and storms and fog and the like, but in all my experience, I have never been in an accident of any sort worth speaking about.... I never saw a wreck and have never been wrecked, nor was I ever in any predicament that threatened to end in disaster of any sort. I will say that I cannot imagine any condition which could cause a ship to founder. I cannot conceive of any vital disaster happening to this vessel. Modern shipbuilding has gone beyond that.

— **Captain E. J. Smith (HMS Titanic)**

Irony aside, the quote on the previous page belies our inability to plan for unexpected adverse outcomes. It would seem complacency is an inevitable by-product of success, but one achieved at grave cost. Procedural sedation is a vital part of the behavior management continuum advocated and practiced by the American Academy of Pediatric Dentistry (AAPD) and its members. Every day thousands of children are sedated safely and without harm across the country. In spite of sedation's safety track record, it is the unexpected outcome—a death, hospitalization, and the like—that drive us to analyze and re-analyze our processes in an attempt to keep our children safe. In weighing the option to use procedural sedation, we truly must strive to achieve a standard of “zero tolerance” for adverse outcomes.

The AAPD is committed to making safety the key factor in determining all its recommendations regarding the therapies and care provided by its members. This commitment has been underscored when formulating its best practices, developing its continuing education courses, designing its webinars, and drafting its operating principles.

In 1818, *The Lady's Magazine* published a sidebar on the foundations of basic-skills-oriented education programs emphasizing reading, writing, and arithmetic—the Three R's. Along this same line of thinking, I'd like to put forward the “Three A's” for basic-sedation skills: Assumptions, Assessment and Awareness. I will frame these skills within the parameters of our current AAPD guidelines.

ASSUMPTIONS

1. Assume parents will fib.

I may have taken this assertion from the TV series “House,” but it's true none-the-less. Because parental assessments are not always reliable, be sure to rely on your physician colleagues to obtain a history and physical (H&P) when scheduling procedural sedation of children. While I have participated in research demonstrating that physician H&Ps are dubious at times, the point is that someone (either the dentist or physician) is objectively assessing the child's health.¹ The AAPD guidelines do an excellent job of not only outlining basic components of assessment but also highlighting areas that impact sedation—items such as BMI/obesity, history of prematurity and associated airway illness during early

childhood, and a review of systems. The adage “never treat a stranger” comes to mind. In summary, know your patient.

2. Assume parents will not understand.

The AAPD clearly states that informed consent is the “process of providing patients/parents with relevant information regarding diagnosis and treatment needs so that an educated decision regarding treatment can be made.” Requiring informed consent compels discussion of risks, benefits, and alternatives to any therapy. A compelling reason must exist before making a decision to use pharmacologic therapy (sedation or general anesthesia). In a time when insurance companies attempt to drive clinical decision making, practitioners must be the ones who step back, examine risks to the child, and, using this assessment as their guiding “north star,”² plan for appropriate procedural sedation to which parents give consent. Additionally, health literacy can impact a parent's ability to understand written documents. According to the National Assessment of Adult Literacy, the understanding of 14 percent of adults (30 million people) falls below the basic level of health literacy.³ This fact underscores the importance of drafting a carefully worded, easily understood consent form and discussing it adequately with a child's parents before administering sedation or general anesthesia.

3. Assume the family will get stuck in traffic!

Flippancy aside, an issue of constant discussion and debate is whether children can be dosed with “anxiolytics” at home. The AAP/AAPD guidelines clearly state that “The administration of sedating medications at home poses an unacceptable risk.”⁴ Case reports indicate that children have been given medications at home which induce an unexpected depth of sedation and lead to tragic situations which result in the worst of all imaginable outcomes, a child's death. It is worth noting that the AAPD guidelines adopt the American Academy of Pediatrics (AAP) definition⁵ of “pediatric,” i.e. all patients aged 18 and under. Both AAP and AAPD guidelines apply to this entire age group.

ASSESSMENT

1. Assess ventilation.

Studies have demonstrated as much as a 200-second diagnostic lead time when using capnography testing to detect apnea as compared to using a pulse oximeter alone. The American Society of Anesthesiologists (ASA) and the American Society of Dentist Anesthesiologists list capnography as the standard of exhaled carbon dioxide assessment. The AAP/AAPD recommend capnography as the preferred measure of

The key preventive measure is to assess the quality of ventilation, because evidence of impaired ventilation will typically precede oxygenation problems noted on the pulse oximeter.



Titanic – 1997 film

“Mr. Ismay, it was under your directive that we were traveling through an ice field at the arrogant speed of twenty-one knots! I am the master of this vessel and I have been too complacent!”

Captain E. J. Smith (HMS Titanic)

AMERICAN ACADEMY OF PEDIATRIC DENTISTRY RESOURCES ON PROCEDURAL ANESTHESIA AND SEDATION

Guideline for Monitoring and Management of Pediatric Patients During and After Sedation for Diagnostic and Therapeutic Procedures

www.aapd.org/media/policies_guidelines/g_sedation.pdf

Policy on the Use of Deep Sedation and General Anesthesia in the Pediatric Dental Office

www.aapd.org/media/Policies_Guidelines/P_Sedation1.pdf

Guideline on Use of Anesthesia Personnel in the Administration of Office-based Deep Sedation/General Anesthesia to the Pediatric Dental Patient

www.aapd.org/media/Policies_Guidelines/G_AnesthesiaPersonnel1.pdf

Guideline on Use of Local Anesthesia for Pediatric Dental Patients

www.aapd.org/media/Policies_Guidelines/G_LocalAnesthesia2.pdf

ventilation, although replaceable with amplified pre-tracheal stethoscope, if appropriate, and purposeful bi-directional communication is present. The key preventive measure is to assess the quality of ventilation, because evidence of impaired ventilation will typically precede oxygenation problems noted on the pulse oximeter. In many cases, the anatomy of a young patient will lead to upper airway obstruction caused either by a forward-tilted head, or most commonly, the tongue, which exhibits a relative macroglossia in a child.

2. Assess your staff.

In private offices, particularly in rural areas, 911/first-responder response times may be variable. Therefore, dentists and their staff are the key link ensuring the patient's survival. Early identification of respiratory or cardiovascular problems and high-quality basic life support and airway management are essential in successful rescue of the patient. This is where running mock codes, or testing office preparedness is key. The importance of dental office staff in an emergency cannot be overstated, as their skills are essential to ensure successful outcomes. The AAP/AAPD guidelines have distinct sections relating to on-site preparedness and facility requirements. Visit the Society for Pediatric Anesthesia website at www.pedsanesthesia.org/critical-events-checklists where you may download multi-lingual emergency checklists.⁴

All providers must prepare to rescue the child from one sedation level deeper than was intended.

3. Assess the child.

This concept cannot be reinforced enough. On several occasions a dental team has been so focused on treatment of the tooth that they failed to realize the child had stopped breathing. The AAP/AAPD guidelines underscore that "If sedating medications are administered in conjunction with an immobilization device (i.e., protective stabilization), monitoring must be used at a level consistent with the level of sedation achieved." This underscores a point that is fundamental in pediatric sedation—children exhibit variable responses to sedative medications. All providers must prepare to rescue the child from one sedation level deeper than was intended. There is no such thing as "only Versed." Even when using Versed alone, a patient may require resuscitation or rescue. A basic principle taught in Basic, Advanced Cardiac, and Pediatric Advanced Life Support (BLS/ACLS/PALS) training courses is to treat the patient, not the monitor. Even if the pulse oximeter reads 100 percent, is the child cyanotic? Is she obstructing? Understand what "normal" is, and then constantly be alert for signs indicating that a deviation from normal is occurring. If a deviation does occur, be prepared to act swiftly and without hesitation.

AWARENESS

1. Be aware of potential adverse events.

The American Dental Association, AAPD, ASA and a host of other organizations have affirmed the importance of

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simulation-based continuing education. I teach in the AAPD Sedation Simulation course, and one of the most gratifying things for me is to have someone who is initially nervous gradually realize that they have acquired the knowledge and demonstrated the ability to keep a child safe. The more simulation-based scenarios a provider encounters the more this training will reinforce the basic skills needed to rescue a patient should the need arise. PALS has changed over the years; now it is a heavy scenario-based course which reinforces the fundamental principles of rescue.

2. Be aware of how vital signs are related and interpreted.

During procedural sedation, a child's vital signs may be altered because of medication being administered. Again, if the practitioner understands normal (and in this case pre-sedation baselines) they will be prepared to act in the case of aberrations. With greater depths of sedation, the necessity of monitoring becomes increasingly important, and having a dedicated person available to monitor physiologic parameters is required. If this person is a staff member, they need to understand how a low blood pressure may be indicative of hypovolemic shock in a non-responsive patient—particularly since patients are kept without food or water prior to sedation. Case-based scenarios and continuing education courses for staff and dentists help hone the skills needed to interpret how vital signs are interconnected and how they may reflect the patient's level of physiologic stability.

Risk management is not something routinely incorporated into dental school curricula, yet it is the basis for all we do in dentistry. Caries risk assessment, periodicity of radiographs and recall appointments, and procedural sedation workups are steeped in the mindset of risk management. Our national guidelines and consensus statements give us boundaries for what should be "acceptable risk" (within the confines of standard-of-care), but each provider accepts or rejects risk when they make a treatment plan. The "Triple As" I've listed above are suggestions of how to modify our risk management decisions in approaching pediatric procedural sedation, couched within terms of the AAP/AAPD guidelines. These suggestions represent the best collection of evidence we have on how to mitigate adverse outcomes associated with sedation in children.

We live our professional and personal lives avoiding risk-related icebergs. Our AAPD/AAP guidelines act as buoys to keep us in safe waters. They assist us in steering clear of uncharted dangers lurking in dark waters and enable us to keep the children we treat—our most precious cargo—safe and without harm. ☺

References

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EQUIPMENT THAT HELPS US KEEP OUR PATIENTS SAFE

MINDRAY
Passport 12 Monitor
\$4,800 (starting price)
mindraynorthamerica.com



**SEDATION
RESOURCE**
Bluetooth Stethoscope
\$649
sedationresource.com



HEINE
Laryngoscope
\$732
heinenusa.com



LEARDAL
Resuscitator \$192
leardal.com



PHILIPS
AED \$1,199
heartsmart.com