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NEWSLETTER

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Patient Perspectives Personalize Patient Safety

The following report highlights patient and family perspectives of adverse events that were presented at the APSF Board of Directors Workshop on October 21, 2005. These unique and important accounts give clinicians a glimpse into how anesthesia complications affect our patients and their families and demonstrate the importance of good communication and disclosure.

by John H. Eichhorn, MD

Three intensely personal presentations of tragic anesthesia events were the nucleus of the APSF Board of Directors (BOD) workshop, "The Role of Patients in the Mission of the APSF," at the APSF Annual Meeting October 21, 2005, in Atlanta. The survivor of an anesthesia-related cardiac arrest, the mother of an 11-year-old boy who suffered massive permanent brain damage from an anesthesia accident, and the wife of a 33-year-old marathon runner who eventually was allowed to die after an anesthesia mishap, all told their stories to an empathic audience that was appalled, entranced, and galvanized, in an effort to determine what the APSF can do to help heal their wounds and prevent others from experiencing such trauma.

While the APSF has sought patient input for many years, this was the first time the foundation was able to organize a program reflecting the perspective of patients or "victims" of injuries from accidents solely related to anesthesia care. As the broader concept of patient safety and the efforts at blame-free full disclosure and discussion following medical accidents have been more widely publicized in the U.S., survivors of medical catastrophes (including families of patients who die) appear more willing to publicly share their experiences. As a reflection of this, several survivor support/advocacy groups were recognized at the National Patient Safety Foundation Annual Meeting in May 2005.

Because the October APSF workshop was focused on the profound impact on patients and surviving families of incidents perceived to represent adverse outcomes specifically from anesthesia care, and how the APSF can learn from these stories, the presentations were accepted as offered by the non-medical survivors. There were no "M and M" type reviews, no questioning to search for precise details of the anesthesia care and possible mechanisms of injuries. The outcomes were what they were, even if the presenters in some circumstances may not have fully appreciated relevant aspects of physiology, pharmacology, or anesthesia protocols. Rather, the APSF Board of Directors was primarily interested in the experiences, perceptions, and emotions of the presenters. The goal was to gain new insight from a new source to help establish a role for patients in the APSF and also to guide and energize anesthesia care and patient safety efforts for the future. The stated ultimate objectives were to provoke action that will make the APSF better understand the needs and concerns of patients/families who experience an adverse anesthesia event and to develop methods for patients/families to be more involved in helping insure patient safety.

The workshop was organized and moderated by Jeffrey B. Cooper, PhD, Executive Vice President of the APSF. He stressed that this is the "human side" of the equation of anesthesia care—a balance to the remarkable technologic and behavioral progress in patient safety. A key goal of the program was to inaugurate a new perspective for the APSF that will be driven by the power of patients and the power of stories. Dr. Cooper noted that this program was an attempt to "open up the filters" that physicians often automatically apply to patients' views and avoid the reflex response of "that's not how it's done"/"that can't be done" so often applied to ideas from patients or their survivors. Further, he commented that one of the reasons it had been difficult to assemble a program of this nature was that (fortunately) anesthesia care catastrophes are exceedingly rare, and also that open public discussion can be inhibited by medical-legal exigencies (there were no pending claims or proceedings involving any of the workshop presenters). One inspiration for Dr. Cooper was the open discussion by both the survivor of an anesthesia-induced cardiac arrest and the involved anesthesiologist of an event that occurred within the Harvard system (Dr. Cooper's academic affiliation), and that was the basis of the first story. [NOTE: Following are brief summaries of the presentations. First-person detailed accounts authored by the workshop presenters themselves are planned for an upcoming issue of the *APSF Newsletter*.]

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(Left to Right): Sue Stratman, Dr. Jeffrey Cooper, Dr. Julianne Chase, Dr. Frederick van Pelt, and Linda Kenney present Patient and Family Perspectives at the 2005 APSF Board of Directors Workshop.

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APSF President Presents State of Foundation Report

by Robert K. Stoelting, MD

As President of the Anesthesia Patient Safety Foundation (APSF), it is my privilege to report annually on the activities of the foundation during the past calendar year. I am pleased to report that 2005 has been a rewarding and successful year including advocacy of safety initiatives intended to fulfill our mission that no patient shall be harmed by anesthesia.

Audible Information Signals

I am most pleased to report that the APSF "audible alarms" initiative has reached a successful outcome that can only be viewed as the "right thing to do for our patients." As a result of your foundation's efforts, both the American Association of Nurse Anesthetists and the American Society of Anesthesiologists have added audible alarms from pulse oximetry and capnography to their monitoring standards. The evidence was compelling that this new monitoring requirement (standard) will save lives and improve patient safety. Without the APSF advocating this change, it is unlikely that audible alarms would have been added to the monitoring standards. I doubt if any one of us would knowingly fly on an airplane on which the pilot silenced the audible alarms; our patients deserve no less.

ASA and AANA agree with APSF initiative and add audible alarms for pulse oximetry and capnography to their monitoring standards.

Carbon Dioxide Absorbent Desiccation Conference

The report of the "Carbon Dioxide Desiccation Safety Conference" convened by the APSF in April 2005 was published in the Summer 2005 *APSF Newsletter*. This conference was attended by representatives of industry (carbon dioxide absorbent manufacturers, machine manufacturers, producers of volatile anesthetics) along with clinicians, with the single goal of creating a consensus statement for dissemination to all anesthesia professionals. The recommendations of the conference demonstrate the APSF's role in providing safety information to the anesthesia professional responsible for care of patients during anesthesia and surgery.

A unique value of the APSF is its ability to bring together members of industry, nursing, and medicine under a neutral umbrella without the issue of restraint of trade or conflict of interests that would be present in other environments. The carbon dioxide absorbent conference was a rewarding example of this unique aspect of the APSF.

Long-Term Outcomes

An evolution of the APSF Long-Term Outcome conference in September 2004 is the APSF Task Force chaired by Marcel E. Durieux, MD. He and the members of his task force are evaluating the scientific basis of possible factors (inflammation, autonomic nervous system activity, genetic profile, drug interventions [beta-blockers, alpha-agonists, statins], anesthetic depth, body temperature) on long-term outcome following anesthesia and surgery. In addition, a future issue of the *Anesthesiology Clinics of North America* edited by Steffen E. Meiler, MD, will be devoted to issues discussed at this conference.

Data Dictionary Task Force

The APSF Data Dictionary Task Force chaired by Terri G. Monk, MD, has been successful in creating common anesthesia terms that have been adopted by the Systematized Nomenclature of Medicine and licensed by the National Library of Medicine. Dr. Monk and her colleagues (again reflecting the cooperative efforts of industry and clinicians under the sponsorship of the APSF) have now entered the next phase of the process in developing a schema of standardized terms (minimum data elements) for use on anesthesia records as part of automated information management systems. This is the next essential step to collect comparative data, from millions of anesthetics, to determine best practices leading to improved anesthesia patient safety.

Board of Directors Workshop

The APSF Board of Directors workshop in October 2005 was organized by Jeffrey B. Cooper, PhD, APSF Executive Vice President, and reflected the foundation's initiative to include patients in the mission of APSF. The topic of the workshop was "full disclosure" to patients when an adverse anesthesia event occurs. Participants included 3 families (a parent, a patient, a spouse) and 1 anesthesiologist who cared for the patient participant. Their poignant stories of how adverse events during anesthesia changed their lives was a moving and memorable experience for the attendees. The common message from all the participants was the compelling human need for explanations (as soon as possible) and ultimately some recognition that what happened to them or their family member would become a learning experience to reduce the likelihood of a similar experience occurring to someone else in the future.

Research Grants

The APSF has awarded more than $2 million dollars since 1987 for support of investigators pursuing patient safety research. Two grants for $75,000 were awarded for 2006, and 1 of these

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Incredible Save Followed by Poor Communication

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"Incredible Save"

The patient who survived a life-threatening anesthesia complication and her anesthesiologist stood shoulder to shoulder at the lectern to recount their perspectives of an anesthesia nightmare. The assembled APSF Board was spellbound by the gut-wrenching story.

Ms. Linda Kenney, at age 37, was scheduled for one in a long series of foot/ankle surgeries and agreed to a popliteal nerve block as part of the anesthetic. Frederick (Rick) van Pelt, MD, had extensive experience with such blocks. Using a nerve stimulator, he injected 30 ml of bupivacaine in a routine incremental manner, employing classic safeguards. However, subsequent evolving signs of bupivacaine toxicity were followed by grand-mal seizure and cardiac arrest. After 10 minutes of ACLS protocol without any impact, a fortuitous set of coincidences led to the resuscitation of the patient. Directly across the hall from the OR in which the arrest occurred was an open-heart surgery OR, cardiopulmonary bypass (CPB) pump primed and ready, waiting for a patient to arrive. CPR in progress, Ms. Kenney was wheeled across the hall and "crashed" on to CPB via an emergency sternotomy. Within a few minutes and approximately 30 minutes after the injection, sinus rhythm returned. After an hour on CPB, she was weaned. The incision was closed and she was taken to ICU, where she recovered without neurological damage over the following days.

The parallel perspectives on the events following the arrest and resuscitation were fascinating. Dr. van Pelt was told that he had done the block correctly, that even the best physicians get sued, and not to talk to anyone about the event. Ms. Kenney's husband was called to the hospital, sequestered alone in a small conference room for an extended period, and was offered no immediate or long-term support for his distress, panic, and anger. Ms. Kenney recalls awakening in the ICU and later being told she had "an allergic reaction to the anesthesia," which she found hard to believe, and that made her distrustful. There was no other discussion of the cause of the incident with her. She was most concerned about the emotional well-being of her 3 young children. After experiencing some minor but annoying complications, she was discharged 10 days after the arrest with wound care instructions for her chest and a follow-up appointment for that, but no counseling of any type. Dr. van Pelt wanted very much to speak with the patient while she was in the hospital, but was strongly discouraged from doing so by the hospital administration and, fearing the negative emotional impact to the patient, also by her caregivers. He was expected to go back to work the next morning as if nothing had happened, even though he was very emotional and distracted.

Small group participants explore Board of Directors Workshop issues involving patient perspectives on adverse events.

Ms. Kenney knew she was lucky to be alive and knew if she had been at a different hospital, she likely would have died. Against advice, Dr. van Pelt wrote her a letter about 10 days after her discharge acknowledging the suffering she and her family had experienced, apologizing for what he had done, and expressing a desire for open and honest communication. He stated in his presentation that if the letter provoked her to sue, "so be it." He did not believe he made an error, but he did feel responsible. Ms. Kenney at the time believed this letter was just "damage control" and ignored it. She experienced "survivor guilt" and eventually devolved into significant post-traumatic stress disorder. The event was reviewed in the hospital QA system and in the debate over whether this was a reportable "sentinel event," Dr. van Pelt felt "hung out to dry." For a number of reasons, he left that hospital and relocated to Seattle 4 months later. Ms. Kenney was depressed. Her multiple calls to the hospital for help and support yielded nothing but uncompassionate form letters. She asked for the names of the people on the team that had saved her life so she could thank them and was refused. She grew very tired of being asked by everyone she knew whether or not she was going to sue, and if she saw the white light. She ultimately decided not to sue because she saw the incident as a complication, not an error, and also because she wanted to move on with her life. She decided there would be benefit from finally responding to Dr. van Pelt's letter. Six months after the event she contacted him in Seattle and they had an uplifting phone conversation that was the start of healing for them both. He told her all the clinical details, and she had understanding and forgiveness. Dr. van Pelt eventually returned to his former hospital in Boston, and 2 years following the event, they met in a coffee shop to talk further.

Constructive interaction between the survivor of an anesthesia catastrophe and the involved anesthesiologist yielded a resolve to "do something" about the appalling lack of support and care revealed by the aftermath of this event. Ms. Kenney founded the Medically-Induced Trauma Support Services (MITSS - website), an organization dedicated to helping patients, families, and care providers involved in adverse medical events. MITSS focuses on the need for 1) full disclosure in real time; 2) an apology or acknowledgment of responsibility and recognition of the traumatic impact; 3) concrete efforts to prevent similar occurrences in the future; and 4) support that is flexible and patient directed—emotional, logistical, financial, or whatever is needed (excepting legal). To its credit, the hospital that just wanted Ms. Kenney to go away after her event, now 6 years later, embraces MITSS in its efforts to correct the glaring deficiencies exposed by her experiences. Dr. van Pelt reiterated that the "wall of silence" operative in his case just pushes patients and their families to sue. It also takes a huge toll on the involved caregivers. He was not supported at all by his colleagues after the event (even though he felt some wanted to reach out to him, but they did not). He had no way to express and deal with his feelings, which, he stated, is typical in the medical care system. Even though the idea that this case "was a phenomenal save" was universally discussed, no one really considered the enormous impact it had on him. Consequently, Dr. van Pelt has assembled a task force at his hospital to develop an OR pilot program to implement after an event that will provide flexible peer-based, emotional support (including group and individual stress debriefing), and access to other resources. He

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Halothane Overdose Results in Cardiac Arrest

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believes the core concept of "integrity and compassion" will have a major beneficial impact.

Uncharacteristically, the APSF Board was virtually speechless after this presentation. There was unanimous acknowledgment that there is a great deal the APSF specifically, and the medical care establishment in general, can learn from thoughtful patient input. An obvious key element was the "disconnect" of the starkly different perspectives and priorities of the patient/family versus the medical care establishment, and the potential damage this disconnect can cause. Overcoming this clearly can have helpful risk management implications, but the emphasis is on promoting healing for all involved. Likewise, the final note of the presentation was positive in that it was recognized that everything was done exactly wrong regarding communication and support, but that this fact led to awareness and constructive changes that should help all those involved in any future anesthesia care catastrophe.

"A Parent's Nightmare"

Ms. Sue Stratman opened with the observation that she had seen both the best and worst of the medical care system. She is the mother of Daniel, who was born with congenital heart disease but had done spectacularly well with 3 open-heart surgeries over the course of his first 11 years and in 1996 was well and vigorously active, successfully playing competitive soccer. He was found to have an inguinal hernia and the repair under general anesthesia was scheduled at the same very well-known large academic medical center where he had his heart repaired. There was a thorough discussion of Daniel's history, cardiac status, and the anesthesia plan with the attending anesthesiologist prior to what was planned for a quick outpatient procedure. During the anesthetic, Daniel arrested and his heart was resuscitated, but he suffered permanent brain damage such that he today is blind, cannot use his arms, can walk only with the assistance of 2 people, can barely speak, and needs total 24-hour care.

Ms. Stratman stated that she was not aware preoperatively that a student nurse anesthetist would be involved in the anesthetic and would be left alone with Daniel during the case by the attending who was also supervising another room. The anesthesiologist was also distracted due to her own ongoing family issues. Ms. Stratman stated that the records had been altered "to make it look like his heart had given out," but that eventual analysis of the original records and the printout from the monitor values suggested this scenario: Daniel climbed up on the table himself and was given an inhalation induction with 5% halothane; this induction dose was continued and not reduced to maintenance levels when the attending left the room; the non-invasive blood pressure machine (NIBP) had not been

In the top photo, Dr. Julianne Chase recounts her experiences, and in the bottom photo, Linda Kenney and Dr. Frederick Van Pelt discuss Ms. Kenney's adverse event. All participants agreed that poor post-event communication was a major problem.

set to cycle at intervals, and the single initial blood pressure value was recorded 3 times on the record over nearly 15 minutes; an LMA was in place, but spontaneous breathing slowed so there was hand-assisted bag ventilation; the surgeon remarked on dark-colored blood upon incision; cycling the NIBP revealed profound hypotension and heart block, then arrest followed.

There was little communication to the family immediately after the event, and there was a delay in allowing them to see Daniel in the PACU, where he was intubated, ventilated, having seizures, and posturing. Beyond the panic, Ms. Stratman was crushed because she had promised Daniel no tubes or ventilator this time. After a week of little improvement and essentially no communication to the family, there was mention of the possibility of discontinuing life support. Daniel's cardiologist demanded an investigation at the hospital. The attending anesthesiologist visited daily and was emotionally distressed, including about events in her own family, which she discussed with Daniel's family. Ms. Stratman stated that the attending anesthesiologist communicated to her that she never really understood what had happened. Mrs. Stratman came to believe that the anesthesiologist did know what happened but did not disclose this.

Ms. Stratman stated that they were kept completely in the dark about the incident, and she learned that the hospital staff had been instructed not to talk with anyone (family, friends, coworkers, or other hospital personnel) while the investigation (initiated by the cardiologist) was conducted. She stated they were stunned to learn the truth about the event but, painful as that was, it was critical to know everything. The family did receive an out-of-court financial settlement. They did receive an acknowledgment from the hospital that mistakes had been made, but no acknowledgment from the anesthesiologist. Neither the hospital nor the anesthesiologist ever admitted that the records had been altered. Ms. Stratman stated that, even 9 years later, she would like the opportunity to talk with the anesthesiologist to help bring closure because she suspects that the anesthesiologist is not doing well with the burden of the situation.

Ms. Stratman clearly outlined what she believes should happen with the anesthetic for a surgery such as Daniel's: 1) take it seriously—as if it is the most complex major surgery imaginable, even though it's a "minor case"; 2) the attending should never leave the patient [although it appeared that the function of anesthesia trainees in academic medical centers was not fully appreciated]; 3) be sure the equipment works and is used correctly; and 4) tell the truth. As seen in the previous presentation, there was a profound desire by this family to "do something" to help prevent tragedies such as this. The family has started the Daniel Stratman Foundation to help educate about patient safety. They are members of a medical malpractice survivors' support group. Ms. Stratman stated they had served on a hospital "parents board," but abandoned that when it was clear to them the hospital was not really interested in discussing substantive patient safety issues with families.

Again, the APSF Board was moved. Note was again taken of the potential disconnect between patient/family understanding of events during medical care, prospectively, and especially retrospectively, and the providers' realities. The damaging impact of failure of disclosure after the event and overall failure of communication was unmistakable. Finally, as before, the drive by the survivors to "do something," to "make a difference" so similar catastrophes would not afflict other families in the future, was heartfelt and strong, which is precisely the element sought by the APSF Board in these presentations and, more importantly, as stimulus for future follow-up efforts by the foundation.

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Question of Competence Raised After Unrecognized Hypoventilation

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"A Question of Competence"

Dr. Julianne Chase, Senior Assistant Dean for Medical Education at NYU School of Medicine, revealed to the APSF Board that this was the first time she had discussed with a professional group of physicians the event her husband experienced in the OR since it happened, in 1986. She then told the powerful story of Danny Delio, 33, an exercise physiologist in superb physical condition as an active marathon runner. He had had previous hemorrhoid surgery and the same surgeon suggested surgical treatment of an anal fistula after draining an abscess in the office. Over Dr. Chase's objection, Danny scheduled his surgery at a local community hospital rather than an available teaching hospital. An internist friend of theirs told them there were 2 anesthesiologists at that hospital to avoid because of prior complications and incidents, and that he would speak with the surgeon to advise him which anesthesiologists to request and which to avoid. Danny had confusion on the day of the procedure about which was which, but did not want to bother his internist friend early that morning to check. He did ask his surgeon if the procedure could be done without general anesthesia and was advised that was not a good idea. The anesthesiologist who did the preoperative evaluation was not the one who would be administering the anesthetic, and Dr. Chase did not believe this was proper, but Danny was prepared to go ahead and did so. Both believed the internist friend had arranged for one of the "good anesthesiologists" to do the case.

Precise events in the OR were never clear to Dr. Chase. Near the end of the case, with Danny breathing spontaneously, reportedly "with very little assistance," the anesthesiologist announced that there was a cardiac arrest. Danny's heart was resuscitated in 5 minutes, but he then suffered intractable grand mal seizures reflecting hypoxic brain damage. After intubation and ventilation in the OR, Danny's pCO_2 was more than 80, and the pH was 7.0, suggesting that there had been unrecognized hypoventilation and consequent respiratory acidosis. He was transferred out of the hospital where the event occurred to the ICU in the larger local county hospital in a persistent vegetative state, where he became the subject of a court case regarding withdrawal of nutrition and hydration. Danny Delio died 13 months after his anesthetic for repair of an anal fistula, and following a landmark court case supporting his right to refuse medical treatment if he were ever in a persistent vegetative state.

Following the catastrophe, the family's internist friend confirmed that the anesthesiologist involved was one of the two he had said to avoid. Apparently the anesthesiologist requested had been working all weekend and had transferred this case to his senior colleague on the morning of surgery. When the surgeon was later asked why he accepted this personnel change, he replied that he thought it did not matter. In the one conversation Dr. Chase had with the involved anesthesiologist, he had no explanation for the cause of the event, was defensive, and offered no expression of remorse or regret. She never saw or spoke to him again. The surgeon expressed deep regret and sorrow, particularly after Danny's death, and this revealed to Dr. Chase the profound impact medical misadventure can have on the involved practitioners, recalling some of the points made by Dr. Van Pelt.

Dr. Chase was told that the involved anesthesiologist retired soon after the event under pressure from the hospital. Her malpractice suit was settled out of court.

She, at times, still feels guilty about not having been more insistent on the morning of surgery about being certain that her husband was getting the "good anesthesiologist," but that revelation provoked her to share persistent questions about the internal regulation of the quality of practice within the medical profession, and the obvious patient safety implications. Why were there anesthesiologists practicing who should be avoided—particularly when other doctors at the hospital knew of their lapses? How does one stop doctors from practicing when they are incompetent? Why is it so difficult for physicians to monitor each other? [Following Dr. Chase's presentation, intense discussions ensued regarding these questions.]

Again, as with the others, Dr. Chase expressed a strong desire to help implement measures that will prevent similar catastrophes from striking other patients and families. She suggested a monitoring program to detect "near-misses" and physicians who are "slipping repeatedly," and then a remediation program for them and also alternatives to divert physicians into jobs they could safely perform. The APSF Board continued the thorny and complex discussion of the issues of measuring physician competence, setting criteria for action, and implementing enforcement when a quality problem is documented. Finally, the related extended patient safety concept that injuries would be prevented by implementing such a program was raised but, predictably, there was no agreement.

So Now What?

The high-impact and thought-provoking nature of the 3 presentations was dramatically evident by the length, breadth, and intensity of the discussion among members of the APSF Board and also the presenters. Consistent with the goal of outlining possible action for the APSF, several themes and suggestions emerged. One important item that could immediately and directly help prevent or mitigate patient injuries was again broadcasting a reminder that "Administrative Guidelines for Response to an Adverse Anesthesia Event" have been published and are available on the APSF website: **www.apsf.org**, "Resource Center," "Clinical Safety Tools," then "Adverse Events Protocol." Another suggestion was the simple idea of surveying patients/families to help determine what type and how much information and communication they really want, both in general and specifically concerning an adverse medical event.

A primary specific initiative is to continue to collect (possibly including through a "hotline" to the APSF) and publicize these potent "stories" of patients/families who have experienced an adverse anesthesia event. Not only will this raise the awareness of all those who read those accounts, it will form a database that can be organized and mined for common elements, much like the model of the ASA Closed Claims study that identified clinical trends (preventable hypoventilation as a cause of injury) and even specific syndromes (cardiac arrest during spinal anesthesia). A related initiative will be the use of the great power of the telling of these stories to develop a curriculum in "the patient side of anesthesia patient safety" for distribution to all anesthesiology residency and nurse anesthesia training programs, as well as to medical schools for incorporation into their clinical teaching. Closely tied would be additions to modules used in anesthesia simulator training that add experience in post-event management of both the patient/family and the involved anesthesia provider. This intense role-playing likely would evoke strong emotions and would be videotaped for the debriefing of the participants in the specific simulation and also for potential inclusion in curriculum modules for anesthesia trainees and medical students. Having these modules available on the web for all anesthesia providers through their respective national professional organizations also would have a significant impact because their direct relevance and inherent drama would provoke widespread interest and attention.

One major recurrent theme was the failure of communication with the patient/family at the time of the catastrophic event and thereafter. The overall concept of trying to shift from a "culture of blame" to a "culture of learning" certainly applies. It was agreed that, in the spirit of "the patient's bill of rights," there should be an expectation by the patient/family of open communication and full disclosure (even to the point that the surgical/anesthesia consent forms should specify that after any event, prompt full disclosure will be made). The expected concerns about risk management and the potential legal liability implications of apologies and full disclosure were expressed, but reference was then made to the study from the VA system demonstrating a significant reduction in liability costs associated with prompt full disclosure after an event.

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Workshop Identifies Need to Tap Patient Resources

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Related was the favorably-received suggestion that patient care facilities where anesthetics are administered should have an ombudsman or "patient advocate" always immediately available or on call so that this advocate can immediately interpret, facilitate communications, and organize support of all types for the involved patient/family in the event of an anesthesia accident, or any acute medical adverse event for that matter. This tied in to the projected goal that perioperative services should be "high-empathy organizations" as well as high-reliability organizations. The proposal that patient/family representatives be included on the committee for the peer-review analysis after an adverse event provoked significant discussion, but did not yield a consensus. However, the suggestion that the institution and the practice group involved with an anesthesia accident share with the affected patient/family the details of changes made following the event (whether policy, procedure, behavior, equipment, or organizational) intended to prevent any recurrence of that type of accident met with widespread approval.

Promoting thoughtful, compassionate, and open support for anesthesia providers who have been involved in a catastrophic anesthesia accident (even one with an eventual good outcome) is another unanimously accepted proposal resulting from the APSF Board workshop. Clearly the front line and the bulk of this effort should be at the local level, within the institution and immediate group of the involved anesthesia provider(s). Prospective concrete plans that are widely disseminated to all involved should be in place in order to avoid a confusing scramble of disparate resources at the time of an event. Group leaders and facility administrators should immediately activate the pre-planned response to provide support and counseling, as well as specific advice and encouragement about disclosure to the involved anesthesia personnel. Further, it was suggested that the APSF could establish another type of "hotline" to offer situation-specific suggestions to assist and support the personal needs and concerns of anesthesia providers finding themselves under stress following involvement in an adverse event. The more general question of anesthesia providers under so much personal stress as to be dangerously distracted and a safety risk was also broached. Enhanced vigilance and sympathetic support from coworkers, promoted by articles such as this one, was seen as the best immediate strategy.

Finally, possibly the thorniest issue closed out the discussion. The question of measuring practitioner competence and quality of practice and, then, how precisely this translates into documentable impact on patient safety prompted calls for further discussion and research. A survey of anesthesia providers regarding how they would suggest evaluating practice competency was proposed. Implementation of carefully crafted true "360 evaluations" for anesthesia clinicians was recognized as potentially very valuable, but cumbersome to implement. Soliciting APSF Research Grant applications regarding this specific technique and even a small pilot study conducted by the APSF itself were considered. The APSF Executive Committee will address these ideas in January. Likewise, offered for consideration was possible APSF sponsorship of a larger study that would start with an attempt to define baseline anesthesia competency.

Overall, the APSF Board of Directors Workshop on "The Role of Patients in the Mission of APSF" was a remarkably rich and stimulating experience that appeared to have more impact on the participants than could have been imagined. The APSF has resolved to have more awareness of and input from patients and families, both in general and specifically related to the aftermath of anesthesia catastrophes. Optimum utilization of this untapped resource can only enhance and encourage efforts to further the APSF stated mission that "no patient shall be harmed by anesthesia."

Dr. Eichhorn, Professor of Anesthesiology at the University of Kentucky, founded the APSF Newsletter *in 1985 and was its Editor until 2002. He remains on the Editorial Board and serves as a senior consultant to the APSF Executive Committee.*

See Page 74 for APSF Grant Application Guidelines

Award Limit Has Been Increased to $150,000 Per Application Funded

Letter to the Editor

Full Disclosure Recommended

To the Editor:

The Fall 2005 issue of the *Anesthesia Patient Safety Foundation (APSF) Newsletter* includes the article "DepoDur™: A New Drug Formulation With Unique Safety Considerations." It is disclosed that the author is a paid scientific advisor for Endo Pharmaceuticals, the U.S. marketer of DepoDur™, and has also received research support from Endo. Most of the article describes the putative benefits of DepoDur™. A smaller portion deals with safety issues and presents generic advice common to intravenous and neuraxial opioids. The opposing views of an unbiased author are not presented. Given the tone of the article, one could mistake it as marketing literature. This cynical but realistic view could be avoided if APSF would select authors who are not influenced by such conflicts of interest.

It is more concerning that the article does not clearly state that Endo is a financial supporter of the APSF. The financial relationship between APSF and Endo Pharmaceuticals should have been clearly revealed in the article. It is reasonable to ask if Endo's financial support played a role in the APSF decision-making and editorial process, especially since that support was not clearly disclosed.

The specific concern expressed in this letter should not be generalized to other APSF activities or publications. However, since APSF's credibility and reputation could be seriously damaged with only one mistake or ethical lapse, any indiscretion is important. It is also relevant that the American Society of Anesthesiologists (ASA) is a long-time provider of significant financial support to the APSF. Since many *APSF Newsletter* readers are also the dues-paying ASA members providing that support, the APSF has an important obligation to maintain editorial objectivity and avoid even the perception of bias or inappropriate influence.

Jeff Mueller, MD
Scottsdale, AZ

Editor's Response:

Dr. Mueller raises points to which the APSF and the Newsletter *Editorial Board are sensitive. We believe we carefully attempt to avoid commercial bias in safety articles that are written by our invited authors. However, if informed readers such as Dr. Mueller conclude otherwise, we will reexamine our approach. As Dr. Mueller points out, the article in question disclosed that the author has received investigative grant support from, and has been compensated as a scientific advisor by, Endo Pharmaceuticals. In the future, the* APSF Newsletter *will also include, as appropriate, a statement that the APSF receives financial support from an industry sponsor who could be perceived to benefit from a given article. This statement will be in addition to our current practice of listing all corporate sponsors on the donor page. The APSF thanks Dr. Mueller for his interest and letter.*

President Welcomes Input as APSF Enters 20th Year

"President's Report," From Page 62

grants received an additional $5,000 as the **Ellison C. Pierce, Jr., MD, Education Award**. The other grant is designated the APSF/AHP Research Award in recognition of the contribution from Anesthesia Healthcare Partners for support of this grant plus an additional amount for administrative support to the APSF.

Beginning in 2007, the APSF Research Grants will be increased from the current level of $75,000 to $150,000. This increased level of funding is intended to reflect the quality of the research applications and the importance of the grant process in the mission of the APSF.

APSF Newsletter

The *APSF Newsletter*, as the official journal of the APSF with Robert C. Morell, MD, as editor, continues to provide the most rapid dissemination of anesthesia patient safety information possible. The current circulation exceeds 76,000 recipients and reflects the fact that every anesthesia professional in the United States receives the *Newsletter* and benefits from the information it provides. I am personally committed to doing everything possible to insure that all anesthesia professionals continue to receive the *APSF Newsletter* as patient safety information is valuable and important to everyone who cares for patients in the operating room.

A highly successful part of the *APSF Newsletter* has been the "Dear SIRS" (Safety Information Response System) column that is coordinated by Michael A. Olympio, MD, Chair of the APSF Committee on Technology. Dr. Olympio and his committee members provide timely responses to questions including equipment design and function that are submitted by recipients of the *Newsletter*. These responses also include the comments from colleagues representing industry and often the manufacturers of the equipment in question.

Wall Street Journal Article

On June 21, 2005, a front page article in the *Wall Street Journal* entitled, "Heal Thyself—Once Seen as Risky, One Group of Doctors Changes its Ways" described the success of the anesthesia patient safety movement in reducing professional liability insurance premiums by virtue of making anesthesia safer. The article was complimentary to the APSF and its role over the years in anesthesia safety. As President of the APSF, I recognize and salute the contribution of all anesthesia professionals for their role in making possible the safety successes described in this highly visible article.

Financial Support

Financial support to the APSF from individuals, specialty and component societies, and corporate partners in 2005 has been most gratifying. The increased level of support in 2005 will make new initiatives possible and provide for ongoing initiatives, as well as increase research funding. In particular, the APSF wishes to recognize Anesthesia Healthcare Partners for their generous contribution in 2005 making possible the co-sponsorship with the APSF of a research grant awarded in 2006. Equally important, the October 2005 House of Delegates of the American Society of Anesthesiologists approved increasing the funding of the APSF from $400,000 annually to $500,000 beginning in 2006. Anesthesia is unique in American medicine in having a foundation dedicated to anesthesia patient safety, and this is reflected by the vision and support of the American Society of Anesthesiologists since the formation of the APSF in 1985.

As in the previous annual report, I wish to reiterate the desire of the APSF Executive Committee to provide a broad-based consensus on anesthesia patient safety issues. We welcome comments and suggestions from all those who participate in the common goal of making anesthesia a safe experience. There remains much to still accomplish, and everyone's participation is important and valued as "your foundation" enters its 20th year.

Best wishes for a prosperous and rewarding year 2006.

Robert K. Stoelting, MD
President, APSF

APSF Selects New Vice President

At its October 2005 annual meeting, the APSF was pleased to announce the appointment of Paul Baumgart as its new Vice President. Paul Baumgart is General Manager of Respiratory Care for GE Healthcare Clinical Systems, based in Madison, Wisconsin, with responsibility for GE's global respiratory care business. Previously he held marketing roles at GE covering perioperative monitoring products and OR information systems. Prior to joining GE in December 2000, he spent nearly 20 years at Ohmeda in a variety of marketing positions related to the company's anesthesia system business, including Director of Marketing for the Americas.

Paul's active involvement in the Anesthesia Patient Safety Foundation dates to 1987 when he joined the committee on Education at the suggestion of W. Dekle Rountree, then President of Ohmeda, who at that time was serving in the role of the first Vice President of the APSF. Since then Paul has served on both the Committee on Education and on the Committee on Technology. During the 2004 meeting of the ASA, Paul was elected to serve on the Board of Directors of the APSF and will serve on the Committee on Scientific Evaluation in 2006.

Paul has been a recognized speaker at anesthesiologist, nurse anesthetist, anesthesia technologist, and biomedical engineering meetings throughout North America and Europe on topics that include anesthesia safety, operating room information management, anesthesia gas delivery, and monitoring system design and evolution. He holds an MBA degree from the University of Wyoming and is an adjunct faculty member in the University of Wisconsin Executive Education program. He and his wife Lynn reside in Madison, Wisconsin.

Dr. Robert Stoelting (left), APSF President, welcomes new APSF Vice President, Paul Baumgart.

APSF Awards Two Grants for 2006

by Sorin J. Brull, MD

The Anesthesia Patient Safety Foundation (APSF) is pleased to report that it continues to attract outstanding applications for funding. The educational focus of APSF includes innovative methods of education and training to improve patient safety, development of educational content with application to patient safety, and development of testing of educational content to measure and improve safe delivery of perioperative anesthetic care.

The application process continues with an electronic, online submission format introduced last year. The applications, as well as all the required attachments, are uploaded to the newly redesigned APSF website (www.apsf.org), a process that facilitates the application review by members of the Scientific Evaluation Committee, improves the timeliness of response, and facilitates transmission of reviewer feedback to the applicants. The Scientific Evaluation Committee members continue to modify and perfect the electronic application and review process.

Also of significance for the APSF grant application process was the increase in funding to $75,000 per accepted application introduced in 2004. In addition to the *Clinical Research and Education and Training* content that is the major focus of the funding program, the APSF continues to recognize the patriarch of what has become a patient safety culture in the United States and internationally, and one of the founding members of the foundation—Ellison C. "Jeep" Pierce Jr., MD. The APSF Scientific Evaluation Committee continues to designate 1 of the funded proposals each year as the recipient of this prestigious nomination, the **Ellison C. Pierce, Jr., MD, Research Award**. The award carries with it an additional, unrestricted prize of $5,000. New this funding cycle is the addition of the **APSF/Anesthesia Healthcare Partners Research Award**, made possible by an unrestricted grant from Anesthesia Healthcare Partners (AHP).

For the year 2005 (projects to be funded starting January 1, 2006), two grants were selected for funding by the APSF Scientific Evaluation Committee (for names of committee members, please refer to the list in this issue). The APSF Scientific Evaluation Committee members were pleased to note that they reviewed 21 applications in the first round, 8 of which were selected for final review at the American Society of Anesthesiologists (ASA) Annual Meeting in Atlanta, Georgia. As in previous years, the grant submissions addressed areas of high priority in clinical anesthesia. The major objective of the APSF is to stimulate the performance of studies that lead to prevention of mortality and morbidity from anesthesia mishaps. A particular priority continues to be given to studies that address anesthetic problems in healthy patients, and to those studies that are broadly applicable and promise improved methods of patient safety with a defined and direct path to implementation into clinical care. Additionally, the APSF is encouraging the study of innovative methods of education and training to improve patient safety.

The applications that the Scientific Evaluation Committee received this year covered a variety of topics:

- The cost-effectiveness of reducing the incidence of retained surgical sponges.
- The investigation of a neuromuscular blocker advisory system utilizing adaptive process control technology.
- Improving patient safety during epidural needle insertion by creating an educational outline and objective assessment of skills and judgment.
- Prediction of respiratory compromise during patient-controlled analgesia by heuristic modeling of continuous oximetry and capnography.
- An investigation of the use of electronic patient records to determine independent intraoperative predictors of perioperative mortality.
- The detection of anaerobic metabolism during anesthesia using indirect calorimetry.
- Evaluation of lingual tonsil hyperplasia during the preoperative endoscopic exam.
- Assessment of resident performance during obstetric anesthesia using the human patient simulator.
- The effects of depth of sedation on long-term functional outcome and postoperative delirium in elderly orthopedic patients.
- An evaluation of the severity of illness as a predictive model of outcomes.
- The evaluation of an interdisciplinary OR team in a malignant hyperthermia simulation scenario to promote improved outcome.
- The analysis of anti-coagulant effects of three times daily (TID) low-dose heparin regimen on removal of epidural catheters in surgical patients.
- The investigation of phenotyping the susceptibility to malignant hyperthermia using a microdialysis technique.
- The evaluation of vocal cord immobility due to recurrent laryngeal nerve paresis during anterior cervical spine surgery.
- An investigation of the association between anesthesiologist age and incidence of malpractice litigation.
- The development of a perioperative dental risk recognition and prevention program.
- The evaluation of the acceptance of a novel syringe-catheter connector system for spinal and epidural administration of medication.
- The effectiveness of perioperative beta-blockade in morbidly obese patients in reducing intraoperative anesthetic requirements.
- The investigation of the prolonged QT syndrome in the perioperative period.
- The development of digital video technology to improve the education, proficiency, and safety of anesthesia residents performing invasive clinical procedures.

The APSF Scientific Evaluation Committee met during the ASA annual meeting on October 22, 2005, in Atlanta for final evaluation of the proposals. Of the 8 finalists, the members of the APSF Scientific Evaluation Committee selected 2 awardees:

Melanie C. Wright, PhD

Melanie C. Wright, PhD – Assistant Professor, Department of Anesthesiology, and Human Simulation and Patient Safety Center, Duke University, Durham, NC. Her grant submission is entitled, *"Objective Measures of Performance in Simulated Anesthesia: A Comparison of Novices and Experts."*

The use of human patient simulators in anesthesiology training and assessment has been limited by the lack of objective, validated measures of human performance. Such measures are necessary if simulators are to be used to evaluate the skills and training of anesthesia providers and teams, or to evaluate the impact of new processes or equipment design on overall system performance. There are 2 main goals of this project: the first is to quantitatively compare objective measures of anesthesia provider performance with regard to their sensitivity to both provider experience and simulated anesthesia case difficulty. The authors plan to compare previously validated measures of anesthesia provider performance to 2 objective measures that are relatively novel to the environment of anesthesia care: an objective measure of provider situation awareness, and a measure of providers' eye scan

See "Grants," Next Page

Drs. Wright and London Each Receive Awards

"Grants," From Preceding Page

patterns. The second goal of this project is to qualitatively evaluate the situation awareness and eye tracking data to identify key determinants of expertise in anesthesia providers. These determinants of expertise may then be used to further enhance objective measures of performance as assessment tools, and to improve training of anesthesia providers.

The results of this study are directly applicable to the assessment of anesthesia providers' ability and to training, and will ultimately lead to improved patient care and safety. This study proposes to validate 2 objective measures of performance that may provide better scalability with respect to assessing multiple performers. In addition, situation awareness and eye tracking measures may provide improved means for assessing the underlying dynamic knowledge of care providers and their performance with respect to accessing relevant information. The validation of these measures may also serve to support efforts in the design and evaluation of anesthesia displays for their safe and effective use by care providers.

Perhaps more importantly, this study provides a basis for identifying specific determinants of expertise in anesthesia. Through qualitative evaluation of situation awareness query responses and eye tracking data, the authors propose to identify specific indicators that are reflective of skill acquisition in anesthesia. Such information will be useful in enhancing training of anesthesia providers.

Investigators listed in Dr. Wright's research proposal include Jeffrey M. Teakman, MD, Jonathan B. Mark, MD, and Mark Stafford-Smith, MD. Other personnel include Eugene W. Hobbs, Laboratory Technician; Bryan Andregg, Analyst Programmer; and Barbara G. Phillips-Bute, Statistician.

In addition to receiving the requested funding of $74,959 for this project, Dr. Wright is also the recipient of the **Ellison C. Pierce, Jr., MD, Research Award**, which consists of an additional, unrestricted grant of $5,000.

Martin J. London, MD

Martin J. London, MD — Professor of Clinical Anesthesia, Department of Anesthesiology, University of California, San Francisco, San Francisco, CA. His grant proposal is entitled, *"Perioperative Pharmacologic Prophylaxis for Cardiovascular Events in the Department of Veterans Affairs: A Pharmacoepidemiologic Pilot Project."*

The objective of this proposal is to develop a pharmacoepidemiologic study of the association of cardiovascular pharmacologic prophylaxis with perioperative and 1-year outcomes after major noncardiac surgery in the Department of Veterans Affairs (DVA) population. Outpatient and inpatient prescription data from the system-wide Pharmacy Benefits Management–Strategic Healthcare Group for beta-blockers, statins, calcium channel blockers, alpha-2 agonists, and antiplatelet agents will be matched with risk factors, surgical details, and perioperative outcomes (myocardial infarction, cardiac arrest, pulmonary edema, stroke, all cause mortality, and length of stay) for patients undergoing major general, vascular, thoracic, urologic, neurosurgical, and orthopedic procedures in 4 fiscal years (2002–2006) collected by the National Surgical Quality Improvement Program (NSQIP). One-year all-cause mortality will be determined using the DVA's administrative death benefits database (BIRLS). The authors will study approximately 100,000 major surgical cases performed at approximately 123 hospitals. Propensity scoring will be used to adjust for medication prescribing biases, followed by risk adjustment using validated NSQIP methodology. Logistic regression models will be developed using patient and hospital covariates along with drug use (considering duration of therapy, dose, and class) to determine associations with the primary (perioperative mortality and outcomes) and secondary (1-year mortality and hospital length of stay) outcomes. This pilot study will facilitate a greater understanding of current practices in a high-risk surgical population, and will lay the groundwork for larger scale funding from federal agencies. This project has a particular application to patient safety, as it will better delineate specific areas in which focused, randomized controlled trials of particular drugs may be logistically practical and economically feasible. The collaborators listed in Dr. London's proposal are William G. Henderson, PhD, Co-Director of the NSQIP from the Denver Data Analysis Center, and Francesca Cunningham, PharmD, research coordinator.

In addition to receiving the requested funding of $75,000 for his project, Dr. London is the recipient of the inaugural **APSF/Anesthesia Healthcare Partners Research Award**.

On behalf of APSF, the members of the Scientific Evaluation Committee wish to congratulate all of the investigators who submitted their work to APSF, whether or not their proposals were funded. We hope that the high quality of the proposals and the important findings that will undoubtedly result from completion of these projects will serve as a stimulus for other investigators to submit research grants that will benefit all patients and our specialty.

Sorin J. Brull, MD, is Chair of the APSF Scientific Evaluation Committee and Professor of Anesthesiology at the Mayo Clinic College of Medicine, Jacksonville, FL.

Dear SIRS

Absorbent Wrapper Design Questioned

S AFETY
I NFORMATION
R ESPONSE
S YSTEM

Michael Olympio, MD,
Chair of the APSF Committee on Technology and Co-Founder of the Dear SIRS Initiative.

Dear SIRS refers to the **Safety Information Response System**. The purpose of this column is to expeditiously communicate technology-related safety concerns raised by our readers, with input and responses from manufacturers and industry representatives. This process was developed by Drs. Michael Olympio, Chair of the Committee on Technology, and Robert Morell, Editor of this newsletter. Dr. Olympio is overseeing the column and coordinating the readers' inquiries and the responses from industry. **Dear SIRS** made its debut in the Spring 2003 issue.

Editor's Note: Although Dr. Wright may have later determined the manufacturer of the product in question, the Editors subsequently located at least 2 additional reports of circuit obstruction by unwrapped absorbent canisters, apparently manufactured by other companies. Our focus, then, is not to implicate any particular brands, but to allow manufacturers to address the issue of safety. ~ Drs. Morell and Olympio

Dear SIRS:

I am aware of 2 instances where the plastic wrapper on the soda lime was not removed prior to installation into the machine. Both instances occurred late in the day and were accompanied by unexpected ventilation problems. Both instances were "solved" before a catastrophe occurred, but there was much "running around" during the trouble-shooting.

I am concerned that this will result in a patient death.

This could all be avoided if we always checked our machines before induction, but I know that my colleagues don't always do that once the day is underway. Also, we instituted a protocol whereby the anesthesia "aide" who changes the lime is to write a note and set it on the gas machine warning the anesthetist that the lime has been changed. This was not done in the most recent case. That case was also accompanied by a change in nursing personnel at 3:00 pm. The new nurse was not informed that the lime had been changed, nor was I.

The problem here is that the line of communication can always be broken.

If, however, the canister could not be closed with a properly designed wrapper on it, then it would be impossible to close the cage over an unwrapped canister. The wrapper on these canisters is clear plastic with some fenestrations (which allowed some airflow through them) and printed on that plastic in red letters is the following: "THIS WRAPPER MUST BE REMOVED PRIOR TO USE." It is repeated numerous times on each canister, and is hard to miss.

I would appreciate your thoughts. Thanks for listening, and thanks for the APSF.

Tom Wright, MD
Minneapolis, MN

Responses

Dear SIRS,

Grace has taken several steps to ensure that end users are aware of the wrapping around our prepak cartridges and that said wrapping should be removed prior to use. The first step is a clear, written statement printed on the wrap stating clearly "STOP!!! - remove this shrink wrap before use." Second, we have a red "easy open" tear strip around the top of the package that has clearly written on it "STOP - remove before use." Third, and even more important, Grace does not tighten the wrapping to the point at which it fully adheres to the sides of the container. We purposefully "blouse" the wrapping so it protrudes from the sides of the container, making the wrapping not only more evident, but also making it more difficult for the end user to put the cartridge into the delivery unit. I have attached a photo as a visual aid to show you what I mean.

I would very much like to get further details from Dr. Wright to determine whether it was a Sodasorb brand cartridge that was put into use prior to the wrapping being removed, and if so, to get additional details so we can enter this incident into our formal quality follow-up process.

Jeff Mack
Global Sales & Marketing Manager, Sodasorb
Grace Performance Chemicals
W.R. Grace & Co.-Conn

Dear SIRS,

Carbolime is shipped with a shrink wrapper that incorporates a label within the wrapper material itself. The label clearly states that the wrapper must be removed before use. Additionally, when the wrapper is shrunk onto the canister, the "corners" of the wrapper protrude from the circumference of the canister making it difficult to insert the canister into an anesthesia machine without removing the wrapper. Despite these factors, there have been—albeit extremely infrequent—reports of users placing Carbolime canisters in anesthesia machines without removing the wrapper from the canister. Allied encourages users of its Carbolime product to read and heed all labels associated with the product.

Eldon P. Rosentrater
VP Administration
Allied Healthcare Products, Inc.

See "Wrapper," Next Page

Design Changes May Have Unexpected Consequences

"Wrapper," From Preceding Page

Dear SIRS:

We are committed to working together with our distributors, equipment manufacturers, and designers, as well as the end users to ensure ease and proper use of our products and to participate in proper training.

Sofnolime is shipped to this end with safety features in mind.

1) Clear markings are placed in the outer wrapper of cartridges to enable user-friendly reminders and facilitate training in the preparation and use of "one shot" cartridges.

2) Cartridges are shrink-wrapped with clear markings and instructions.

We believe that the concept of "better by design" in combination with these 2 principles can make a difference.

Molecular Products encourages all distributors and customers to spread the "good practice" of reading all labels and instructions before use of consumables. Continuous training and re-enforcement programs are an integral part of these good practice regimes.

Our carton and product markings are under constant review, and we welcome suggestions as to more effective, internationally recognizable, and attention-seeking labels that would reduce further any instance that threatens patient safety.

"Designed for purpose" is the ultimate goal of every product and this incident has provoked debate about removable packaging that could aid in avoiding repeat instances.

The "better by design" approach can have some unexpected consequences. It is quite easy to introduce a safety feature that, while preventing one form of misuse, inadvertently introduces an unexpected effect.

These effects can include both safety and commercial issues. Introducing a tear off safety tag that prevents insertion of the absorber can lead to people forcing the disposable cartridge into place, which causes damage to the ventilator equipment and in turn potentially leads to an even larger hazard to the patient than the original issue. It may also prevent insertion of further cartridges.

There is also the issue of increased cost. For instance, apart from the extra cost of the safety device itself, there can also be manufacturing process costs or packing density effects, which can alter the shipping costs and storage efficiency.

This photograph is an example of one manufacturer's reminders to remove the wrapper on an absorbent canister before installation into the anesthesia machine.

An apparently "simple" solution is not always "simple" and, without extensive field research, does not always have the expected or desired effect.

David Baines
Sales and Marketing Director
Molecular Products Limited

Dear SIRS:

The letter from Tom Wright, MD, to the *APSF Newsletter* describes what may most likely be seen by any anesthesia provider as an immediate high-priority problem, the unexpected inability to ventilate a patient (the lack of visibility of the root cause, the absorbent wrapper, complicated this event). Typical techniques may ultimately find the problem but, as the author states, "there was much 'running around' during the trouble-shooting."

The author further suggests possible solutions that may help prevent this event from occurring in the future and, while some solutions may be explored, the preoperative checkout procedure required by the FDA[1] provides users with an appropriate method to help avoid these events today. The FDA procedure provides both an accurate and reliable method to detect an anesthesia machine that is not functioning properly. The FDA procedure is designed to be conducted at the beginning of the work day and, in an abbreviated form, prior to each subsequent anesthetic.

The FDA checkout procedure is currently being reviewed[2] and recommendations for changes may be presented shortly. In the meantime, this checkout procedure should remain a crucial portion of every safe anesthetic.

Michael Mitton
Director of Clinical Affairs
GE Healthcare, Life Support Solution

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In memory of Gale E. Dryden, MD (friends of the Dryden family)
In memory of Margie Frola, CRNA (Sharon R. Johnson, MD)

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Anesthesia Patient Safety Foundation (APSF)

2006 GRANT PROGRAM

Guidelines for Grant Applications Scheduled to Be Funded January 1, 2007

The Anesthesia Patient Safety Foundation (APSF) Grant Program supports research directed toward enhancing anesthesia **patient safety**. *Its major objective is to stimulate studies leading to prevention of mortality and morbidity resulting from anesthesia mishaps.*

NOTE: The grant award limit has increased to $150,000 per project (including up to 15% institutional overhead). Additionally, there have been changes in areas of designated priority, in requirements for materials, and specific areas of research. For the current funding cycle, the APSF is placing a specific emphasis on PATIENT SAFETY EDUCATION.

To recognize the patriarch of what has become a model patient safety culture in the United States and internationally, the APSF inaugurated in 2002 the **Ellison C. Pierce, Jr., MD, Research Award**. The APSF Scientific Evaluation Committee will designate one of the funded proposals as the recipient of this nomination that carries with it an additional, unrestricted award of $5,000. The APSF is also proud to announce the inauguration of the **APSF/Anesthesia Healthcare Partners (AHP) Research Award**, made possible by a generous, unrestricted grant from AHP.

PRIORITIES

The APSF accepts applications in 1 of 2 categories of identified need: **CLINICAL RESEARCH and EDUCATION AND TRAINING**. Highest priority is given to

- Studies that address peri-anesthetic problems for relatively healthy patients; or
- Studies that are broadly applicable AND that promise improved methods of patient safety with a defined and direct path to implementation into clinical care; or
- Innovative methods of education and training to improve patient safety.

AREAS OF RESEARCH

Areas of research interest include, but are not limited to

- New clinical methods for prevention and/or early diagnosis of mishaps;
- Evaluation of new and/or re-evaluation of old technologies for prevention and diagnosis of mishaps;
- Identification of predictors of negative patient outcomes and/or anesthesiologist/anesthetist clinical errors;
- Development of innovative methods for the study of low-frequency events;
- Measurement of the cost effectiveness of techniques designed to increase patient safety;
- Development or testing of educational content to measure, develop, and improve safe delivery of anesthetic care during the perioperative period; and
- Development, implementation, and validation of educational content or methods of relevance to patient safety (NOTE: both patient and care provider educational projects qualify).

SCORING

Studies will be scored on

- Soundness and technical merit of proposed research with a clear hypothesis and research plan;
- Adequacy of assurances detailing the safeguarding of human or animal subjects;
- Uniqueness of scientific, educational, or technological approach of proposed research;
- Applicability of the proposed research and potential for broad healthcare adoption;
- Clinical significance of the area of research and likelihood of the studies to produce quantifiable improvements in patient outcome such as increased life-span, physical functionality, or ability to function independently, potential for reductions in procedural risks such as mortality or morbidity, or significant improvements in recovery time;
- Ability of research proposals to maximize benefits while minimizing risks to individual human research participants. Each proposal should proscriptively enunciate the criteria for instituting rescue therapy whenever there is the remotest possibility of an untoward adverse event to a human research volunteer. In some instances, the rescue therapy may be triggered by more than 1 variable (e.g., duration of apnea [in seconds], oxygen saturation <90%, etc.). Additionally, the protocol should specify the nature of the rescue procedure(s), including the rescue therapy and dosages, and the responsible personnel. If other departments are involved in the rescue process, the application should specify if such departments are to be informed when a new volunteer is participating in the trial.
- Priority will be given to topics that do not have other available sources for funding.
- Proposals to create patient safety education content or methods that do not include a rigorous evaluation of content validity and/or benefit will be unlikely to attain sufficient priority for funding.

NOTE: Innovative ideas and creativity are strongly encouraged. New applicants are advised to seek guidance from an advisor/mentor skilled in experimental design and preparation of grant applications. Poorly conceived ideas, failure to have a clear hypothesis or research plan, or failure to demonstrate clearly the relationship of the work to patient safety are the most frequent reasons for applications being disapproved or receiving a low priority score.

BUDGET

The budget request must not exceed $150,000 (including a maximum of 15% institutional overhead). Projects may be for up to 2 years in duration, although shorter anticipated time to completion is encouraged.

ELIGIBILITY

Awards are made to a sponsoring institution, not to individuals or to departments. Any qualified member of a sponsoring institution in the United States or Canada may apply. Only 1 person may be listed as the principal investigator. All co-investigators, collaborators, and consultants should be listed. Applications will not be accepted from a principal investigator currently funded by the APSF. Re-applications from investigators who were funded by APSF in previous years, however, will be accepted without prejudice.

Previous applicants are strongly encouraged to respond to the reviewers' comments in a letter indicating point-by-point how the comments and suggestions were addressed.

Applications that fail to meet these basic criteria will be eliminated from detailed review and returned with only minimal comment. A summary of reviewers' comments and recommendations will be provided to applicants only if requested from the Scientific Evaluation Committee Vice-Chair.

AWARDS

Awards for projects to begin January 1, 2007, will be announced at the meeting of the APSF Board of Directors on October 14, 2006 (2006 ASA Annual Meeting, Chicago, IL).

NOTE: **No award will be made unless the statement of institutional human or animal studies' committee approval is received by the committee prior to October 1, 2006.**

See "Application," Next Page

Grant Application Submission Date — June 19, 2006

"Application," From Preceding Page

PAPERLESS APPLICATIONS

All applications and accompanying documents MUST INCLUDE

- application
- applicant's curriculum vitae
- applicant's acceptance form
- departmental chair letter of support
- budget justification
- Institutional Review Board approval or submission letter.

These documents will be accepted in **ELECTRONIC** format only. Electronic files in Microsoft Word, Excel, or Adobe Acrobat PDF format are acceptable for all text, charts, and graphics, and **must be uploaded to the APSF website:**

http://apsf.org/grants/application/applicant/

Please follow the Application Format instructions carefully; applications not conforming to the requirements may be disallowed.

APPLICATION FORMAT

I. Cover Page

A. Title of research project

B. Designation of proposal as "Clinical Research" or "Education and Training"

C. Name of applicant with academic degrees, office address, phone number, fax number, and e-mail address

D. Name, office address, and phone number of departmental chairperson

E. Sponsoring institution and name, office address, phone number, and e-mail address of the responsible institutional financial officer

F. Amount of funding requested

G. Start and end dates of proposed project.

II. Research Summary - a 1-paragraph description of the project.

III. Research Plan (limited to 10 pages, typed, double-spaced, excluding references; appendices are discouraged):

A. Introduction

1. Objectives of the proposed clinical research or education and training project.
2. Background: reference work of other authors leading to this proposal and the rationale of the proposed investigation or project. Describe the relationship to the priorities highlighted in the first paragraph of the APSF guidelines. Include copies of in-press manuscripts containing pilot data, if available.
3. Specific aims: what questions will be answered by the investigation? If applicable, what hypothesis will be tested? For an educational project, what are the specific learning objectives or objectives of the methodology being developed?
4. Significance and applicability: briefly describe the historical prevalence and severity of the morbidity and mortality of the studied anesthesia mishaps. Quantify the potential improvements in patient outcome or recovery time and identify how the proposed work can be broadly applied to reduce procedural risks in health care.
5. If the application is a resubmission, describe changes from prior application, and specifically address the reviewers' comments.

B. Methods to be employed

1. Describe data collection procedure, specific techniques, and number of observations or experiments. For educational projects, describe how the effects of the intervention program will be assessed. Qualitative methodologies are acceptable.
2. Describe types of data to be obtained and their treatment, including statistical and/or power analyses, if indicated.
3. Point out and discuss potential problems and limitations of the project.
4. If appropriate, include a statement of approval of this proposal by the institutional committee reviewing human or animal investigations, or a statement that approval has been requested.

IV. Budget - include all proposed expenditures. Indicate under each category the amount requested or provided from other sources.

A. Personnel (limit salaries of individuals to NIH Guidelines)

B. Consultant costs

C. Equipment

D. Supplies

E. Patient costs

F. Other costs

G. Total funds requested (no indirect costs)

H. Budget justification - CLEARLY and completely justify each item, including the role of each person involved in the project. If computer equipment is requested, explain why such resources are not already available from the sponsoring department/institution. NOTE: Failure to adequately justify any item may lead to reduction in an approved budget.

I. List all current or pending research support (federal, foundation, industrial, departmental) available for the proposed project to the principal investigator, his collaborators, or his mentor. List all other research support for the principal investigator, stating percentage of effort devoted to current projects, and percent effort expected for pending projects.

J. List the facilities, equipment, supplies, and services essential for this project and indicate their availability.

V. Abbreviated CV (maximum of 3 pages) of the principal investigator only.

VI. Letter from the departmental chairperson indicating

A. The number of working days per week available to the applicant for the proposed research, the degree of involvement of the applicant in other research projects, and the chair's degree of enthusiasm for the proposed project.

B. The availability of facilities essential to the completion of the proposed research.

C. An agreement to return unused funds if the applicant fails to complete the project.

VII. Sign and date the Acceptance of Conditions of the Grant form and upload this form as an Adobe PDF file to the website along with the application.

VIII. Starting with the 2004 funding cycle, **ONLY ELECTRONIC APPLICATIONS** (Microsoft Word or Excel format and Adobe PDF format for figures or drawings) will be accepted.

GUIDELINES FOR PREPARATION OF APPLICATIONS AND ELIGIBILITY REQUIREMENTS CAN BE OBTAINED FROM THE APSF WEB PAGE: **http://www.apsf.org**

The original application must be submitted electronically to the website no later than Monday, June 19, 2006. Once the completed application is uploaded, an automatic confirmatory e-mail will be generated and sent to the Chair of the Scientific Evaluation Committee:

Sorin J. Brull, MD
Chair, APSF Scientific Evaluation Committee
Professor of Anesthesiology
Mayo Clinic College of Medicine
4500 San Pablo Road, JAB-4035
Jacksonville, FL 32224
Telephone: (904) 296-5688
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2005 Abstracts Include Many Safety Topics

by Glenn S. Murphy, MD, and Jeffery S. Vender, MD

Nearly 1,500 scientific papers were presented at the 2005 American Society of Anesthesiologists Annual Meeting in Atlanta, Georgia. Important studies relating to patient safety were discussed in many of the 94 separate sessions. This review will highlight a few of these important presentations.

Intraoperative Awareness

Several abstracts examined the incidences and consequences of intraoperative awareness. The Thai Anesthesia Incidence Study (A-1283) prospectively collected data from 20 hospitals over a 1-year period. Details of intraoperative awareness were recorded and analyzed to identify contributing factors and preventive strategies. Among over 150,000 anesthetics, 99 cases of awareness were observed. Awareness was noted more frequently in certain patient populations (female gender, ASA I and II patients, patients undergoing cardiac, obstetric, and lower abdominal surgery). Although 50% of patients reported experiencing pain during the awareness episode, only 13% described postoperative emotional stress or anxiety. Pollard and colleagues (A-8) conducted a modified Brice interview in postoperative patients (within 24-48 hours) to determine the incidence of intraoperative awareness. A total of 161,824 general anesthesia patients were interviewed over a 4-year period. Only 12 cases of intraoperative awareness (0.007% incidence) were identified in this investigation, which suggests that the risk of awareness may be lower in certain practice settings. Researchers in Sweden (A-7) examined the severity of immediate and delayed suffering due to intraoperative awareness. After interviewing 2,681 consecutive patients scheduled for general anesthesia, 98 patients were identified who considered themselves to have experienced awareness. Detailed interviews were conducted in the 46 patients who appeared to have actually been aware during a general anesthetic. Thirty patients described an acute emotional reaction, and 15 patients experienced late symptoms with a median severity score of 4 (on a scale of 12). Four patients contacted medical personnel due to mental symptoms relating to awareness. However, only 1 patient was diagnosed with post-traumatic stress disorder. Leslie et al. (A-9) presented details of awareness cases in the B-Aware Trial. Patients with confirmed awareness in this trial were more likely to have preoperative impaired cardiovascular status and intraoperative hypotension requiring vasopressor treatment than patients without awareness. In addition, these patients received lower concentrations of inhaled volatile anesthetics (MAC equivalent of 0.3%). Six of 13 patients reported adverse consequences resulting from the awareness episode. These findings clearly demonstrate that hemodynamically unstable patients are at greatest risk of awareness, and measures to reduce the risk of this complication in this high-risk population must be considered.

Pediatrics

Three abstracts from the Pediatric Sedation Research Consortium (PSRC) were presented (A-1312, A-1312, A-1314). The PSRC is a collaborative group of 24 institutions organized to examine the safety of pediatric sedation practices and practitioners. A web-based data collection tool was used to collect data on all sedation procedures performed at each institution. Data were received on 10,552 procedures. Complications were defined as any of the following; apnea, desaturation, unplanned mask ventilation or intubation, prolonged sedation or unplanned deep sedation, emesis, use of reversal agents, or change in vital signs >30%. The incidence of complications was lowest when sedation was provided by an anesthesiologist (2.6%) when compared to other clinicians (nurse/physician assistant 4.7%; ER physician 7.0%; intensivist 7.0%; pediatrician 8.7%; radiologist 5.7%). Adjusting complication rates for age, ASA status, and emergency status increased these differences further. The results from the PSRC suggest that serious complications related to pediatric sedation are rare, and that the risk of complications may be influenced by the type of provider administering sedative agents.

The Pediatric Perioperative Cardiac Arrest (POCA) Registry was formed in 1994 to investigate causes and outcomes associated with perioperative cardiac arrest in children. Researchers from the University of Washington School of Medicine examined the causes of cardiac arrest in pediatric patients over 2 time periods: 1994-1997 and 1998-2003 (A-1310). There was a decrease in the proportion of infants and an increase in the proportion of older children (6-18 years) suffering a perioperative cardiac arrest over time. The severity of injury during the 2 time periods did not differ, with more than one-quarter of cardiac arrests resulting in death. The proportion of medication-related deaths was significantly lower in the 1998-2003 period (20%) compared to the 1994-1997 interval (32%). The authors attribute this difference to the declining use of halothane in favor of sevoflurane in pediatric patients.

Jimenez and colleagues analyzed 525 pediatric claims from the ASA Closed Claims database to identify trends in types of patient injury and outcomes over the last 3 decades (A-1309). The proportion of claims relating to respiratory events decreased over time (1970s - 57%; 1990-2000 - 25%; $P < 0.001$), as well as the proportion of claims for death or permanent brain damage (1970s - 78%; 1990-2000 - 61%; $P=0.03$). Although the reasons for these changes in pediatric claims over time are not established, the authors hypothesize that improvements in monitoring, drugs, or training (subspecialization) may have influenced patient outcomes.

Airway

The incidence and predictors of difficult mask ventilation have been poorly understood. Kheterpal et al. (A-1415) examined the level of ease or difficulty of mask ventilation during 15,923 general anesthetics over a 1-year period. The ability to mask ventilate was graded on a 4-point scale (1: ventilation without the need for an oral airway, 2: ventilation requiring an oral airway, 3: ventilation that was difficult, inadequate, or required 2 providers, or 4: impossible ventilation). Grade 3 ventilation was observed in 214 (1.3%) patients and Grade 4 occurred in 24 (0.16%) cases. Independent predictors of Grade 3 ventilation included a history of snoring, a BMI >25, limited jaw protrusion, the presence of a beard, and an ASA status of 3-5. Predictors of Grade 4 ventilation were the presence of a neck mass or sleep apnea. These data suggest the predictors for difficult intubation and ventilation may differ.

Two studies by Mort and colleagues investigated emergency airway management of the obese patient outside the operating room setting. An emergency intubation database was reviewed to examine the incidence of difficult intubation (A-1145), and the role of the LMA as a rescue device (A-288), in this patient population. When compared to a cohort of patients with a BMI <25, morbidly obese (MO) patients (BMI >40) had a higher incidence of poor glottic visualization (Lehane-Cormack grade 4: 28%-MO vs. 8%), unsuccessful intubation on first attempt (48%-MO vs. 28%), and requiring more than 3 intubation attempts (18% vs. 10%). The incidence of hypoxemia was also higher in the MO group. The authors also reported on the use of the LMA as a rescue device in obese patients (BMI >30) outside the OR. A total of 97% of obese patients were successfully ventilated with the LMA within 3 attempts at placement. Overall, 91% of patients were successfully intubated via the LMA. The authors note that obese patients pose challenges to the airway manager outside the OR, and that the LMA may be a useful device to establish both ventilation and intubation in these situations.

Miscellaneous

The impact of type of anesthesia (inhalational vs. intravenous) on outcomes remains controversial. Investigators from the Netherlands studied the association between method of general anesthesia (propofol or volatile agents) and 1-year mortality (A-1271). Adult patients (n = 1,508) undergoing general or vascular surgery were examined. Multivariate logistic regression analysis was used to adjust for potential confounding variables. Overall 1-year mortality was 5.2%. Mortality was associated with comorbidities, age, and surgical procedure, but not with type of anesthesia. The authors note

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Lee Presents POVL Data

"Abstracts," From Preceding Page

that inhalational agents were more frequently used in older patients with comorbidities, which may explain previous observations of higher mortalities in patients administered volatile agents.

Ischemic optic neuropathy (ION) is the most common cause of postoperative visual loss (POVL) after spine surgery. Lee and colleagues examined the ASA POVL Registry to identify potential risk factors for POVL (A-1). Seventy-one cases of ION following spine surgery were reviewed and compared to 9 cases of central retinal artery occlusion. Of the 71 ION cases, the median age was 50, mean anesthesia duration was 10 hours, the mean estimated blood loss was 3.8 liters, and 79% of cases had ≥15 minutes of a systolic blood pressure <100 mmHg. Cases of central retinal artery occlusion were associated with a shorter anesthesia duration (6.4 hours) and a lower estimated blood loss compared to ION cases. Although ION may occur during prolonged spine surgery with significant blood loss and hypotension, the wide ranges in these reported variables suggest a multi-factorial etiology of ION.

This brief review summarized only a small number of the important abstracts on patient safety presented at the 2005 Annual Meeting. To view other abstracts on patient safety, or to obtain further information on the abstracts discussed in this review, please visit the Anesthesiology website at www.anesthesiology.org.

Dr. Murphy is Director of Cardiac Anesthesia for Evanston Northwestern Healthcare and an Associate Professor at Northwestern University Medical School in Chicago. Dr. Vender is Chairman of the Department of Anesthesia at Evanston Northwestern Healthcare and Professor at Northwestern University Medical School in Chicago.

Letter to the Editor

Labor Analgesia Needs to Be Available

Solution to Challenge Deserves Careful Consideration

To the Editor:

We read with interest, and much dismay, the letter by Dr. Thomas Parker, Jr., regarding labor epidurals in the summer 2005 issue of the *APSF Newsletter*. Dr. Parker raises some issues that are important and of very real concern to the specialty of anesthesiology. Daytime fatigue and patient-safety concerns owing to night-time work is an obvious and important problem. Provision of comprehensive, 24-hour-per-day anesthetic services in small, rural hospitals is a particular challenge. Limited anesthetic manpower and resources are a source of stress for many practitioners in a variety of settings, both large and small. Appropriate reimbursement for our services is an essential matter of fairness and important to all practitioners.

However, Dr. Parker's letter was a virtual diatribe against labor epidurals, and more specifically, against the women requesting them. We feel this is misdirected and inappropriate. Dr. Parker refers to women requesting pain relief with labor epidurals as "incessant," "entitled," "demanding," and "privileged," and to labor epidurals themselves as "non-essential." Labor pain is one of the most severe pains a woman will ever experience in her lifetime, and relief of this pain is no less important than the surgical anesthesia we provide in the operating room. The provision of obstetric analgesia or anesthesia, either at night or during daylight hours, is one of the most important services that we as anesthesiologists can provide. The women who receive these services are no more or less deserving of pain relief than any other patient in the surgical suite.

What, according to Dr. Parker, renders epidural analgesia in labor a "privilege"? What other services provided by Dr. Parker are considered "privileges," and who among his patients are "entitled" to receive these services? What is an "incessant demand"? Is the sound of a woman in excruciating pain, pleading for relief, an "incessant demand"? Does the "request" for pain relief become a "demand" when made by a patient without private health insurance? Is labor pain somehow more amenable and appropriate to relieve by regional analgesia at 2 o'clock in the afternoon than at 2 o'clock in the morning? When does a group of patients experiencing severe pain become "overly demanding"? Perhaps when they cannot pay for the services that would provide relief?

The American Society of Anesthesiologists and the American College of Obstetricians and Gynecologists have issued a joint statement that, "In the absence of a medical contraindication, maternal request is sufficient medical indication for pain relief during labor. Pain management should be provided whenever medically indicated."[1] While this document goes on to note, "that of the various pharmacologic methods used for pain relief during labor and delivery, regional analgesia techniques—epidural, spinal, and combined spinal epidural—are the most flexible, effective, and least depressing to the central nervous system, allowing for an alert, participating mother and an alert neonate," there is no requirement to use regional analgesia. Individual hospitals and anesthesia groups must determine what they can practically and safely provide. This might include single shot-spinal opioids with additional IV opioids as needed, as some smaller centers do, or simply IV opioids if regional analgesia is not feasible. We would further note that this document takes a strong stance on appropriate reimbursement.

Dr. Parker does raise issues of serious concern. These issues deserve ongoing, careful consideration and discussion among the leadership of our professional societies. However, it is not in keeping with the spirit of professionalism that we expect from our anesthesia colleagues to belittle, insult, and disparage women in labor for their entirely appropriate requests for pain relief. These issues need to be faced by our obstetric colleagues as well as hospital administrators, in consultation with the anesthesiologist. Together, we can find solutions and provide adequate pain relief for women in labor, and insure safe, healthy deliveries for the children in our respective communities.

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Reference

1. ACOG Committee Opinion, # 231," Pain Relief During Labor," February 2000. This opinion replaces # 118, January 1993. (It is a joint statement from the ACOG Committee on Obstetric Practice and the ASA Committee on Obstetric Anesthesia.)

Editor's Note: The *APSF Newsletter* wishes to thank Drs. Camann, Hughes, and Birnbach for their thoughtful input on this important issue.

Scientific/Technical Exhibits Replete With Safety Themes

by John H. Eichhorn, MD

Patient safety again was a prominent theme in the exhibit hall at the American Society of Anesthesiologists Annual Meeting October 22-26, even with the hurried translocation from hurricane-ravaged New Orleans to Atlanta. Both the Scientific/Educational Exhibits and also the Technical Exhibits from vendors of anesthesia-related equipment and supplies contained a few fresh concepts related to patient safety as well as many familiar themes with some new refinements.

In the Scientific/Educational Exhibits, 9 of the 48 exhibits in some way related to airway concerns. This simply reinforces the intriguing suggestion that airway management remains likely the greatest technical/mechanical challenge for anesthesia professionals. Indeed, it is the one central component of practice that has changed the least in the "modern era" of anesthesia, as defined by the widespread adoption nearly 20 years ago of electronic monitors such as oximeters and capnographs to extend the power of human senses and allow much earlier detection of dangerous intraoperative situations. The fact remains that general anesthesia continues to include induction of unconsciousness and then paralysis of a patient's ventilatory musculature when there is no specific guarantee that intubation of the trachea or even positive pressure ventilation will be possible. Accordingly, virtually all anesthesia professionals still today experience "difficult airway" situations with a frequency that depends on their type of patients and practice. Thus, airway tools of a wide variety, airway models, airway simulators, airway educational efforts and the associated Scientific/Educational Exhibits, as well as airway-related products for sale in the Technical Exhibits continue to constitute a significant fraction of the displays. Frustratingly, there was no exhibit this year of any type of future "Star-Trek"-like computerized scanner that would fit over the patient's head at the bedside or in an office setting and in seconds generate a detailed 3-D map of the airway and also a highly educated "smart algorithm" opinion of precisely how to manipulate and/or instrument the airway to facilitate successful airway management. Invention, testing, approval, and implementation of such devices or their (realistic) functional equivalent would revolutionize anesthesia care in somewhat the same manner as the introduction of electronic monitoring did in the mid-1980s.

In any case, a comprehensive plan for a departmental airway workshop was outlined by sponsors from the Medical College of Wisconsin, with reports of enhanced confidence in airway management gained by participants. Likewise, computerized video of airway management situations were presented from Rhode Island Hospital with the added intention of creating a detailed video archive of the difficult airways of specific patients for future pre-op reference by subsequent anesthesia personnel. Another related exhibit from the Cleveland Clinic featured a website for airway teaching material, particularly video. [Such a website could be a potential archive of actual difficult airways—with video of how to manage them—that could be accessed by any anesthesia provider anywhere when provided with the unlocking security code of the subject difficult airway patient who needs additional anesthesia care.] Specific airway management strategies for pregnant patients and for pediatric patients were featured in extensive exhibits. Strategies for topical anesthetization of the airway were featured as well as another exhibit devoted specifically to tools useful when extubating a patient (up to and including transtracheal jet ventilation and cricothyrotomy). An exhibit from Yale featured video through the LMA "C-Trach" device that is designed specifically to allow the anesthesia provider to see via a fiberoptic bundle down into the airway and guide placement of an endotracheal tube via the LMA under "direct vision" in circumstances where traditional views of the larynx are impossible. Further, the new concept of specific self-customization of the widely accepted "difficult airway algorithm" by different individual practitioners was recommended in an exhibit from Montefiore Medical Center in New York. Finally, the importance of these and all the airway related issues was specifically emphasized by the fact that "The Society for Airway Management" (founded in 1995 and pointedly billed as "apolitical") had a booth in the exhibits and highlighted its promotion of airway education and research as well as its liaison with other anesthesia-related professional groups.

Other Scientific/Educational Exhibits with safety themes included one from the University of California at San Francisco with the intriguing title "How to Avoid Death for a Dollar," which featured the implementation of (inexpensive) perioperative cardiac risk-reduction strategies employing proven beneficial medication: beta blockers and clonidine. A literature review as well as implementation protocols for medication administration were available. The American Sleep Apnea Association had a booth promoting its "A.W.A.K.E. Network" of apnea support groups. The use of ultrasound guidance for placement of arterial, central, and peripheral venous vascular catheters as well as for assisting with peripheral nerve blocks was again presented in 2 exhibits, but with more emphasis on the safety strategies of preventing errors and untoward patient outcomes. Finally, the evolution of molecular genetic testing for susceptibility to malignant hyperthermia and its obvious anesthesia patient safety implications was outlined in an exhibit presented by Henry Rosenberg, MD, from New Jersey. Note also that there was an exhibit from the University of Minnesota regarding "surgical errors" and a systems-based approach to help avoid them. The presentation cited the distribution of major errors as: wrong site (76%), wrong patient (13%), and wrong procedure (11%). While patient safety, not legal liability, was the exhibit's emphasis, the implications were clear for anesthesia providers involved in such "surgical errors."

The Technical Exhibits at the ASA meeting were nearly as numerous and elaborate as in a normal year, albeit rearranged from the original printed floor plan. The ASA-associated foundations were prominently located directly by the main entrance door with the APSF booth directly in the entry path. Attendee interest in the APSF patient safety exhibits was significantly increased this year.

In the large exhibit hall, continuing the theme from the Scientific/Educational Exhibits, there were no fewer than 29 technical/commercial exhibits exclusively or largely devoted to equipment and supplies for airway management, again dramatically emphasizing the major role of improving airway handling as an ongoing component of the evolution of anesthesia patient safety. Several very large displays exhibited a panoply of all manner of airway tools and equipment, possibly raising the question that there may be too many competing technologies and varieties of equipment available for there to be adequate investigation of their applications, risks, and benefits. As is frequently characteristic of the commercial marketplace in medical equipment, it appears that several manufacturers have rushed into production of new tools or technologies that have only been "tested" by their inventor and have never been the subject of peer-reviewed publications or multi-center clinical trials. While this approach may be entrepreneurially understandable, it makes for a bewildering array of choices for average anesthesia practitioners. For many, it may seem much easier to stick with the familiar Mac 3 or Miller 2 rather than try to figure out what may be better, either in general or in "difficult airway" scenarios.

There were several updates and variations on the fiberoptic and video-assisted laryngoscopes, several of which were intended for routine everyday use. Some featured eyepieces and some other displays offered miniature cameras that projected either to very small (1.7 inch diagonal and attached directly to the laryngoscope handle) or very large video monitors. Several were battery powered from rechargeable battery packs. Some systems featured blades containing integral optics that would fit onto a traditional C battery-powered handle, claiming to give a view around the base of the tongue without the need to displace it as in traditional direct line-of-sight laryngoscopy. One flexible optical stylet powered by 4 AA batteries claimed the ability to turn difficult intubations into routine ones with "success on the first attempt every time."

See "Exhibits," Next Page

Patient Warming, Infusion Pumps, and Monitoring Included Among Exhibits

"Exhibits," From Preceding Page

Patient warming was another very common commercial theme in the Technical Exhibits. Several new brands and variations of warming blankets or equivalents were displayed. Actively warmed wraps for the patient's arms as the sole source of warming were offered as a new solution, particularly for procedures in which traditional blankets could not be used. One genuinely new technology involved a flexible heating fabric containing very thin low-voltage heating wires that make the slightly stiff fabric become toasty warm. This single-use system was touted as simpler, less bulky and cumbersome, and much less expensive than the commonly employed forced-air/plastic blanket system. Further, and apparently the subject of intense interest at the exhibit booth from many meeting attendees, was the additional new product that is a vest or jacket of the same heating material for the anesthesia provider who is chilly (or "freezing") in the OR. The material gets fairly warm, but not hot, and can be turned on and off by connecting or disconnecting a power cord to the same electric power supply that is connected to the patient's warming blanket.

Infusion pump displays touted patient safety with an increased emphasis and volume that has not been seen before. Apparent sensitivity to case reports of patient injuries from infusion pump accidents and subsequent regulatory and government inquiries seemed to be motivating some of the sales discussions from representatives of these companies. Likewise, new features and variations of rapid infusion devices stressed safety issues, particularly improved ability to detect air in infusion lines and then prevent entry of that air into the patient's blood stream.

Ventilation monitoring during MAC and sedation seemed to reemerge as a targeted safety issue this year. Several companies heavily promoted the potential safety benefits of qualitative or near-quantitative assessment of expired CO_2 during sedated spontaneous ventilation. There was no specific reference to reported hypoventilation accidents with "deep sedation," such as in plastic surgeons' offices or even endoscopy or imaging suites, but the implications were unmistakable.

Finally, an intriguing new product that could have safety implications was featured. A mechanical device inserted in the breathing circuit in place of the Y-connector is intended to speed up emergence from the effects of inhalation anesthetics and, for example, reduce the time in stage 2 delirium and reduce time to extubation at the end of a general anesthetic. It functions in 2 ways, by causing some rebreathing and resulting deliberate mild hypercapnia intended to stimulate increased minute ventilation and, thus, the faster exhalation of volatile anesthetics, and also by a second internal component that is an "anesthetic absorber" that captures the exhaled volatile anesthetic and prevents any return into the patient via the semi-closed circuit, thus increasing the excretion gradient and speeding emergence. Three abstracts with 45 total patients were cited as supporting clinical trials.

Overall, patient safety remains a central focus of the exhibits at the ASA Annual Meeting. This recognizes both the current success in improving safety and also the significant challenges still remaining, such as, for example, in making genuine changes in practice, leading to lower risk of patient injury associated with issues in airway management.

Dr. John Eichhorn, Professor of Anesthesiology at the University of Kentucky, founded the APSF Newsletter *in 1985 and was its editor until 2002. He remains on the Editorial Board and serves as a senior consultant to the APSF Executive Committee.*

APSF Executive Committee Invites Collaboration

From time to time the Anesthesia Patient Safety Foundation reconfirms its commitment of working with all who devote their energies to making anesthesia as safe as humanly possible. Thus, the Foundation invites collaboration from all who administer anesthesia, and all who provide the settings in which anesthesia is practiced, all individuals and all organizations who, through their work, affect the safety of patients receiving anesthesia. All will find us eager to listen to their suggestions and to work with them toward the common goal of safe anesthesia for all patients.

Letter to the Editor

Reader Highlights Value of Listening

To the Editor:

Bravo to Dr. Terring W. Herionimus, III, MD, FACA, FCCP, for his excellent letter published in the Spring 2005 *APSF Newsletter*. In his discussion of the tragic cases described in Dr. Lofsky's article, he noted his admonition to residents and students to not break contact with the patient.

I have made the observation that newly trained anesthesiologists routinely forego the use of precordial and esophageal stethoscopes. I believe they have been trained to rely on the other monitoring devices in use. While I applaud the ongoing development of sophisticated monitoring technology, I have great difficulty understanding how anyone can have a secure feeling without this direct patient contact. I have been in practice for 18 years and find these tools indispensable. Not only do they help avert disaster, but they are so important in the practical management of patients. Some of the scenarios in which I feel they are critical are as follows: immediate detection of partial or complete airway obstruction; assessment of proper placement and seating of LMAs; migration of endotracheal tube into the right mainstem bronchus, especially in pediatric cases during which I place the precordial on the left chest; diagnosis of wheezing; need for suctioning; disconnection; and light anesthesia with swallowing and borborygmi.

No doubt, some or maybe all of these conditions may be noted with other monitors. But how much more rapidly does one hear a wheeze as opposed to noticing a change in the end-tidal carbon dioxide curve? Or what about noticing an increased airway inflation pressure: isn't it much more instantaneous to just hear secretions clogging the endotracheal tube?

These are just a few examples that come to mind. I have been so troubled by this that I consulted my mentor from UCLA who told me that he thinks the problem is starting in medical schools with less emphasis on auscultation. He feels that many residents are uncomfortable with auscultation, and that even if they use an earpiece, they don't know what they are listening to.

I have also acted as a reviewer for malpractice cases in which these issues have been critical to patient outcome, although sometimes this is hard to prove in retrospect.

What can we do to improve this situation? Do we need to tighten the ASA standards? Or do others feel I am completely off base? I look forward to some answers.

Danielle M. Reicher, MD
Encinitas, CA

Letter to the Editor

Oxygen May Mask Hypoventilation—Patient Breathing Must Be Ensured

To the Editor:

We strongly support Overdyk's communication[1] about the many patients daily at risk of respiratory depression, and would like to elaborate on 3 issues he raised in order to pinpoint some of the problems.

First, he states that "Cashman reported an incidence of respiratory depression of. . . 1.3% by bradypnea (RR <10)." In sedated patients, both respiratory rate and tidal volume, and even $ETCO_2$, as isolated indices, fail to correlate consistently with alveolar ventilation (VA), and therefore pCO_2. This of course makes sense when one considers the effect of tidal volume on dead space (VD/VT) and therefore VA, and the clinical observation that narcotic-induced respiratory slowing is frequently associated with an increase in tidal volume. The latter, in turn, reduces VD/VT and ameliorates the effect of the decrease in respiratory rate on VA. This, in fact, is the rationale for using opiates as a cornerstone of therapy in managing the early phase of respiratory failure and fatigue characterized by rapid shallow breathing in acutely ill patients. Bottom line: Bradypnea is certainly a signal that opiate therapy may be endangering the patient, but if only for better physiologic understanding, nobody should be under the impression that bradypnea correlates directly with VA and pCO_2. Further, even $ETCO_2$ monitoring is problematic since adequate tidal volumes are required to reflect the alveolar pCO_2, and shallow breathing may result in a low $ETCO_2$ because of poor mixing of expired gas. Therefore, careful trained interpretation of $ETCO_2$ is necessary in using this as a measure of ventilation in nonintubated sedated patients.

Second, Overdyk states that, "Supplemental oxygen. . . merely postpones the patient's insidious progress from bradypnea to apnea." Since supplemental oxygen has no significant effect on ventilation, it has no direct causative effect on the progression from bradypnea to apnea (other than eliminating hypoxic drive). What it does do is *mask* that natural opiate-induced progression from bradypnea to apnea, by failing to allow the patient to become hypoxemic, which would otherwise cause a pulse oximeter alarm, thereby alerting clinicians to the respiratory danger. It is crucial to appreciate these points—that clinicians, without realizing that they are doing so, are using the pulse oximeter as a gauge of ventilation, and that oxygen masks hypoventilation as detected by pulse oximetry, by maintaining the SpO_2, even to the point of apnea.[2-4]

Finally, Overdyk writes that using pulse oximeters is a "deceptively ineffective approach" to preventing catastrophic respiratory depression—but this is only true when supplementary oxygen is being administered. In a patient breathing *room air*, pulse oximetry is highly effective in signaling hypoventilation and/or airway obstruction! The problem, again, is that clinicians who use pulse oximetry to monitor ventilation may fail to appreciate the relevant physiology of the Hb-oxygen dissociation curve, and how it affects such a practice (i.e., that the application of oxygen, even 1 or 2 liters by nasal cannulae, moves the patient to the right on the Hb-oxygen dissociation curve, in which case the PaO_2 no longer linearly correlates with the SpO_2, and as a result, the SpO_2 then no longer correlates with alveolar ventilation).

The Practice Guidelines for Sedation and Analgesia by Non-Anesthesiologists[5] recommend that supplemental oxygen be administered to all patients undergoing deep sedation. Unfortunately, the Guidelines, which thousands of practitioners look to for guidance, are entirely silent on the complications of this practice. Interestingly, a recent report in the emergency medicine literature highlighted this issue.[6] Apparently, these practitioners seem to have more insight into the relationship between the SpO_2 and hypercapnea—and the confounding influence of supplemental oxygen—than other clinicians who deal with exactly this interface, in every patient they treat, on a daily basis. For example, Ramsay was criticized (*Anesthesiology* 2005;102:1066) for failing to use supplemental oxygen in patients administered a dexmedetomidine infusion for airway surgery, the communicating authors completely missing the point that pulse oximetry, expressly on room air, was a vitally—if not the only—accurate monitor of respiratory depression in the reported cases.

As Overdyk indicated, respiratory depression continues to be a frequent liability event in many settings, with PCA use alone translating into "thousands of patients with potentially catastrophic respiratory depression per day." Similarly, during procedural IV sedation, respiratory complications continue to occur commonly, despite a veritable industry of regulations and policies designed to prevent such critical incidents. Clearly, clinicians and guidelines are missing the critical practical message that *breathing is the only thing that counts*. In fact, it could be argued that instead of making opiate use and IV sedation safer, pulse oximetry has introduced an unforeseen complication, because now clinicians are misled by a number, instead of being singularly attentive to the physical act of breathing and airway patency—watching the chest go up and down, and listening to the hiss of air through the nose or mouth—as they were in the old days, because back then, those were the only parameters one could monitor to keep the patient safe. Following that rationale leads to the inescapable conclusion that much, if not the majority of respiratory morbidity and mortality that has occurred in the current era (of IV sedation with monitoring via pulse oximetry) could have been avoided simply via the deliberate and purposeful exclusion of the use of supplemental oxygen (which would effectively put a brake on the level of sedation a clinician was willing to administer).

Clinical medicine does need a better mousetrap to directly measure ventilatory sufficiency in nonintubated patients, and we would agree that the APSF is the ideal organization to tackle the problem. Transcutaneous carbon dioxide monitors may provide a solution and certainly warrant further validation. In the meantime, pulse oximetry can be an effective solution, as long as clinicians understand how to use it appropriately. If PCA use on room air results in hypoxemia, then the fix is not to apply oxygen as de facto treatment, but to either decrease the opiate allowed, or if supplemental oxygen is administered,* move the patient to a more closely monitored environment.

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(*The decision to use supplemental oxygen should be clinically based, as with any other drug, not reflexive just because the SpO_2 drops. The benign nature of isolated hypoxemia was noted in an earlier communication.[7])

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Perioperative Temperature Management: Roundtable Discussion Identifies Need to Avoid Hypothermia

The following are the minutes of a roundtable discussion held in Louisville, KY, on June 11, 2005, chaired by Scott Robinson, MD, and Kushagra Katariya, MD. Also participating were Dan Sessler, MD, Andrea Kurz, MD, William Edward Hodges, CCP, and Jan Odom-Forren, MS, RN.

The panel commented on documented causes and effects (summarized in Table 1) of perioperative hypothermia. The panel's concerns included

The Unavoidable Chilling Effect of General and Regional Anesthesia during Surgery

Physiologic temperature regulation in warm-blooded animals is intricately controlled by relying upon the autonomic and somatic nervous systems' ability to sense changes in ambient temperature, and within a narrow threshold, respond appropriately to maintain core body temperature in the normothermic range between 36°C and 38°C.

Induction of either general or regional anesthesia impairs thermoregulation, allowing a redistribution of heat from the central compartment of the body (consisting primarily of the major organs) to the periphery. In addition, heat is lost to the cold OR environment over time, furthering the heat deficit that will ultimately be repaid postoperatively.

The Consequences of Perioperative Hypothermia

Very young, very old, and very sick patients are more likely to become hypothermic during anesthesia and surgery regardless of procedure. Additionally, certain procedures exacerbate perioperative hypothermia by their length or field exposure alone. The systemic changes indicated in the table have been noted to occur even as little as 0.5°C below the normothermic range. Members of the panel believed these effects are under-appreciated by the general medical and surgical community, believed the severity of damage increased in tandem with the degree of hypothermia, and discussed some of the reasons for this as well as some solutions.

The General Lack of Appreciation for the Incidence and Effects of Hypothermia

Panelists noted that despite the importance of normothermia for surgical outcomes, there persists an inter- and intra-institutional inconsistency. Some institutions uniformly strive for normothermia, and consistently monitor core temperature, while others may not even monitor as much as 40% of their patients. Panelists spotlighted several reasons for this inconsistency, including the following:

Staff turnover contributes to inconsistent practice patterns because a trained constituency for strict attention to practice patterns for maintaining normothermia may dissolve as staff moves to new locations or even just new areas of interest.

Technical factors especially concerning the measurement of core temperature may impair the clinician's ability to accurately determine a thermal target. The appropriate sites for measuring core temperature are the esophagus, nasopharynx, tympanic membrane (using an appropriately placed thermocouple), and pulmonary artery. Many of these sites are unavailable during different types of cases. Of note, the bladder temperature may accurately reflect other core temperatures, but in conditions of low urine flow may be as unreliable as rectal temperature. Relying on patient reports of comfort during neuraxial anesthesia when they are equally vulnerable to hypothermia is frustrated because patients' sensation of hypothermia may be completely disrupted, and they may report comfort when in fact they are becoming hypothermic.

Lack of evidence-based guidelines on how best to warm patients results in practice guidelines (especially ASA standards), which are general and non-specific. Clinicians are given maximum clinical flexibility, but little guidance about which technique may prove successful in particular situations. Practice guidelines are in many cases more helpful than standards because they are specific enough to overcome institutional and personal practice based on tradition and convenience.

The benefits of warming may not be immediately apparent. Compared with using a drug or performing surgery, the results of warming may be relatively delayed. Unlike giving a drug and observing an immediate response, changes in core body temperature occur very slowly because of the energy flow to and from the body during heat transfer. When core temperature falls early in a procedure, despite active warming, clinicians doubt the effectiveness of the intervention. Also, each patient and procedure is different enough to be an "experiment of one" whereby the clinician does not know whether a different modality would have a better result in the particular patient.

The appropriate stakeholder may not make decisions about what happens in the OR. Decisions about adopting warming technology may be made at an institutional level where the benefits of normothermia may not be the primary concern. Also, there may be unintentional "turf battles" about who controls the treatment of certain complications (e.g., wound infections) whose inception in the hypothermic intraoperative period may be hidden to observers of the problem at a remote time. Education and closer cooperation is essential. Communication and feedback from colleagues may be fragmented, such as the lack of reporting wound infections to the anesthesiology area, or the lack of communicating temperature information to surgery area.

Some patients are just difficult to warm. During spinal surgery, the patient is excessively exposed to the cold OR environment with little available area for attaching warming devices. Similar problems occur in some major cardiac and vascular procedures where, in addition, active warming of poorly perfused lower extremities (including during aortic cross-clamping) is proscribed. Trauma patients undergoing multiple operations by several surgical teams at the same time represent another such problem group.

Safety considerations include hyperthermia and burns. Adult patients warmed by forced air are unlikely to become seriously hyperthermic because they can still sweat. In children and infants, this method is less effective due to a relatively larger surface to absorb heat. Burns from forced air devices have been reported when the delivery hose has been used without an appropriate blanket. Circulating-water garments and pad devices have more effective heat transfer, and therefore are provided with a servo control to prevent hyperthermia.

Pre-Warming: An Important Component of Perioperative Temperature Management

One member of the panel suggested that 30 minutes of pre-warming would keep patients normothermic during 2 subsequent hours of surgery without further active measures being taken. Others noted that at least the initial drop in temperature is lessened in the pre-warmed patient so that intraoperative rewarming does not take so long. No intervention can counteract the redistribution of heat from the core to the periphery during the initial phase of hypothermia. Even forced air warming during the first hour or so can only affect the peripheral compartment, having no effect on core temperature. It is only after the periphery is warm that the total body heat content increases enough to begin warming the core. Pre-warming as much as 30 minutes outside the OR or during pre-anesthesia procedures such as starting lines could preclude the need for intraoperative warming in short cases, and could markedly improve the effectiveness of warming during longer ones.

Passive vs. Active Warming Strategies

Passive warming by insulating to the maximum extent possible all exposed skin surfaces can reduce radiant and convective heat loss by approximately 30%. All the common materials usually employed are equally effective, but the benefit drops off

See "Hypothermia," Next Page

Hypothermia Has Multiple Effects

"Hypothermia," From Preceding Page

greatly after the first layer. Seventy percent of the heat loss and all of the heat redistribution must be dealt with actively.

Active warming involves the use of a device that can both prevent heat loss (insulating the surface, but also warming the skin to reduce the gradient for radiant heat loss) while also providing a net positive thermal flux from the device to the patient, thereby increasing the total heat content of the body and warming the core. Active warming with forced air is inexpensive, safe, and far more effective in several studies than passive warming. Although the heat capacity of air is low, forced air devices are effective because the air is dispersed over a wide surface area. There is no demonstrated difference in effectiveness between brands of forced air systems.

Heat transfer from advanced technology circulating-water devices can be up to 5 times greater than air per unit area. This accounts for their usage in surgical cases where body surface is at a premium and satisfactory results are difficult to achieve with forced-air.

Summarizing, roundtable participants agreed that evidence-based practice guidelines could, where implemented, result in widespread measurement of core temperature and the use of active warming devices in all types of cases where anesthesia induced hypothermia occurs. This could, in fact, go a long way toward the goal of normothermia for every patient, reducing the attendant consequences.

Possible Impact of Hypothermia

Organ System/Function	Resulting Effect(s)
Adrenergic System	• Stimulation of sympathetic nervous system • Significant increase in norepinephrine • Minimal adrenomedullary/adrenocortical response
Coagulation Function	• Decreased platelet function • Impaired coagulation cascade • Increased fibrinolysis • Potential for increased blood loss and need for transfusion
Cardiovascular System	• Systemic and pulmonary vasoconstriction • Increased blood pressure • Increased likelihood of ventricular dysrhythmia • Increased risk of myocardial infarction
Immune System	• Decreased neutrophil and macrophage function • Decreased tissue oxygen levels • Increased risk of wound infection • Potential for delayed wound healing
Metabolic System	• Postoperative shivering, which increases total oxygen consumption
Pharmacokinetic Function	• Potentiation of neuromuscular blockers • Decreased minimal alveolar concentration of inhaled agents
Psychological/Emotional Effect	• Decreased patient satisfaction
Respiratory System	• Blunted ventilatory response to oxygen • Decreased tissue oxygen requirements • Left shift in hemoglobin-oxygen dissociation curve

APSF Education committee members Ken Abrams, Tricia Meyer, Susan Polk, Alan Harvey, and Richard Prielipp reviewed all 51 Scientific Exhibits and arrived at a consensus opinion for the ***Ellison C. "Jeep" Pierce, Jr., MD, Best Scientific Exhibit in Patient Safety Award****. This year's winner is "MacIntosh and IBM-compatible Laptop-based Vidoegraphy of Airway Management for Teaching Airway Management and Record Keeping" from Brett L. Arron, MD, Richard Gillerman, MD, and James E. Peacock, RN of Rhode Island Hospital, Providence, RI. Dr. Stoelting (left) presents the award while Committee Members Richard Prielipp and Tricia Meyer look on.*

The APSF continues to accept and appreciate contributions.

Please make checks payable to the APSF and mail donations to

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Difficult Intubation in the Obese Patient

by Craig Troop, MD

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The following scenario is a synopsis of the anesthesiologist's worst nightmare: can't intubate/can't ventilate. This ongoing concern in anesthesiology is being revisited in light of the personal observation that as the prevalence of obesity increases, standard oral intubation is becoming more difficult. The following summary is based on an actual closed claim case.

Case

A 54-year-old man was scheduled for a total knee replacement. The patient was 5'6" and weighed 250 pounds. His BMI was 40 kg/m^2. In addition to obesity concerns, his medical history included hypertension, hypercholesterolemia, GERD, type II diabetes (diet controlled), and possible sleep apnea. The patient agreed to the placement of an epidural catheter for postoperative pain control but demanded to "be asleep" for the surgery.

Following the uneventful placement of an epidural catheter, the patient was placed in a **fully supine position**, monitors were connected, and a rapid sequence induction was performed. Oral laryngoscopy with a MAC 3 blade was attempted which revealed a grade 4 view (no identifiable laryngeal anatomy).[1] Mask ventilation with an oral airway/bag and mask was attempted and noted to be difficult requiring high positive inspiratory pressures. Oral laryngoscopy with a MAC 4 and then a Miller 2 blade was attempted. The difficult airway cart, an intubating LMA, and additional anesthesia assistance were summoned. Between each attempt to secure an airway, mask ventilation became increasingly difficult; peak airway pressures were reported to be "sky high." After several minutes of unsuccessful airway management, a general surgeon arrived. As the surgeon attempted a difficult tracheotomy, the patient arrested and further resuscitation efforts failed.

Discussion

For every dramatic, worst-case scenario as above, how many countless near misses occur? This article is not intended to be a lengthy review of the difficult airway. There are many excellent resources addressing this topic by notable national airway educators. (Please see Caplan, et al.'s "Practice Guidelines for Management of the Difficult Airway."[2,3] The House of Delegates of the American Society of Anesthesiologists spent more than 18 months and more than $150,000 in approving these guidelines.) The intent of this article is to share some suggestions based on personal experience.

As mentioned earlier, I have observed a trend of an increase in the overall number of difficult airway patients. There are several reasons for this, but perhaps an identifiable problem is the ever-increasing incidence of obesity with attendant comorbid disease processes. Five of the top 10 most "overweight cities" in the U.S. are in Texas.

As a broad classification, the morbidly obese patient is "apple-shaped" (tight fat) in appearance or is "pear-shaped" (loose fat) in appearance.[4] Based on my experience, the "tight fat" obese patient tends to have a higher incidence of difficult airway issues.

There are several physical signs that can alert one to the possibility or probability of a patient having a difficult airway. The 6-Ds of airway assessment are 1 method used to evaluate for signs of difficulty:

1. Disproportion (tongue to pharyngeal size/ Mallampati classification)
2. Distortion (e.g., neck mass)
3. Decreased thyromental distance (receding or weak chin)
4. Decreased interinscisor gap (reduced mouth opening)
5. Decreased range of motion of the cervical spine, and
6. Dental overbite.[5,6]

Although all 6 points are important, in my opinion, "the jaw tells the story." An over-looked and simple clinical sign to assess the jaw is the upper lip bite test.[7] The patient is asked to touch their upper lip with their lower teeth, i.e., protrude the mandible. This simple test addresses D3 and D6. Concerning point D5, ask the patient to look up at the ceiling or tilt their head backward. Any launching forward of the patient's shoulders confirms that the range of motion of the cervical spine is limited.

Having clinically identified a potentially difficult airway and especially for the "tight-fat"/"apple shaped" obese patient, here are some personal, practical suggestions:

1. **Start from a position of strength.** The term HELP (head elevated laryngoscopy position) was coined by Dr. R. Levitan.[8] Two articles on prepositioning the morbidly obese patient have shown that this position improves the laryngoscopy view[9] and that there is an increase in the desaturation safety period.[10] Rescue ventilation techniques, (oral airway/bag and mask) are facilitated by the HELP position. The head and neck are elevated above the chest and abdomen. The airway is therefore more isolated and easier to work with. Further, the weight of the abdomen is falling away from the diaphragm and less positive airway pressure is required. Stacking with blankets can create the HELP position, but may cause variable and/or unstable results. A pre-cut foam positioner designed to quickly achieve the HELP position is commercially available.
2. **Have airway management plans A, B, and C worked out,** and all materials immediately available in the OR before the induction of anesthesia. If plan A is not achieving the desired result, activate plan B, or C early. There is much wisdom in the phrase, "Don't persist in the same technique and expect a different result." There are numerous airway devices available for advanced airway management. In my opinion, it is important to master 3 or 4 different techniques, and maintain a comfort level with each through constant practice.

Again, the above suggestions are my opinions based on personal experience. For more information, please review the ASA algorithm for managing difficult airways, available at www.asahq.org/publicationsAndServices/Difficult%20Airwaypdf.

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DISCLOSURE: Dr. Troop is the inventor of a commercially available pre-formed positioning aid mentioned in this article.

Letter to the Editor

Reader Calls for Fair Risk-Benefit Analyses

To the Editor:

I would like to comment on 2 articles in the fall *APSF Newsletter*, "Complications of Cervical Epidural Blocks Attract Insurance Company Attention" and "DepoDur™: A New Drug Formulation with Unique Safety Consideration." I believe the articles have major problems and reflect poorly on how the APSF handles emerging safety issues.

The article on cervical epidural blocks is actually a nice mini-review; however, the entire focus of the article is on how to reduce insurance risk and it makes several recommendations. The article recommends the use of fluoroscopy, use of the prone position, avoiding injections if pain is experienced, and limiting sedation if possible. However, it is not clear in reading the case reports presented that any of these measures do any good! Fluoroscopy with epidurograms was used in the majority of cases, the use of sedation was about 50%, and the article pointed out, it is not clear that needle contact with the spinal cord is painful.

Thus, given that cervical spinal cord trauma may be reduced but not eliminated, the correct question is what is the risk versus benefit of cervical epidural injection? It is not a secret that there is a controversy and a paucity of randomized controlled data to show that epidural steroids are of benefit;[1] some do not use them in their practice at all. If there are any benefits, they seems to be short lived and of limited clinical usefulness.[2]

The real story is not reducing the risks of cervical epidural steroids, but whether they should be done at all. If a drug were released by a pharmaceutical company that had an incidence of paralysis, arachnoiditis, anoxic brain injury, and death, and the company had difficulty showing that it had clinical utility, it would never be released. If the APSF had properly reviewed the literature, I believe a reasonable conclusion is to call for a moratorium on cervical epidural outside of randomized control studies, rather than to improve the informed consent process.

The second article, "DepoDur™: A New Drug Formulation with Unique Safety Considerations," also missed the opportunity to improve patient safety. The headline on the second page of this article reads "Appropriate Protocols Needed for DepoDur™." I was excited to read this article as the manufacturer has been widely advertising this medication, and drug representatives were making the rounds selling this drug.

This article, again well-researched and written, goes over the "benefit" of the drug avoiding the need for a "cumbersome epidural pump." However, the article states that 4% of patients receiving this drug required naloxone. A recent review of epidural opioids put the established incidence of respiratory depression at 0.09% to 0.4% from continuous infusion of epidural opioids.[3] I was expecting to get an appropriate protocol for use of this drug that has at least a 10-fold greater incidence of respiratory depression then current therapy. In fact, under the monitoring section of this article the only conclusion is that "there are no universally accepted stands or published guidelines for respiratory monitoring with opioid therapies by an accreditation body or society."

Again the APSF has missed the big picture of putting patient safety first. A risk-benefit analysis again might call into question the need for this drug when its risk of respiratory depression is so much greater than current therapy, and its benefit is so trivial. Because of these questions, perhaps continuous pulse oximetry should be used until more data establish this drug's safety. Perhaps, if the article were written by someone else other than an investigator involved in development of this drug, a more balanced view would be obtained.

The field of anesthesiology is routinely lauded for the great strides in improving patient safety and is held up as a model for other disciplines to follow. We need to continue being ever vigilant and to place our patients first, maximizing their safety and minimizing their risks. But we cannot rest on our laurels; we need to critically examine new medications and new procedures from an objective patient-oriented viewpoint. In the long run, this is what will keep our discipline strong and well respected.

Amir Tulchinsky, MD
Hartford, CT

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Letter to the Editor

Monitoring and Vigilance Needed With DepoDur™

To the Editor:

DepoDur™ will certainly find its niche in the acute pain management arena; however, this formulation should be used with extreme caution. Not only did 75% of the patients need additional analgesia via an IV-PCA pump with all its associated problems as described by Dr. Viscusi,[1] the drug also had a higher side-effect profile. Whether it was 5% of the patients or 12.5%[2] needing an opioid antagonist, these figures compare with 0% in the IV-PCA group. The higher side-effect profile was in the elderly patients with comorbid conditions, the subgroup who could potentially benefit most from this formulation. As the package insert highlights,[3] extreme vigilance and close monitoring is needed when DepoDur™ is used, a condition that is not achievable in the surgical wards of most hospitals.

Babak Roboubi, MD
Director, Acute Pain Service
Washington Hospital Center
Washington, DC

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2. Viscusi ER, Martin G, Hartrick CT, et al. Forty-eight hours of postoperative pain relief after total hip arthroplasty with a novel, extended-release epidural morphine formulation. *Anesthesiology* 2005;102:1014-22.
3. DepoDur™ Package Insert: Full Prescribing Information, Endo Pharmaceuticals, Chadds Ford, PA, 2005

2006 APSF Grant Application Guidelines See Page 74

Letters to the Editor

Postoperative Period Perceived As Most Likely Opportunity for Corneal Abrasions

To the Editor:

I read with interest the letter in the Fall 2005 issue of the *APSF Newsletter* from Dr. Okwuone. Corneal abrasions have been the most frequent complication of anesthesia in my practice, and, if anything, the incidence seems to be rising, despite our best efforts to prevent them.

It is difficult for me to imagine why patients, lying supine for short cases, with nothing (other than eyelid tapes) touching their eyes, who have not been ventilated with a mask, should suffer such injuries.

My belief is that a large number of corneal abrasions are self-inflicted, either during or after emergence from general anesthesia. My experience is that many, if not most patients will reach for their faces as they wake up in particular, in order to rub their eyes. We spend a considerable amount of time in the OR, during transport, and in the PACU verbally and physically restraining patients from touching their faces.

Few things are more irritating, both to anesthesiologists and their patients, than to have a corneal abrasion become manifest after an otherwise uncomplicated anesthetic. I personally have on several occasions received a call from the PACU nurse stating, "Mrs. Jones is ready to go home, but one of her eyes is red and hurting." This an hour after seeing her in PACU with both eyes open (not red), responding appropriately, and denying any discomfort. My guess is that this injury has occurred subsequent to that time, but I am somewhat mystified as to how. I try to watch as the oxygen mask is applied in PACU, since I think that is a potential cause of eye injury, but failing that as the etiology, one must look to the patient.

I don't have an easy solution to this seeming dilemma. Restraining patients for more than a few minutes is impractical for a variety of reasons, not the least of which is medicolegal. Eye ointment, as noted by Dr. Okuone, is usually of dubious value and involves some minor drawbacks of its own—blurry vision, risk of transmitting infection, and the occasional allergic reaction. I would be very interested to hear the views of other anesthesiologists on this subject.

Eric A. Wardrip, MD
Encinitas, CA

To the Editor:

Please allow me to commend Celestive O. Okwuone, MD, for his letter to the editor on "Anesthesia May Predispose Patients to Corneal Abrasions" in the fall 2005 issue of the *APSF Newsletter*.

As he points out the exact mechanisms of the injury to the cornea is unknown, but it is our duty as anesthesiologists to use all precautions to prevent it.

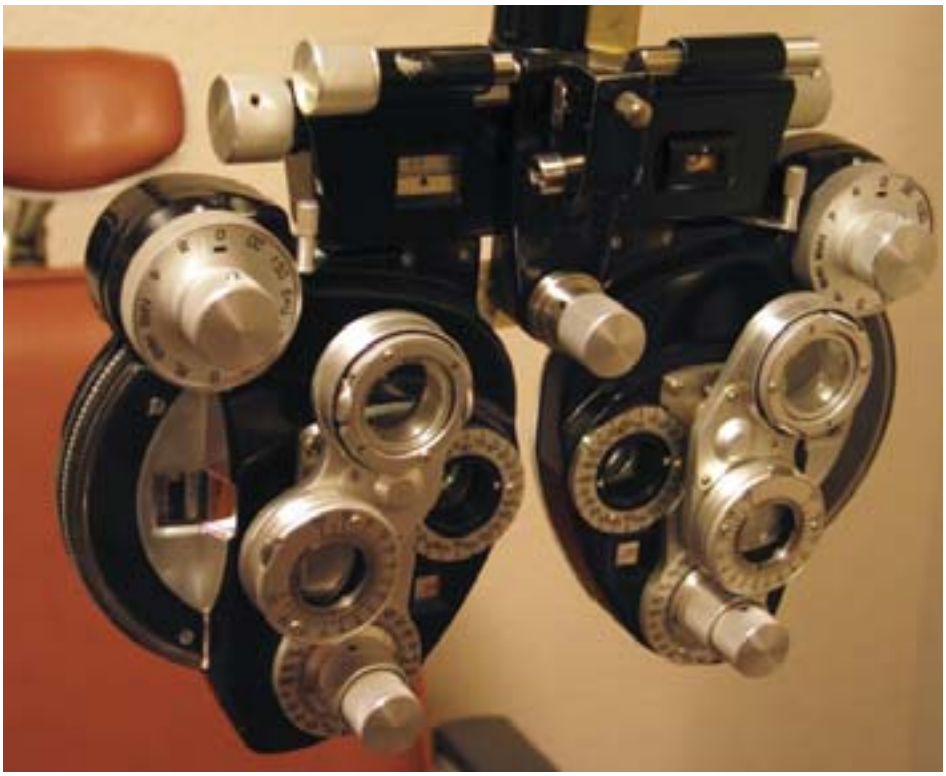
In my opinion most corneal abrasions are caused by the rubbing of the eyes during emergence from anesthesia. Certainly the pulse oximeter sensor in this situation is the most likely cause of injury. To prevent that, I ask the PACU nurses to place the pulse oximeter sensor on one of the toes rather than the finger.

M. Saeed Dhamee, MD
Milwaukee, WI

To the Editor:

I share Dr. Okwuone's concern regarding the potential for corneal injury in the perioperative period. I would add 2 more possible mechanisms of injury. During surgery involving the head or neck in which the eyes are draped, it is possible for the surgeon or assistant to put continuous pressure on the cornea by inadvertently resting an arm on the eye. Another period of vulnerability occurs before or after transport to the PACU when the plastic oxygen mask is placed on the patient's face and can easily pull the eyelid up, scratching the cornea.

Heidi Smith, MD
Seattle, WA



In My Opinion

Labeling History Reviewed and Future Explored

by Patrick Foster, MD

Placing a label on an otherwise unmarked syringe containing a drug intended for intravenous use would seem an uncontroversial contribution to patient safety. Yet 20 years after the original specification was published, we still await universal acceptance of the idea.

The Problem

The need for such a marker has existed since those early days in anesthesia when intravenous barbiturates first challenged inhaled drugs at Pearl Harbor, and when Cecil Gray established the pivotal role of curare in general anesthesia. The speed of response to an intravenous (IV) injection may not allow time to manage the consequences of an error, and use of the IV route in general anesthesia has become more widespread. Many of us have devised systems for labeling our drugs. But now, the single anesthesiologist or anesthetist, once independently responsible for patient well-being during surgical assault, is being integrated into a surgical team, where responsibility for most aspects of a patient's care is shared; others now expect insight into the gasman's codes. So our once simple labeling system, designed as a rapid recognition code for the anesthesiologist or anesthetist, now has to evolve into a nationally agreed code for the precise recognition of pre-prepared injectable drugs for use by other surgical team members.

How it Started

In the mid 1950s the University of Stellenbosch started planning a new medical school campus in Cape Town, South Africa, that would integrate medical, dental, and nursing schools with a major general hospital. All of this came into being in the early 1970s as the largest "school under one roof" in the Southern hemisphere, known as the Tygerberg Hospital. Design ideas were sought throughout Britain, Europe, and the United States, and major equipment sources were expected to come from Britain. However, 6,000-mile supply lines and misunderstandings of local circumstances meant that needs were often best met by local design and manufacture. Against this background, the incidental production of a syringe labeling system for a large anesthesia service was a minor undertaking, supported by the local Anesthesia Society. After testing designs in the mid 1970s Avery printed the original design and supplied international color definitions in the national specification. Rolls, each with 100 individual names on the code color, were mounted alongside each other on a dowel comprising a multiple dispenser. Some colors were chosen to reflect the class characteristics: "danger" red for muscle relaxants; blue to signify the cyanosis of opiate-induced respiratory depression; green for atropine-like drugs used in a syringe size smaller than (red) relaxants. There were few specific antidotes to the IV drugs used in anesthesia, but these were considered important enough to have some link to the color code of the agonist. This was done by using diagonal white stripes and color stripes in the color bar of the agonist. Thus nalorphine, atropine, and flumazenil share the color of opiates, relaxants, or benzodiazepines, respectively. With mixtures some interesting stripe patterns emerged, such as red/green/white alternating for the usual standard relaxant reversal of neostigmine and anticholinergic.

Visiting anesthesiologists to the Tygerberg Hospital took labels home to the United Kingdom, many European countries, Canada, and the United States, thus leading to the development of several informal versions. Dr. Rendell Baker was one of the first to introduce these ideas to the United States.

The original specifications were published in 1985 by the South African Bureau of Standards as SABS 0207-1985, and placed in the catalog of the International Standards Organization, of which the SABS is a member. Currently this standard is published by the Standards South Africa division of the SABS as SANS 10207 (www.stansa.co.za). A second revision is now under preparation to appear on this 20th anniversary of the original.

A Need for Change

After 20 years a revision is necessary, if only to incorporate the changes brought by new technology. There were few applications for computers in a 1970s OR, but today, a syringe label can provide the interface between anesthesia machine and a computer that can "autopilot" a general anesthetic while recording the data. A revision also provides a chance to revisit some of the basic aims that shaped the first standard, which sometimes may have been misunderstood. There were drug representatives who believed the labels would replace the identifying "house colors" of their products. (Today, some makers wishing to support the color code concept, pack drugs of a similar class in boxes of the specified color. This is even more dangerous since drugs such as ephedrine and epinephrine can be mixed up in the same drawer of a drug cart stocked by a junior aid). The main goal was to reduce the danger of the wrong IV injection during the process of anesthesia. A design was proposed for a series of labels easily identifiable by color and print. These were to be applied to any syringe containing any drug, intended for IV use, after it had been transferred from its original pack into an anonymous syringe. Implied in the standard is observance of the safe practice that only the ultimate user of an IV drug should prepare the injection and affix the label. For optimum safety, it is essential to use one standard design as variations may lead to confusion.

Originally the focus of the 1985 standard was on anesthesia practice; however, this need now extends to cover PACU or postoperative ICU care. Recently, JCAHO regulations have addressed a wider range of drugs:

> *"A new requirement for all types of accredited organizations that provide surgical or other invasive services specifies that all medications, medication containers, and other solutions used in peri-operative settings be labeled."*

This innovation, that includes syringes with other medication containers, seems eminently reasonable so long as one notes the following items:

First, a single unlabeled syringe is an anathema; unidentified content is presumed dangerous and to be discarded. Creative solutions will be found to cover simple routine clinical procedures such as the "flu shot." For example, *"Provided that the syringe never leaves the hand of the user from the time of its loading from a manufacturer's container until its discharge, no label need be applied."* Second, the simplest label must now include four data fields: drug name, drug mass per unit volume, date and time of preparation, and dispenser's identity. The standard label now used in most OR's has space for the extra details. Third, these changes are brought about by the challenge to the prime status of the syringe as drug delivery container by the larger medication containers, which deliver more drug over a longer period at less cost in material and supervision. As our "drugs for use in anesthesia" is revised to become "drugs for use in anesthesia and intensive care," so must our designs include new large containers labels with extra data fields relevant to the longer stay within an intensive care system. For this use present syringe labels are too small. Will there be 24-48 hour labels, 7 day specials, or Medicare monthly concessions?

We approach an era when general anesthesia, once provided by the skilled hand, operating a gas dispenser to meter oxygen flows and narcotic vapors, is to be replaced by a ventilator controlled by a dedicated computer that drives a series of gas and infusion meters. As a stranger among these binary controls, may there still be a handheld syringe? Will some experience nostalgia for the days of one provider responsible for the full care of one patient at a time?

On Basic Design

The widespread acceptance of the color coded label system almost certainly depends on easy recognition of a pattern that combines 3 simple elements: the syringe size, label color, and printing. Most times a person will use several drugs, from different classes, as identified by the color code, and each in a syringe large enough for the dose. Often, it is possible to pick out a drug from across the room by the syringe size and color, at a distance where printing would be illegible. Print confirms an initial selection based on syringe size and color pattern. Critics of the system object that color blindness must make the system unreliable. Years of full acceptance and recently a well designed study[1] have shown this to be untrue.

Why aren't our traffic signals red, amber, and blue to suit our many red/green blind users? In fact, this use of color has proven valuable with the small label size imposed by the size of a 2-3 ml syringe: a whole colored label stuck on a rounded surface is easier to interpret than the print.

Enlarging the Code

Should the color code be enlarged to include all drugs used in intensive care as some enthusiasts suggest? I believe that the acceptance of the present system has depended in large part on its simplicity; from the start it was never intended to include all classes in the pharmacopoeia. It would be difficult to find more than about 15 distinct colors and for most users to memorize all 15 (when they daily rely on only 5 or 6 classes in most patients). There are 1 or 2 colors still "available". That should be enough. Meanwhile a white label can be used for all other drugs while the role for color coding remains safe with anesthesia.

In passing, one notes that there are other accepted color codes for volatile anesthetics and for compressed gases that do not interact with the label code.

See "Labeling," Next Page

Letters to the Editor:

Forced Air Warmer Burn Can Occur With Poor Circulation

To the Editor:

We recently had a child in the cardiac catheterization lab experience extensive third-degree burns of a leg due to the forced-air warmer. After analysis of this case, it is apparent that the cause for the burn was poor circulation to the affected leg. Under normal conditions, blood flow removes the heat locally and redistributes it to the rest of the body. In conditions of extremely poor blood flow, temperatures that would normally cause no consequences may lead to significant burns. In this patient as well as many others in the cardiac catheterization lab, causes for diminished lower extremity perfusion include sheaths placed in the groin vessels, thrombosed groin vessels from previous procedures, and low cardiac output. We urge anesthesia providers in the cardiac catheterization lab to use extreme caution when applying forced air warmers to the lower extremities of children, including keeping an adequate amount of space between the warmer and the skin, not using higher temperature settings, and considering placing a blanket between the legs and warmer. Also, the warming sleeve can be placed from the cephalad position toward the torso instead of around the lower extremities first, if there is adequate room at the head of the bed for the warming unit.

Samuel Golden, MD
Cathy Bachman, MD
Chicago, IL

Fatigue Must Be Addressed

To the Editor:

I appreciate the attention that your newsletter has given to the threats to patient safety that arise from fatigued anesthesia providers. I agree with Dr. Curry's letter (Fall 2005 issue) that more providers are needed to enhance safety for our patients. Faced as we are with a shortage of anesthesiologists and CRNAs, it is unlikely that bolstered staff ranks will soon alleviate this problem. A brief review of interdisciplinary literature reveals that the impact of fatigue is being acknowledged in many practice specialties, even those that do not face the manpower issues that we experience. I believe that it is time for the anesthesia community to forge a position paper that deals with the scheduling of providers. Through this, health care administrations may be made more aware of the significant threats that face patients due to overworked and under-supported providers. Vigilance is the key to safer anesthesia.

Brian K. Miller, CRNA, MS
Hudson, WI

Hospital Pharmacy May Help in Meeting JCAHO Requirements

To the Editor:

Dr. Lambert clearly presents the need for commercially prepared appropriately diluted resuscitation medications.[1] In the absence of such, some of the concerns that he identifies can be addressed by a hospital (or OR satellite) pharmacy.

A pharmacy can prepare batch sealed 10 mL syringes of phenylephrine 80 mcg/mL and ephedrine 5 mg/mL. If kept refrigerated, these syringes are good for 7 days after preparation. Advantages of this system include standardizing the dilution concentration in every location, a reduced risk of infectious contamination, a presumed reduced risk of dilution errors (especially if anesthesia trainees are present), anesthesia provider time saving, and appropriate labeling as required by the JCAHO and Department of Health. There is less wastage of medications and diluent since a pharmacist can produce 25 10mL syringes of 80 mcg/mL phenylephrine from just two 10-mg phenylephrine vials and one 250 mL IV solution bag.

Similarly, a pharmacy can prepare 250 mL bags of vasoactive medications (e.g., phenylephrine 80 mcg/mL, epinephrine 16 mcg/mL, and norepinephrine 16 mcg/mL) that are kept immediately available in a conveniently located refrigerator for major cases (e.g., liver transplants, cardiac surgery, and significant trauma cases). Often there is time urgency in starting these cases; having these drugs already prepared could save critical time. Bolus doses can be withdrawn from these bags.

However, with the recently issued USP Chapter 797 standards, it is more difficult for hospital pharmacies to prepare batch medications. For those hospitals that can, the above benefits can be accrued.

Jonathan V. Roth, MD
Philadelphia, PA

Reference

1. Lambert DH. System fixes needed to prevent drug errors. *APSF Newsletter* 2005;20:54-5.

Bar Coding, Computerization May Be Future for Labels

"Labeling," From Preceding Page

Code could be extended by extra markings on a syringe. Better than color coded syringe caps would be a form of coding, color or print, on the thumb plate of the plunger. One could suggest a use to indicate the refrigerated shelf life of pre-filled syringes from a central pharmacy. Stacked syringes are then sorted by end colors.

The Role for Barcodes

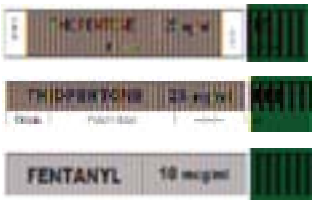
Two questions still await a good answer; what are you going to code, and who will be reading it? With the inclusion of critical care in our label code, there may now be a role for such a vehicle for rapid, accurate patient data transfer. JCAHO, in the document quoted above, places special emphasis on full, accurate data transfer at every patient "hand off" (transfer) between caregivers. The syringe label even has limited space for small barcodes, although the value could be in routine anesthesia may be difficult to see.

Reading barcode requires a computerized scanner. Ultimately this can take the form of a peripheral syringe reader-driver that also detect drug and volume in the syringe by reading code, and, by, following plunger head movement, record dose and time.

Printed Labels

Do people realize that buying into a system of pre-printed labels can lead to a problem? One assumes that members of a department first agreed to their label list of standard drug names and doses. This means that an unscheduled format must be signaled using a (non-color code) white label. Real danger may arise when drug indicates an "almost the same" drug, as when the name remains unchanged but concentration is only changed on the label. If a standard label is used, flag it. Otherwise a user, seeing the familiar color and drug name, might miss the small following figure.

(Was it thiopentone 2.5% or 5%? Did you dilute the sufentanil?).



Until final decisions are made, new label designs might appear as shown.

The practical value of color codes on syringes lies ultimately in ease of use. With a color printer sheets of labels can be printed and kept in a loose-leaf cover. Simpler, but more costly, is to buy rolls of 100 preprinted labels and mount a series on a dowel as dispenser. More elegant and versatile might be an adaptation of a dedicated label printer programmed to produce any selected drug, name, color, and dose, with today's date and preparer. It might even barcode patient name, age, sex, weight. But for millions this last will remain a dream wherever basic drugs, syringes, even oxygen, are still on their wish list.

Patrick Foster is a Professor Emeritus in the Department of Anesthesia, Penn State University, Milton S. Hershey Medical Center, Hershey, PA.

Reference

1. Cumberland P, Rahi JS, Peckham CS. Impact of congenital colour vision deficiency on education and unintentional injuries: findings from the 1958 British birth cohort. *BMJ* 2004;329:1074-5.

From left to right (front row): Sue Stratman, Dr. Julianne Chase, Linda Kenney, and (back row) Dr. Jeffrey Cooper and Dr. Frederick van Pelt shared stories of patient and family perspectives on adverse events at the 2005 APSF Board of Directors Workshop (see this issue's lead article).

In the Next Issue:

The focus of the Spring 2006 issue of the* APSF Newsletter *will be "What to Do After An Adverse Event" and will include

- **Immediate management**
- **Communication**
- **Disclosure**
- **More patient and family perspectives**
- **Effect on the provider**
- **Effect on the trainee**

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