

Safety Topics Are Integral Part of Upcoming 2004 ASA Convention

By Robert C. Morell, MD

The 2004 American Society of Anesthesiologists meeting will be held October 23-27 in Las Vegas, Nevada. Safety will again play a key role at this meeting in the venues of Refresher Course Lectures, Clinical Update Programs, Scientific Presentations, and Scientific Exhibits. The 2004 ASA Annual Meeting Program provides detailed information—in addition, a synopsis is presented in this article as a preview and guide to patient safety at the 2004 ASA.

Refresher Course Lectures Feature Diverse Safety Topics

The 55th Annual Refresher Course Lectures begin on Saturday morning, October 23, and feature Dr. Neligan presenting *Bariatric Medicine: Clinical Implications of Morbid Obesity* (#121), Dr. Ehrenwerth's hot topic of *A Fire in the Operating Room: It Could Happen to You* (#133), Dr. Cottrell discussing *Brain Protection in Neurosurgery* (#145), and Dr. Steve Hall reviewing *The Child With a Difficult Airway: Recognition and Management* (#150). The afternoon session continues with the sequential lectures of Dr. Hagberg presenting *Current Concepts in the Management of the Difficult Airway* (#116), Dr. Mark Warner tackling *Perioperative Neuropathies, Blindness and Positioning Problems* (#117), and Dr. Robert Caplan enlightening us with *The ASA Closed Claims Project: Lessons Learned* (#118). Also in the afternoon Dr. Leak will review *The Potential Hazards of Perioperative Herb and Dietary Supplement Use* (#146), Dr. Klock will review *Drug Interactions for the Anesthesiologist* (#147), and Dr. Berry will be informing us as to *What to Do after a Bad Outcome* (#148).

Refresher Course Lectures continue Sunday morning with Dr. Gross awakening attendees with



Members of the APSF Executive Committee hard at work at the 2003 ASA. Left to right: Drs. Pierce, Blitt, Gaba, and Stoelting.

Less Jolts from Your Volts—Electrical Safety in the Operating Room (#207). Dr. John Eichhorn follows with *Risk Management in Anesthesia Practice* (#208), and Dr. Barash discusses *Sequential Monitoring of Myocardial Ischemia in the Perioperative Period* (#238). The final morning lecture is Dr. Gilbert providing highlights of *Complications and Controversies in Regional Anesthesia* (#245). The Sunday afternoon session includes Dr. Hogue reviewing *ACLS for the Anesthesiologist* (#205), while Dr. Schwartz will provide the parallel *Update on Pediatric Advanced Cardiac Life Support* (#234). Two lectures, Dr. Andrews helping us in *Understanding your Anesthesia Machine* (#211) and Dr. Eisenkraft presenting *Problems with Anesthesia Gas Delivery Systems* (#212), will highlight equipment safety, specifically enhancing our working knowledge of anesthesia machines. Dr. Rocaforte will also discuss the timely topic of *Weapons of Mass Destruction: What We Need to Know* (#206). Airway management will again be highlighted by

Dr. Rosenblatt assisting our *Decision Making In Airway Management* (#217). In addition, Dr. Jeff Vender will pose an interesting question as he asks, *Is Pulmonary Artery Catheterization Still Necessary* (#204)?

Refresher courses continue Monday, October 25, through Wednesday, October 27. Safety based lectures include Dr. Olympio discussing safety features of *Modern Anesthesia Machines, What You Should Know* (#501), and Dr. Morray reviewing *Unexpected Cardiac Arrest in Pediatric Anesthesia: Causes and Preventions* (#309). Regional anesthesia safety is highlighted in 3 presentations: Dr. Wedel reviewing *Neurologic Complications of Spinal and Epidural Anesthesia* (#312); Dr. Horlocker teaching us about *Peripheral Nerve Injury Following Regional Anesthesia: Diagnosis, Prognosis, Prevention* (#414); and Dr. Drasner asking *Is Lidocaine Safe for Spinal and Epidural Anesthesia* (#413)? Finally, Dr. Barach will call our attention to *Nuclear, Chemical, and Biological Hazards: Are You Prepared* (#408)?

Scientific Papers Focus on Patient Safety

The Scientific Papers Poster portion of this ASA Meeting includes 6 sessions encompassing presentations that directly focus on patient safety. The first session will be held on Monday, October 25, at 9 a.m.

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Letter to the Editor:

GrafikPharm: Viewing the APSF From An Outside Perspective

To the Editor:

Our graphic design company has been working on the *APSF Newsletter* since the Winter Issue of 1998. We design the electronic layout, prep the photos and files for printing, and coordinate the printing and mailing of the *Newsletter*. GrafikPharm is located in Wilmington, Delaware, and we service many medical, pharmaceutical, and biotech clients. Originally we were recommended for this project by Bob Black and Marilyn Brown of AstraZeneca. Dr. John Eichhorn was the *APSF Newsletter* Editor at that time.

Through the years we have developed a close working relationship with both editors, Dr. Eichhorn and now Dr. Robert Morell, and have gently and gradually guided the *Newsletter* toward electronic proofing, and recently, a new full color format.

As the person who usually works on the newsletter, I see the articles that come in—the ones that are used and the ones that are temporarily shelved—and from an “outsider” point of view, I am constantly impressed by this unbiased and ethical view of the state of your industry. The *APSF Newsletter* serves as a wonderful forum for discussion. Controversy is enthusiastically welcomed (even when it concerns major contributors to the



Bonnie Burkert, Creative Director at GrafikPharm shares her perspective on the APSF Newsletter.

Newsletter, and even when it highlights some pretty unsavory things—like the person who took a 2-week course in liposuction and was anesthetizing people and operating in a Texas mall—that one really stuck with me). Both sides of issues are explored (see the new **Dear SIRS** column to see what I mean). Timely and vital information is distributed, especially the special Bioterrorism issue, the SARS issue, and the recent High Reliability Organization articles (all available on your website).

As a community, you police yourselves, you keep on top of timely issues, you don't shy away from the tough stuff, and we applaud you. We have a great deal of respect for the intent and philosophy of this organization and we appreciate the opportunity to dedicate our skills to helping you.

*Bonnie Burkert
Creative Director
GrafikPharm
Wilmington, DE*

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Left to right: Thomas A. Cooper (Executive Director, AORN); Jeff Cooper, PhD (APSF Executive Vice President); David Gaba, MD (APSF Secretary); Robert Stoelting, MD (APSF President); Ellison C. (Jeep) Pierce, Jr., MD (retired former APSF Executive Director); and Thomas R. Russell, MD (Executive Director, American College of Surgeons) stand together in their efforts to promote the integration of HRO concepts into perioperative care, at the 2003 APSF HRO Workshop.

Preview of the Upcoming ASA Meeting

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in Hall C2, Area 6 of the Las Vegas Convention Center. Drs. David Mackey and John Tetzlaff will moderate this session. Dr. Lubenow and colleagues open this session with *Safety of Magnetic Resonance Imaging (MRI) in Patients with Implanted Neurostimulators* (A-1362). Dr. Shibata and coworkers from Nagasaki, Japan, will also discuss *Comparative Effects of Disinfectants on the Epidural Needle/Catheter Contamination with Indigenous Skin Bacterial Flora* (A-1363). Also on Monday an afternoon session will be held beginning at 2 p.m., in Hall C2, Area N. Drs. David Murray and Susan Tebich will facilitate this group of papers. Simulation is a major focus of this group, and Dr. Devitt et al., from Dalhousie University, Nova Scotia, Canada, will ask the question, *Can the Number of Unplanned Errors Predict Performance on a Simulator-Based Evaluation Process* (A-1243)? Another Canadian team, led by Dr. Morgan, from Ontario, will present *Global Ratings to Assess Undergraduate Team Performances* (A-1244). Dr. Deborah Whelan and her team from Wake Forest University ask, *Does Training Affect the Definition of a Difficult Intubation* (A-1247)? The subsequent presentation is that of Dr. Melanie Wright, PhD, a former recipient of an APSF Research Award, and her group from Duke University. Her presentation explores *The Role of Simulation in the Development of Clinical Research Protocols* (A-1248). Drs. Harrison, Howard, and Gaba from the VA Palo Alto Health Care System-Stanford University discuss *The Use of Cognitive Aids in Simulated Anesthetic Crises* (A-1250). An Israeli team led by Dr. Haim Berkenstadt also use simulation to explore *Simulation-Based Evaluation of a Point-of-Care Information System for Anesthesiologists While Managing Pediatric Cardiac Dysrhythmias* (A-1252).

Airway Issues Remain Important

In this same session, using a review of 1096 emergency intubations, Dr. Steven Flurry and colleagues present *Airway Rescue with the Bougie in Emergency Airway Management* (A-1251). Airway issues are also presented in paper A-1254, *Lateral Neck Radiography and Prediction of Difficult Intubation: A Double-Blind, Randomized Trial*, which comes from Dr. Kamali's group from the University of Medical Sciences in Fars, Iran. Dr. Kipnis and coworkers from Lille, France, report on the *Development of a Difficult Intubation Risk Assessment and Management Algorithm* (A-1259); Dr. Sengupta and a team from The University of Louisville use *Ultrasound Evaluation of Anterior Neck Soft Tissue Thickness as a Predictor of Difficult Laryngoscopy in Obese Patients* (A-1260); Drs. Wolszczak and Mort from Hartford Hospital discuss *The Role of the Combifube for In Hospital Emergency Airway Management* (A-1261); and Dr. Romeo and colleagues from the University of Pittsburgh will report on *Difficult Airway Management Using Human Dynamic Macrosimulation: Practicing Anesthe-*

siologists Do Not Follow the ASA Difficult Airway Guidelines (A-1262). A German team lead by Dr. Berthold Bein also presents *Tracheal Intubation Using the Bonfils Intubation Fiberscope after Failed Direct Laryngoscopy* (A-1263). Complications from intubation and airway management are also discussed at this session in papers by Dr. Qureshi's group from Louisville who present *Factors Associated with Dental Injuries Associated with Anesthesia at University of Louisville Hospital* (A-1253); Drs. Tolan and Westfield who discuss *Dental Injuries in Anesthesia: Frequency, Causes and Preventive Strategies* (A-1256); and Dr. Yamanaka's team from Osaka, Japan, who report on *Hoarseness Following Endotracheal Intubation* (A-1257).

Also on Monday afternoon, but in Hall C2, Area O, Drs. Calmes and Bacon will be the moderators of a session that includes a presentation by Dr. Candiotti and colleagues from the University of Miami, who explore *Biological and Chemical Terrorism Preparedness—A Survey of Anesthesia Training Programs in the United States* (A-1316). Occupational and environment safety are the focus of 3 presentations in this forum. Dr. Gold's team from the University of Florida call attention to *Addiction: An Occupational Hazard for Anesthesiologists* (A-1323); Dr. Katz from Yale expounds on *Radiation Exposure to Anesthesia Personnel* (A-1324); and Dr. Akito Ohmura, from Teikyo University School of Medicine in Kanagawa, Japan, asks the question: *Are We Polluting the Hospital Environment with Anesthetic Gases* (A-1329)?

Medical Errors and Adverse Outcomes Explored

On Tuesday morning, October 26, in Hall C2, Area F, Drs. William Johnston and Bobbie Sweitzer will moderate a Scientific Papers Poster Session that begins with Dr. Glenn Murphy and colleagues from Northwestern University and Evanston Northwestern Healthcare describing *Retrograde Air Embolization During Radial Artery Catheter Flushing: An Ultrasound Study* (A-1273). Dr. Kimberly Kressin and members of the ASA Closed Claims Database team review the problem of *Burn Injury in the OR: A Closed Claims Analysis* (A-1282). Another hot issue involves the question *Does the Use of Bair Huggers Increase the Likelihood of Operating Room Fires* (A-1298), brought to light by Dr. Deborah Williams' team from Stanford University. Medical errors are the subject of a number of presentations in this session including *Discharge Analgesic Prescription Errors in Pediatrics: A Preliminary Study of 105 Patients* (A-1280), presented by Dr. Lee and coworkers from Johns Hopkins Medical Institutions; *Wrong Sided Anesthetic and Surgical Procedures: Are They Preventable?* (A-1283), presented by Dr. Barach and Sam Seiden from the University of Miami; and *Adverse Events Associated with Anesthesia* (A-1297), discussed by Dr. Myrna Newland and her team from the University of Nebraska. Drs. Dulitz and Wong from



Dr. Robert Morell, Editor of the APSF Newsletter, at the APSF Exhibit from the 2003 ASA Convention.

Northwestern University illuminate the devastating complication of *Postoperative Visual Loss: A Retrospective Chart Review* (A-1286). Dr. Ping-Wing Liu and colleagues from Chang Gung Memorial Hospital-Linkou in Taoyuan, Taiwan, via their poster *A Continuous Quality Improvement Program Reduced Perioperative Adverse Outcomes in a Large Hospital in Taiwan* (A-1278), demonstrate Taiwanese progress in patient safety. Japan is also well represented by Dr. Irita's group from the Japanese Society of Anesthesiologists with their presentation *Cardiac Arrest in the Operating Theater Due to Problems in Administration of Anesthesia-Related Drugs: An Analysis of 3,855,384 Anesthetics over a 4-Year Period in Japanese Society of Anesthesiologists-Certified Training Hospitals* (A-1277).

Information Systems Provide Important Methodology

On Tuesday afternoon, October 26, at 3:30 p.m. in Hall C2, Area 5, Drs. Keith Ruskin and Brian Parker will facilitate a session that has a number of presentations that utilize information systems in patient safety. Dr. Vigoda and colleagues from the University of Miami present both *Anesthesia Information System Helps Identify Missed Opportunities for Perioperative Beta-Blockade* (A-1378) and *Anesthesia Information System Demonstrates Inadequacy of Perioperative Beta-Blocker Therapy* (A-1381). Dr. Thomas Powell from Jackson Memorial Hospital in Miami, Florida has 2 presentations in this session: *Merging Man and Machine in Anesthesia Quality Assurance* (A-1379), and *A Classification System for Electronically Extracted Adverse Events in Anesthesia* (A-1382). Dr. Michael O'Reilly's team from the University of Michigan demonstrates *Using an Anesthesia Information System to Implement Practice Guidelines* (A-1380). Florida is

Another Look at the Forehead Sensor

by Michael W. Russell, MD

Although the pulse oximetry forehead sensor has been a topic in the literature since 1988,¹ its rate of adoption by anesthesiologists has been slow. The reasons for the tepid reception are not altogether clear. Certainly, the forehead sensor is receiving its fair share of scrutiny. For example, the matter of the forehead sensor's advantages and shortcomings was the subject of a score of papers at the ASA, SCCM, and AARC conferences in 2003, and most recently at the STA conference earlier this year.* In light of the attention the sensor has recently received, perhaps a revisit to the forehead sensor—how it works, what it can and cannot do, and how it should and should not be used—is in order.

Due to simple physiology, anatomical distance, and paths of least resistance, changes in oxygen saturation in patients with poor peripheral perfusion manifest in the head more rapidly than in the extremities. This circulatory delay between the forehead and the periphery has been well-characterized.² Several years ago, Bebout and colleagues at Nellcor (Pleasanton, CA) found that the "lag time to detect hypoxemia was about 90 seconds greater for finger versus forehead sensors during peripheral vasoconstriction." More recently, Bebout's work has expanded to include comparisons of the determinations of hypoxemia on the ear, on the forehead adjacent to the supraorbital artery (MAX-FAST™), and in radial blood proximal to the digital arteries. Research involved placing subjects in a cold room and using thermal images to show differences in vasoconstriction and perfusion at the various sites. Thermal scans and readings over time showed that ear sensors (fed by branches of the external carotid artery) and digit sensors were "most affected by thermo-regulatory vasoconstriction and are slower to respond to changes in central oxygenation."³

Vasodilatation and vasoconstriction are often found in the anesthesia environment. For example, the environment itself is cold and the anesthetic agents used can produce vasodilatation. A study by MacLeod et al. looked at adult male volunteers subjected to three hypoxic challenges—normothermia and vasoconstriction, hypothermia and vasodilatation, and hypothermia and vasoconstriction.⁴ SpO₂ values from forehead, ear, and digit sensors were recorded for all 3 conditions. Forehead and ear sensors showed considerably earlier indications of desaturation and resaturation events than the digit sensors.

It is well known that patients tend to become mildly hypothermic and vasoconstricted during procedures and postoperatively. As Cortinez observed in his presentation at the 2003 ASA, "The best tissue bed for pulse oximetry is the one that exhibits the least vasoactivity." Blood to the forehead travels through the supraorbital artery. This

area is not rapidly susceptible to vasoconstriction arising from poor perfusion.^{2,5} In a companion study to the work of MacLeod, Cortinez et al. examined the performance of forehead, earlobe, and digit sensors on patients initially in a normothermic and vasoconstrictive state and then deliberately in a hypothermic and vasodilatory state.⁶ The forehead was found to be "less vasoactive" in both states, leading the researchers to suggest that the forehead "may be the best place for use in pulse oximetry." The subjects in the MacLeod and Cortinez studies were healthy volunteers. Given that the patients in the OR are often at the opposite end of the health spectrum, the need for timeliness and reliability may up the ante even more.

In another study, Branson and colleagues compared the digit and forehead sensor in patients who were being mechanically ventilated and who had poor perfusion.⁷ The study, involving 20 critically ill patients who were at risk for hypotension and hypothermia, included 183 SaO₂-SpO₂ comparisons. Researchers looked at the root mean square differences (RMSD) between SaO₂ and SpO₂ in digit and forehead sensors. The RMSD for digit sensors was 2.67%; the RMSD for forehead sensors was 1.45%. Researchers concluded that the forehead sensor "provides a reliable site for SpO₂ measurement when peripheral perfusion is reduced by hypothermia and hypotension and the concomitant use of systemic vasopressors." In addition, the forehead sensor used in the study offered "improved accuracy and a greater likelihood of detecting a pulsatile signal." In their work with pediatric patients in the OR, Berkenbosch and Tobias also found that the same forehead sensor "was well tolerated and represents a viable option under conditions when extremity-based oximetry is ineffective or unavailable."⁸

Interestingly, Branson's earlier work had not found the same efficacy of the forehead sensor.⁹ However, that work involved edematous patients with their heads down, and no particular attention was paid to sensor placement location. In addition, a headband to secure the forehead sensor was not used in the earlier study but was in the more recent study. In the discussion section of the 2003 study, researchers comment that the edema and the head down position "confound" the findings of the earlier study. They conclude that "proper sensor placement and use of the headband" are important considerations in the success of the forehead sensor.

These cited studies provide evidence that monitoring with the forehead sensor is a feasible notion. However, proper placement and patient position are two simple but overlooked considerations in most areas of patient care, including pulse oximetry. In this context, proper placement refers to placement of the sensor just

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Photo depicting a forehead sensor secured by the headband.

Upcoming ASA Meeting

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again represented by Kanzki-Armand and colleagues from Jackson Memorial Hospital in Miami with the presentation *Health Information Technology: A State-Wide Approach to Improving Quality and Reducing Medical Errors in Florida* (A-1384). Also on Tuesday afternoon, beginning at 2 p.m. in Hall C2, Area O, Drs. Michael O'Connor and Lois Bready will facilitate and moderate scientific papers that include a discussion of the *Impact and Literature Consensus on Implementing a Patient Safety Curriculum* (A-1346), presented by Dr. Tracy Jackson and teammates from The University of North Carolina at Chapel Hill. A group from Penn State in Hershey, Pennsylvania, led by Dr. Murray will discuss *Using a Simulated Environment to Enhance the Safety of Ventilator Use by Improved Understanding of the Interaction Between Ventilators and Patient Pulmonary Physiology* (A-1350). Dr. Murray's group will also present *Models for Providing Simulation Experience to Large Groups* (A-1356).

Finally, on Wednesday morning, October 27, in Hall C2, Area 4, Drs. Joan Christie and Jean Pierre Yared will facilitate scientific papers that lead off with Dr. Powell and colleagues, again from Jackson Memorial Hospital in Miami, Florida. Dr. Powell will present *Adverse Event Reporting Failures, Fear May Not Be the Barrier* (A-1386). Dr. Paul Barach and coworkers, yet again from Miami, present A-1392, *Modeling Techniques to Reduce Errors in Patient Hand-Offs*.

It is clear that patient safety is the subject of an increasing number of important research investigations. The APSF wishes to commend these researchers and the many other clinicians and scientists who are dedicating their efforts to making anesthesia and the perioperative period safer than ever. Thank you.

Dr. Morell is Editor of the APSF Newsletter and a member of the Executive Committee. He is currently a Clinical Associate Professor of Anesthesiology at Wake Forest University and is in private practice in Fort Walton Beach, Florida.

* ASA = American Society of Anesthesiologists, SCCM = Society of Critical Care Medicine, AARC = American Association of Respiratory Care, STA=Society for Technology in Anesthesia.

Reading in the Operating Room: Is It Acceptable, Just Because We Can?

by Terri G. Monk, MD, and Adolph H. Giesecke, MD

Like the stock market, which waxes and wanes in irregular, dysrhythmic undulations, the interest that residents and practitioners have in reading in the operating room (OR) follows a similar course. Recently, we have observed that reading in the OR has gradually crept back into our practice; it is in a waxing phase. We understand why anesthesiologists are tempted to read in the OR ("Watching surgery is like watching paint dry," and "I have no time to read at home so I need to make up for lost time in the OR"). This subject became the focus of serious discussion in a panel on patient safety presented at the recent annual meeting of the Association of University Anesthesiologists in Sacramento, CA. We feel that reading in the OR seriously compromises patient safety and are opposed to it for the following 4 reasons:

First, reading diverts one's attention from the patient. If, because one's attention is diverted, 1 or 2 minutes of warning signals are missed, then the remaining time may not be adequate to evaluate the problem, make a diagnosis, and take corrective action. The consequence may be a severely injured patient. However, with improved monitoring techniques (pulse oximetry, capnography), it can be argued that this scenario is less likely.

Second, the patient is paying for our undivided attention, and most well-informed patients want to know if we plan to turn over a portion of their anesthesia care to a nurse or resident. If we are obliged to honestly answer that concern, then, should we also be obliged to inform the patient that we plan to read during a portion of the anesthetic? If patients knew, they would probably request a reduction in our fee for service or choose another anesthesiologist. On a personal level, we would not want the anesthesiologist caring for us or our family to read during surgery. Is it fair to provide less vigilance to our patients than we would expect during our own anesthetic?

Third, it is medico-legally dangerous. Any plaintiff's attorney would love to have a case in which the circulating nurse would testify, "Dr. Giesecke was reading when the cardiac arrest occurred. Yep, he was reading the *Wall Street Journal*. You know he has a lot of valuable stocks that he must keep track of." It is possible that if anesthesiologists informed their malpractice carriers that they routinely read during cases, the companies might raise premiums or cancel malpractice coverage.

Fourth, the practice of reading in the OR projects a negative public image. In this case, the nurses, technicians, aides, and surgeons represent the public. The officers of the ASA must occasionally serve as spokespersons for our profession at press conferences. Usually this follows a highly publicized disaster. It would be very difficult for them to defend the

practice of reading in the OR. *The public perception of our manner of practice is critical to the future integrity of the practice of anesthesiology.* Let us strive to project an appropriate image. Reading in the OR should NOT be part of the image.

Despite our strong objections to reading in the OR, many of our colleagues feel differently. In 1995, Dr. Weinger wrote an article for the *APSF Newsletter* discussing the practice of reading in the OR and pointed out that there were no scientific data on the impact of reading on anesthesia provider vigilance.¹ He concluded, "In the absence of controlled studies on the effect of reading in the operating room on vigilance and task performance, no definitive or generalizable recommendations can be made," and the decision to read or not should be "a personal one based on recognition of one's capabilities and limitations."¹ This commentary generated a flurry of letters to the editor from anesthesiologists supporting both sides of the issue. Advocates of reading said it was no different than "any conversation with another person in the operating room about topics unrelated to patient care" or "listening to music" during the procedure, while opponents called the practice "appalling" and "totally unacceptable."

In an attempt to resolve the controversy, the APSF awarded a patient-safety grant to Dr. Weinger in 1997 for his project entitled "Scientific Evaluation of Anesthesiologist Performance: Further Validation and Study of the Effects of Sleep Deprivation and of Intraoperative Reading." In a recent abstract, Weinger reported that anesthesia providers read in 35% of cases, but found no evidence that vigilance was different between reading and non-reading periods.² He concluded that intraoperative reading by anesthesiologists "may have limited effects on vigi-

lance and therefore may not *a priori* put patients' safety at risk."

While there appears to be no conclusive evidence that reading in the OR affects vigilance on the part of the anesthesiologist, we still object to this practice. Former President Bill Clinton was highly criticized for his affair with an intern, despite a lack of evidence indicating that this indiscretion affected his performance as president or adversely affected the country. When asked in a recent CBS television interview why he had an affair with Monica Lewinsky, Mr. Clinton responded, "For the worst possible reason: just because I could. I think that's just the most morally indefensible reason that anybody could have for doing anything." As anesthesiologists, we know that we can read in the OR and recognize that there is no scientific evidence that reading in the OR adversely affects a patient's outcome. Would we, however, want to defend this practice in a television interview?

Dr. Monk is a Professor in the Department of Anesthesiology at Duke University Medical Center, Durham, NC, and Dr. Giesecke is a Professor of Anesthesiology and Pain Management and Former Jenkins Professor and Chairman at the University of Texas Southwestern Medical Center, Dallas TX.

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1. Weinger MB. In my opinion: lack of outcome data makes reading a personal decision, states OR investigator. *APSF Newsletter* 1995;10:3-5.
2. Weinger MB. Assessing the impact of reading on anesthesia provider's vigilance, clinical workload, and task distribution. Available on the web at: http://www.anestech.org/Publications/Annual_2003/sta117.html. Accessed on August 9, 2004.



Perusing the business section of the Dallas Morning News, Dr. Giesecke demonstrates the bad practice of reading in the OR.

Dear SIRS

Common Gas Outlet Concern Leads to Corrective Action

SAFETY
INFORMATION
RESPONSE
SYSTEM



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

Dear SIRS:

I had the pleasure of investigating the newest and latest versions of anesthesia machines at the 2003 ASA meeting. I was surprised to observe an auxiliary common gas outlet on the Anestar machine (by Datascope), which could easily and perhaps inadvertently be lifted up and opened during mechanical ventilation. This seemed to be possible without indication to the user, and the fresh gas flow would then be diverted into the room. It was my understanding that prior standards for anesthesia machines (ASTM F1850-98a Section 10; 69.2 Note 25 and 69.2.1, Tests for Compliance) required some type of locking device for the common gas outlet to prevent unnoticed or undesirable disconnection from the breathing circuit. Although many of the modern machines have a direct connection of fresh gas to the breathing circuit, the presence of these "auxiliary" outlets (also found in the GE Datex-Ohmeda Aestiva) has recreated the need for a locking mechanism and/or a visual/audible warning.

I must add that I personally spoke to Abe Abramovich, the Director of Anesthesia Systems Development at Datascope, Corp., about this problem, and his receptiveness to an immediate solution encouraged me to co-create this "Dear SIRS" column in the *APSF Newsletter*. Following is Mr. Abramovich's response to my concerns. I believe that clinicians and industry can work together in a constructive and professional manner to improve the safety of our patients.

Michael A. Olympio, MD
 Chair, Committee on Technology
 APSF

Dear SIRS (response):

The issue you are referring to regarded the fresh-gas outlet port on the right side of the Anestar's patient module. In the original implementation, lifting the spring-loaded, flip-up port lid to insert an external circuit connector operated an internal valve which directed the fresh-gas flow away from the circle system to the fresh-gas port. Normally, if an external circuit is NOT inserted into the fresh-gas port, the resting position of the lid/valve is in the closed position and internal gas flow is directed to the circle system. During the last ASA, you observed that a mechanical interlock to the lid/valve would deter unintended actuation of the device. At the time you saw the original implementation, the fresh-gas port had not yet been released to the field. Although not a hazard to patient safety, since the spring-loaded lid/valve ensures valve closure when not in use, Datascope appreciated this suggestion and implemented it. See before and after photographs below. I view such input as one of the positive elements in the APSF relationship between anesthesiologists and industry in exchanging views and ideas. We all have the patient's best interest in mind, and want the use of Datascope's equipment to be a positive experience.

Abe Abramovich
 Director, Anesthesia Systems Development
 Datascope Corp., Patient Monitoring Division
 Mahwah, NJ

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.



Top: Closed flip-up lid/valve without interlock.
 Bottom: Open flip-up lid/valve without interlock.



Top: Closed flip-up lid/valve showing new interlock.
 Bottom: Open flip-up lid/valve showing new interlock.

Letter to the Editor:

Circuit Obstruction Mimics Bronchospasm

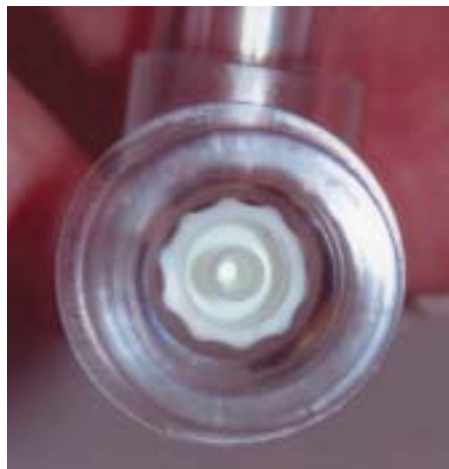
To the Editor:

An 11-year-old male was successfully induced for a cleft palate repair. After insertion of the endotracheal tube, a marked change in pulmonary compliance was noted. The endotracheal tube was replaced on 2 separate occasions and albuterol was administered because of a presumptive diagnosis of bronchospastic disease. When none of these therapeutic interventions were successful in ameliorating the change in compliance, a careful inspection of the anesthesia circuit was then conducted. This inspection revealed a partial obstruction from a Luer adaptor that was designed to fit over the carbon dioxide sampling port.

This Luer adaptor had been impacted in the elbow of the circuit. This occurred because of a process deficiency during the reprocessing of the anesthesia circuit. It should be noted that the hospital had decided to utilize a pasteurization process for reusing anesthesia circuit tubing and bags as a cost-containing measure. The obstruction in the elbow of the anesthesia circuit was not detected because the automated anesthesia machine checkout process for the Datex Ohmeda unit was proximal to the circuit elbow.

Fortunately, the partial obstruction in the anesthesia circuit was discovered in a timely fashion, and an untoward patient outcome was averted. Institutions considering changing from a disposable circuit to a reusable (pasteurization) process need to be sure that the reprocessing procedure assures that no pieces of equipment are inappropriately placed in the anesthesia circuit.

Kathy Nichols, MD
 Dave Thomas, MD
 C.J. Barker, RN
 Tucson, AZ



End-on view of the Luer adaptor wedged into the elbow of the anesthesia circuit.



Side view of the Luer adaptor wedged into the elbow of the anesthesia circuit.

Letter to the Editor:

Oblique Risks of Anesthesia

If we take a few steps back from the anesthesia machine, maybe all of the way back to the staff lounge so we can get a good look at our patient care setting—and we thoroughly survey our work environment—I believe that there exists an area of gross neglect, which poses a potential risk to the general population of our post 9/11 world. A risk, I believe, which we can do a better job of decreasing. Although we all practice in settings accredited by the JCAHO, AAAHC, and AAAASF,* which have “standards” applying to the secure storage and dispensation of medications (e.g., narcotics), we would probably all recognize huge safety gaps in this category of our daily operations. Narcotics may be kept in double lock boxes; however, other drugs, such as succinylcholine, can be accessed from multiple refrigerators and anesthesia carts from the ICU to the ambulatory surgery center. During normal working hours, succinylcholine and other medications are simply not kept under lock and key. As we know, just 5 ml of succinylcholine (in the wrong hands) given intramuscularly to a 70-kg individual on the street, is lethal. I would like to see a dialogue on the merits of various improved/strengthened anesthesiology standards that would keep better tabs on the dangerous drugs used in our profession every day.

I see 2 ways in which we can improve. First, we could keep more dangerous (or potentially misused), non-narcotic medications in fewer, centralized locations that would be under some form of electronic surveillance at all times. Second, we should encourage standards that would require computer tracking chips (such as those currently used in grocery and hardware stores) to be placed inside medication vials/ampoules so that the medication could be tracked—from shipment at the factory to delivery at the bedside. These suggestions could not only decrease theft and waste, but also provide a more secure “system” within which we practice our trade. Terrorism and injury to innocent people may be just as great a threat on the smaller scale of health care institutions, as they are in the larger arenas of mass public gatherings and weapons of mass destruction.

Adam Frederick Dorin, MD, MBA
 San Diego, CA

* JCAHO = Joint Commission on Accreditation of Health-care Organizations, AAAHC = The Accreditation Association for Ambulatory Health Care, AAAASF = The American Association for Accreditation of Ambulatory Surgery Facilities.

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In memory of Normand MacDonald Bremmer, MD (Texas Society of Anesthesiologists)

In memory of Robert A. Sandoval, MD (Texas Society of Anesthesiologists)

In memory of Margie Frola, CRNA (Sharon R. Johnson, MD)

Letters to the Editor:

Woodward Maneuver Advocated For Treatment of Cardiac Arrest

To the Editor:

Cardiac arrest during spinal anesthesia with the resultant severe to lethal neurologic injury was highlighted by Caplan in his 1988 review of closed malpractice insurance claims.¹ Preemptive treatment as well as pharmacologic arrest protocols have been put forth, but none address one basic physiological aspect of the heart: The heart is a non-sucking pump (i.e., myocardial relaxation coupled with central venous pressure allows for passive filling of the heart).² During cardiac arrest while the patient is under axial anesthesia, no matter how vigorously the closed chest is massaged, the cardiac output will not be enough to sustain perfusion to the brain. In addition, with the arterial vascular system dilated distal to the sympathetic block, one would surmise a preferential perfusion to the lower body in spite of CNS auto regulation.

In 1952, a Tasmanian orthopedic surgeon described a case in which a 4-year-old boy in surgery for fractures of the hand unexpectedly developed cardiac arrest. He was initially unable to establish normal cardiac rhythm. As was the custom at the time, he performed open chest cardiac massage. He describes the heart as being "small and empty," and his manual compressions of the heart were not effective in circulating blood. He immediately had the legs elevated vertically and felt the volume of the heart double almost instantly. It also began to beat spontaneously. He continued by wrapping the legs from foot to hip with Esmarch bandages.³ Woodward subsequently

published 4 additional case reports in which cardiac arrest was successfully treated by elevating the legs.⁴

Elevating the legs has 2 functions. First, it functions to restore preload to the heart, facilitating closed chest massage, and secondly, it increases flow resistance to these areas possibly providing less of a steal from CNS perfusion.

The Woodward maneuver is a simple means of generating cardiac preload as well as some increase in peripheral vascular resistance. Once circulation has ceased, bombardment with pharmacology will be ineffective without some means of circulation. We suggest that if preventative strategies fail to avert a cardiac arrest that the first line of defense be the Woodward maneuver.

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Reader Extremely Tired of Fatigue

To the Editor:

It has always perturbed me that for the 20 years I've been a practicing anesthesiologist not once have I seen guidelines for work hours for anesthesia providers. We all know too well the regulations imposed for airline pilots, truck drivers, nuclear plant workers, and even for residents-in-training for whom the new policy on work hours started in New York State. These guidelines are not baseless. There are innumerable studies by the military and articles in our own journals that dissect the effect of fatigue and long hours on the type of work that we do. That work that I am talking about is work that requires our utmost vigilance on a second-by-second basis. Working 12-14 hours a day or more and having to come back and start the whole process over again not only is detrimental to our health, but even worse for our patients. It is common sense that whatever hinders our work will eventually affect the patient.

Why the resistance to setting up guidelines for practicing anesthesiologists? Are there not guidelines for drug abuse among physicians? Are there not guidelines on how we should conduct ourselves in a manner which benefits the patient at all times? Then why the resistance to mentioning, specifically, the role fatigue plays on our performance? I just do not understand.

In my community, anesthesiologists are working long hours and keep going at the same pace without relief. I am not sure that many weeks of vacation is an answer. Vacation just gives temporary relief, not a change in "workstyle." We talk so much about lifestyle, but we should focus on "workstyle." This subject has come up in *Anesthesiology*,¹ *Anesthesiology News*, and in the *Anesthesia Malpractice Prevention Newsletter*. So this isn't a subject that hasn't been dealt with, and our specialty needs to set the tone and document some guidelines.

I know I am not the only one who feels strongly about this issue, as I have seen many letters to the editor in various journals. I just hope that some day our leadership, whom I respect so much, will wake up to the issue of fatigue.

Laurette M. Ellis, MD
Miami, FL

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Be sure to visit the APSF Booth in the Exhibit Hall at the 2004 ASA Convention in Las Vegas

Letter to the Editor:

Etiology of Hypoxemia Often Overlooked

To the Editor:

I was struck by a seeming dichotomy in two sections of the Winter 2003-04 *APSF Newsletter*, the columns on postoperative hypoxemia vs. the current HRO initiatives.

To a critical care physician, it is readily apparent that in most clinical settings, it is not the **what** that is important, but the **why**. I can imagine few things more fundamental to accomplishing the goals of HRO than a thorough understanding of the physiologic mechanisms underlying any clinical scenario. Hypoxemia may be the best example, for the following reasoning: Hypoxemia, itself, is virtually benign medically. Rather, in almost all clinical scenarios, it is not the specific pO_2 of a patient that is important, but rather, why the pO_2 is what it is.

In Murphy and Vender's article reviewing the 2003 ASA scientific papers, they discuss a paper regarding postoperative hypoxemia. In this review, they note the cause (intensive opiate analgesia), but focus on the hypoxemia without noting that the real problem is the ventilatory defect. This is more than just semantics. Frequently, clinicians pay more attention to hypoxemia, thinking it deleterious; therefore they apply oxygen, without an understanding that it's not the secondary hypoxemia that will hurt the patient, but the primary defect (ventilatory or pulmonary parenchymal) that really needs to be addressed to "save" the patient.

In similar fashion, the ASA's *Practice Guidelines for Sedation and Analgesia by Non-Anesthesiologists* are remarkable for underemphasizing the importance of breathing. The guidelines even state, "If hypoxemia develops during sedation/analgesia, supplemental oxygen should be administered." In my experience, such a concept is a recipe for respiratory arrest. It is a common occurrence in the ICU to review a chart of a newly intubated patient from the floor who has hypoxemia documented in their chart, followed by the application of oxygen, without sufficient (or any) investigation of the cause of the hypoxemia. In the case of the above, I would suggest that during sedation/analgesia, if hypoxemia develops, the first and foremost emphasis should be immediate determination of the cause of the hypoxemia. If the patient's physical breathing appears adequate and the airway is determined to be patent, then the procedure can be continued with oxygen supplementation. In fact, the entire 14-page guideline document could arguably have been summarized by one short sentence: BREATHING (via a patent airway) IS THE ONLY THING THAT COUNTS.

In short, hypoxemia is virtually always a secondary issue, a simple but highly important signal that something is wrong. In terms of patient safety, the focus on hypoxemia itself, and consideration of

it as harmful, is misplaced, and may even be injurious to the patient by distracting the clinician from a focus on the primary clinical problem, which may or may not be apparent. Subsequent application of oxygen may be doubly dangerous by raising the SpO_2 , thereby masking, often temporarily, the underlying pathology. Not that oxygen should not be applied when the SpO_2 reaches some low level, but dogged attention must not be diverted from determining and addressing the cause of the hypoxemia.

In addition to the guidelines statement cited above, the guidelines also recommend that supplemental oxygen be administered to all patients undergoing deep sedation "unless specifically contraindicated." I'm not sure what the latter means, but the guidelines are silent on the complications of this practice, which render oxygen, in my opinion, one of the most dangerous drugs used in acute care medicine.

Specifically, in many settings, practitioners use the pulse oximeter as the de facto monitor of adequacy of ventilation, without realizing that they are doing so. By my observation, this includes many who are not anesthesia providers, yet practice sedation, along with nurses in the recovery room and ICU, and even during monitored anesthesia care. These individuals may fail to understand that only if the patient breathes room air does the SpO_2 correlate closely with alveolar ventilation (with only a lag of a few breaths). Once added inspired oxygen is applied, even one or two liters by nasal cannulae, the patient is moved to the right on the Hb-oxygen dissociation curve, and the pO_2 no longer linearly correlates with the SpO_2 ; the SpO_2 therefore no longer correlates with alveolar ventilation. In fact, the higher the percentage of inspired oxygen, the less the SpO_2 moves with even large changes in pO_2 , and therefore pCO_2 —all the way up to apneic oxygenation.

Thus, the use of oxygen may mask the onset and delay the recognition of inadequate ventilation, apnea, and/or airway obstruction, as detected by pulse oximetry. Accordingly, probably the best way for the non-anesthesia provider to stay out of trouble during IV sedation is to titrate drugs slowly to a patient breathing room air. The decline in SpO_2 to the point of the practitioner's comfort would thus preclude further administration of drug doses or combinations that would cause further hypoventilation or apnea. (Note that the level of induced hypoventilation directly reflects the degree of sedation; in turn, in a sedated patient breathing room air, the SpO_2 correlates with the ventilatory status. Thus, in such a patient the SpO_2 offers an indirect but quantitative measure of the patient's level of sedation, and as a practical matter, sedative admin-

istration can therefore be titrated to the SpO_2 , but only if the patient is breathing room air.)

For those who have any doubt about the benign consequences of hypoxemia itself, the following reports and case histories from anesthesiologists and critical care physicians from around the world who participate in the GasNet and CCM-L web-discussion groups are presented for consideration:

- Fourteen-year-old with severe hypoxic encephalopathy after choking. After terminal extubation, SpO_2 25-40% for 18 hours. Normal HR and BP, good perfusion, normal ECG, no metabolic acidosis on ABG despite a PaO_2 of 24 mmHg (pH 7.30, $PaCO_2$ 59).
- The FAA requires that flight crews wear oxygen only for altitudes above 12,500 feet. For non-pressurized aircraft, the FAA requires that passengers be offered supplemental oxygen for altitudes only above 14,000 ft, which corresponds to a SaO_2 below 82%.
- "In research sleep studies, saturations varied in the 80-90% range. People with sleep apnea go for many years prior to diagnosis, spending most of every night with saturations lower than that, and it doesn't bother them very much. And they are mostly people with co-morbidity as well. I've spent a number of experimental periods myself with a saturation of 80% and barely noticed the difference."
- "When flying at 5500 feet my SpO_2 was 91%. I remember thinking to myself that here I was, making life-threatening decisions in real-time, with a PaO_2 at the low end of the scale."
- "My little pulse oximeter has traveled widely and highly. This pulse oximeter was originally purchased for studies on Mt. McKinley at 14,000-18,000 ft, and accompanied me on a highly enlightening trip to Bolivia. In sea-level Miami I boarded the plane at 98% saturation, by mid-flight it had dropped to 85%, and by the time I got off in La Paz the next morning, my oxygen saturation had dropped to 60%. I carried my own luggage through customs. I felt short of breath but euphoric and herculean. The average O_2 saturations of lifelong residents of Lake Titicaca (13,000 ft) and Bolivia's Altiplano (13,000-17,000 ft) were 82-85%."
- "Hiking the Inca trail, I found that my wimpy saturations in the mid-high 80s were for unknown reasons higher than those of most of the Quechuan porters."
- "Annually in Colorado at Independence Pass (roughly 12,000 ft), I spend a couple of hours tricking tourists into exercising while wearing a

See "Hypoxemia," Next Page

Letter to the Editor:

Hypoxemia May Be Tolerated Better Than We Might Think

“Hypoxemia,” From Preceding Page

pulse oximeter. O₂ saturations run as high as 90% or as low as the mid-70s. Most are in the high-80s.”

- “The take-home message to me, however, was that people function quite well with traditionally considered “inadequate” saturation. Or at least they can be easily duped into carrying their own luggage.”

Proof of lack of detriment does exist. There have been studies in thousands of patients showing that when anesthesiologists are not aware of the SpO₂, moderate levels of hypoxemia (i.e., SpO₂s in the 80s) occur commonly, with no adverse effect to patients.^{1,2}

From the above and other studies, and from knowledge and insight gained since the advent of pulse oximetry in the OR, there can be little doubt that during the majority of years that anesthesiology has been practiced (i.e., from the mid 1800s to the mid-1980s), episodic undiagnosed hypoxemia was rampant, yet patients weren't dying, having myocardial infarctions, or stroking out by the hundreds, unless the hypoxemia was prolonged. The latter cases virtually always occurred as a result of a major ventilatory problem, recognized or not (in particular, unrecognized esophageal intubation, apnea, or airway obstruction).

There is no consistent evidence, even in patients with stable coronary artery disease, that low levels of acute hypoxemia (or even chronic hypoxemia in some settings) are, in themselves, dangerous. On the contrary, there is much anecdotal evidence of no harm coming to such patients. Evidence from the years previous to the development of the pulse oximeter would overwhelmingly corroborate that. What is potentially dangerous are the reasons for which the SpO₂ drops acutely in acute care settings.

Finally, “A Focus on History” (*ASA Newsletter* September 2001) states: “Inhalation anesthesia of the early 1920s consisted of either breathing anesthetic gases and vapors via a mask and bag or by open-drop of volatile liquids (ether or chloroform) on a gauze mask. There were no intravenous agents to speed induction. One hundred percent nitrous oxide was administered for gas induction and attainment of maximum anesthesia. Induction was usually accomplished within 2 to 3 minutes and was followed by addition of 10 percent to 15 percent oxygen, or more, to avoid cyanosis. ‘Too much oxygen’ was shunned to avoid diluting the nitrous oxide.”

Leo Stemp
Springfield, MA

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Editor's Note: While this letter makes several valid and important points, it is important to NOT withhold supplemental oxygen from those patients for whom it is indicated by clinical judgment. The APSF Newsletter invites readers' thoughts and comments on this topic.

APSF Executive Committee Invites Collaboration

From time to time the Anesthesia Patient Safety Foundation reaffirms 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.

Proper Patient Selection Most Important With Forehead Sensor

“Forehead,” From Page 32

above the eyebrow so that it is centered slightly lateral of the iris. Placement also includes use of the headband, as Branson's work indicates. Patient position for use of the forehead sensor *excludes* patients in Trendelenberg's position due to venous pulsations. The product literature carries this admonition, but its importance may have not been given due emphasis in clinical settings. Recently published studies of poor performance with forehead monitoring all tend to overlook the importance of placement site, patient orientation, and headband use.¹⁰⁻¹²

A third and likely most important consideration is appropriate patient selection. With cost containment an abiding consideration, clinicians must be mindful that, no matter how convenient—site access on the forehead, rather than buried under surgical drapes—the forehead sensor is not for general use. It is intended for patients with poor peripheral circulation. In this group of patients the advantages of the forehead sensor have been well-documented.

Dr. Russell is the Medical Director of the Dare County Emergency Medical System and the Director of Anesthesia at the Outer Banks Hospital in Nags Head, NC.

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