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NEWSLETTER

The Official Journal of the Anesthesia Patient Safety Foundation

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APSF Newsletter Becomes an E-Publication

Regular hard copy publication will cease effective Spring 2010.

Be sure that your professional organization (ASA, AAAA, AANA, ASATT) has your correct email address on file to ensure your continued notification and receipt of the *APSF Newsletter.*

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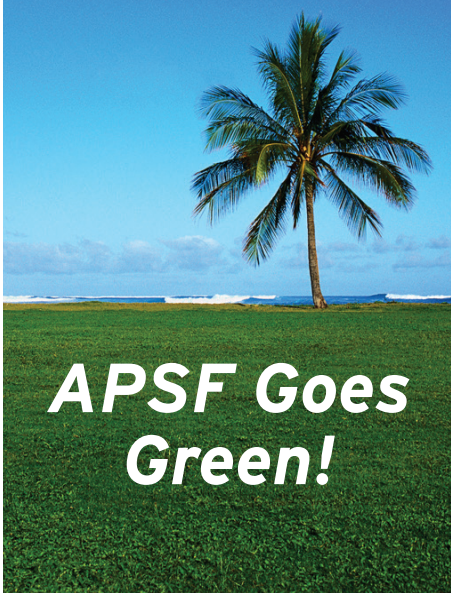

APSF Goes Green!

Dangers of Postoperative Opioids—Is There A Cure?

The following article is a special editorial authored by Robert K. Stoelting, MD, APSF President, and Matthew B. Weinger, MD, APSF Secretary. This editorial addresses the continuing problem of opioid induced respiratory depression.

On October 13, 2006, the APSF conducted a workshop in response to concerns about the safety of using patient-controlled analgesia (PCA) in the postoperative period.[1] The workshop focused on improved detection of postoperative opioid-induced respiratory depression. A number of clinical observations and recommendations resulted including:

- *Even though current methods of detecting and preventing opioid-induced respiratory depression have limitations, the APSF believes that continuous monitoring using available technologies could still prevent a significant number of cases of patient harm.*
- *Thus, the APSF urges health care professionals to consider the potential safety value of continuous monitoring of oxygenation (pulse oximetry) and ventilation in patients receiving PCA or neuraxial opioids in the postoperative period.*
- *Although pulse oximetry will monitor oxygenation during PCA, it may have reduced sensitivity, as a monitor of hypoventilation, when supplemental oxygen is administered. When supplemental oxygen is indicated, monitoring of ventilation may warrant the use of technology designed to assess breathing or estimate arterial carbon dioxide concentrations. Continuous monitoring is most important for the highest risk patients, but depending on clinical judgment, should be applied to other patients.*

We believe that unexpected and potentially harmful opioid-induced respiratory depression continues to occur. In most cases, there is inadequate monitoring (as described above) of oxygenation and/or especially ventilation, as well as a failure to consider unique characteristics of the patients' history and physical status that place them at higher risk for respiratory depression from opioid analgesics.

Standardized protocols for PCA or neuraxial opioids may promote a "one size fits all" approach to pain management without sufficient consideration of individual patient characteristics and medical conditions. Continuous pulse oximetry is not being routinely employed. More commonly, respiratory monitoring relies on nurses' periodic observation and documentation of breathing or respiratory rate. Even when continuous pulse oximetry is utilized, supplemental oxygen may be administered, sometimes without confirming its necessity or appreciating its potential to mask progressive hypoventilation.

It is critically important to emphasize the need to individualize postoperative pain management (opioid dose and infusion rate are not the same for every patient) and to insist that continuous monitoring of oxygenation (pulse oximetry) be the routine and not the exception. The use of supplemental oxygen must be justified. Finally, during PCA or neuraxial opioid therapy, intermittent subjective

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Inside:

Unexpected Respiratory Depression Continues to Occur

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assessments of ventilation or level of consciousness are unreliable predictors of *future* respiratory depression, even over short time frames (10-15 minutes).

We recommend consideration of the use of technology to continuously monitor ventilation in all patients receiving postoperative PCA or neuraxial opioid pain management. Where appropriate, this should be a routine component of postoperative care in patients known to be at high risk for opioid-induced respiratory depression (existing depressed level of consciousness or respiratory impairment, sleep apnea, or the very sick or elderly). Even if ventilation assessments are performed intermittently during routine nursing observations, the use of respiratory monitoring technology (capnometry) would improve the detection of progressive or unrecognized hypoventilation.

In summary, we believe that every patient receiving postoperative opioid analgesics should be managed based on the following clinical considerations:

- Individualize the dose and infusion rate of opioid while considering the unique aspects of each patient's history and physical status.
- Make continuous monitoring of oxygenation (pulse oximetry) the routine rather than the exception.
- Assess the need for supplemental oxygen, especially if pulse oximetry or intermittent nurse assessment are the only methods of identifying progressive hypoventilation.
- Consider monitoring ventilation (even if intermittent) with technology capable of detecting progressive hypoventilation.

Unrecognized postoperative opioid-induced respiratory depression can be reliably detected only if an understanding of the pathophysiology of the sequence of events and available monitoring technology are considered in all patients.

Reference

1. Weinger MB. Dangers of postoperative opioids: APSF workshop and white paper address prevention of postoperative respiratory complications. *APSF Newsletter* Winter 2006-2007; 21:61-67.

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Medication Safety in the Operating Room: Time for a New Paradigm

The Royal Palms Resort and Spa
Phoenix, AZ
January 26, 2010

This one-day conference is sponsored by the Anesthesia Patient Safety Foundation and will bring together a multidisciplinary group of speakers and attendees to discuss the role of a new paradigm (STPC) intended to facilitate medication safety in the operating room:

- ✶ Standardization (drugs, concentrations, equipment)
- ✶ Technology (drug identification and delivery, automated records)
- ✶ Pharmacy (satellite pharmacy, premixed solutions, and prefilled syringes whenever possible)
- ✶ Culture of Safety (recognition and reporting of drug errors to reduce recurrences)

If you are interested in attending this conference, please contact Deanna Walker (walker@apsf.org) for registration details.

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NEWSLETTER

The Official Journal of the Anesthesia Patient Safety Foundation

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Cross Contamination Via Gas Sampling Lines?

Q **Dear Q&A,**

The infection control Department at our hospital raised an alert for potential ICU patient cross-contamination via the CO_2 sampling tubing in the operating rooms. My understanding is that this is almost impossible given the physics of constant negative pressure suction/aspiration in the CO_2 sample line that is emptied into the evacuation system. I would expect that any ventilatory effort by the patient would always draw gas from the breathing circuit tubing, never from the gas sample line, because the gas analyzer continues to draw gas out of the breathing circuit throughout the entire respiratory cycle.

Throughout discussions with hospital administration they have maintained that they wish for us to change the CO_2 sampling tubing after EVERY case. I would appreciate any insight that you could provide.

Evan Pivalizza, MD
Houston, Texas

Q **Dear Q&A,**

After a recent tour of other surgery institutions I have noticed a difference in opinion regarding CO_2 and gas sampling disposable lines. Most of the time on the anesthesia circuit I see the sampling line attached to a HME filter where there should be no cross contamination between patients when reusing a sampling line from case to case and patient to patient. But on occasion I have noticed an intubated patient on a t-piece, baby safe system, or other types, delivered to the PACU, and the sampling line is directly connected to a patient without an HME filter filter in the line. And then, later on in the day, I noticed it being utilized on another patient without a filter again. It was my understanding that the sampling line was being reused for quite some time, and unless there were known or suspected conditions of TB, influenza, and maybe pneumonia or other warranted conditions, there was no changing of the sampling line from patient to patient. I have contacted our manufacturer but their statement was very vague.

Thanks,
Eric J. Peterson, CRNA, MS, MBA, MHA
Willmar, Minnesota

A **Dear Dr. Pivalizza and Mr. Peterson,**

There is general agreement with your analysis concerning the negative pressure and constant flow path exiting into the scavenging system, and the minimal likelihood of airborne contamination. However, it is conceivable that contact contamination from the connector might result in low level initial colonization of the connector housing the sampling site, and possibly the endotracheal tube. Currently, there are no published data to support this theoretical concern.

Some recent machines, and perhaps some retrofitted conventional gas machines, have connectors that route effluent gas from the analyzer to the breathing circuit via the absorber. This could theoretically contaminate the breathing circuit, but one Committee on Technology (COT) member remarked that his department employed this effluent return for many years in over 600,000 cases without a recognized problem. Sending the effluent to the scavenging system, instead, would eliminate this theoretical concern.

Some very old gas analyzers had a reverse-purge function to clear the sample line, which would have also suggested a potential contamination problem, but to our knowledge, that has never been documented either.

Anecdotally, in the institution mentioned above that recycled the effluent, the sample line was only changed during scheduled maintenance every 6 months or when thought to be contaminated. The line was routed into an elbow connector with the port protruding approximately 5 mm into the lumen, which may have minimized the contamination risk. More recently, however, that institution changed to disposable sampling lines, and the dramatically increased incidence of loose or incorrect connections led to numerous clinical problems. Also, several COT clinicians from other institutions agreed that the "law of unintended consequences" had also occurred in their own locations. Following an inclusive literature search, performed by medical library staff, there are no reports of cross contamination of patients that were attributable to non-disposable sampling lines in the operating room. While it would be very difficult, and hugely expensive to design a study capable of definitively addressing this issue, anecdotal data from approximately a half million cases at a single institution suggest that cross contamination was probably not a significant patient care issue. However, a latent cross contamination problem might exist if someone is actually looking for it.

A suggested compromise for your particular situation may be to install a fresh sampling line prior to performing an anesthetic on cases likely to require long-term postoperative intubation, or after any case with a high

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Numerous questions to the Committee on Technology are individually and quickly answered each quarter by knowledgeable committee members. Many of those responses would be of value to the general readership, but are not suitable for the Dear SIRS column. Therefore, we have created this simple column to address the needs of our readership.

Dear SIRS

Go With the Flow (of O_2)

S AFETY
I NFORMATION
R ESPONSE
S YSTEM

Dear SIRS refers to the Safety Information Response System. The purpose of this column is to allow expeditious communication of 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 2004 issue.

The information provided is for safety-related educational purposes only, and does not constitute medical or legal advice. Individual or group responses are only commentary, provided for purposes of education or discussion, and are neither statements of advice nor the opinions of APSF. It is not the intention of APSF to provide specific medical or legal advice or to endorse any specific views or recommendations in response to the inquiries posted. In no event shall APSF be responsible or liable, directly or indirectly, for any damage or loss caused or alleged to be caused by or in connection with the reliance on any such information.

Dear SIRS:

A free-standing ASC where I work has recently begun using the Datascope AS 3000 gas machines. I am concerned about the gas flow controls.

I am concerned that when one turns on nitrous oxide, both nitrous oxide and oxygen flows increase. When N_2O flow is decreased, the O_2 flow correspondingly decreases to its original setting.

However, when I perform a pediatric general inhalational induction, I begin with N_2O and O_2 in a 70-30 admixture. If the N_2O is turned on first, the O_2 flow rises. When the N_2O flow is decreased, so too is the O_2 flow. If both gases begin at 0 L/m, decreasing N_2O flow will reduce O_2 flow to 0 L/m. To illustrate, N_2O flow is increased to 7 L/m and O_2 flow rises to about 4 L/m. Using sevoflurane, when an adequate level of anesthesia is attained, flows are adjusted to a 50-50 admixture. This results in O_2 flow decreasing to near zero, or 200 ml/min. This necessitates resetting the O_2 flow to equal that of N_2O.

Yesterday, in the pediatric ENT room, this questionable mechanism resulted in no fewer than 8 flow control knob adjustments. I feel it is inherently unsafe that O_2 flow can decrease to near zero independent of someone physically turning the flow control knob. Where is the reciprocating gear mechanism that links the flow control knobs in this system? It is as if the gear system is reversed.

Again, I feel that oxygen flow should only decrease when one physically turns the O_2 flow control knob. I feel this apparatus is minimally safe and maximally impractical. Further, I feel that these gas flow control knob adjustments greatly increase the workload in an already busy setting.

Thank you so much for your time and attention in this matter.

Sincerely,
Shayne Miller, CRNA
Abilene, TX

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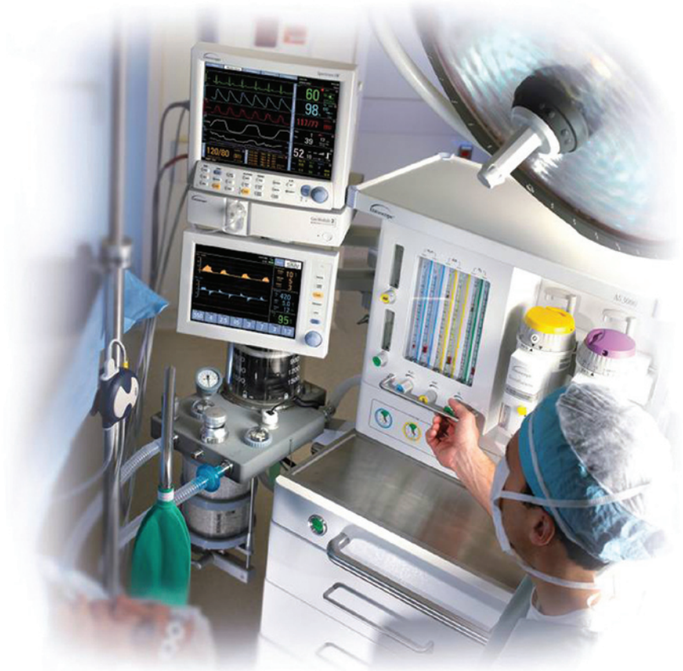

Figure 1. Manufacturer's representation of an anesthesia provider adjusting the fresh gas flow on a Datascope AS-3000.

Manufacturer Recommends Adjustment of O_2 Flow After Adjusting Nitrous

"Dear SIRS," From Preceding Page

In Response:

Datascope Patient Monitoring welcomes the opportunity to discuss the differences in the AS3000's implementation of the O_2/ N_2O ratio device. Anesthesia machine brands on the U.S. market today have subtle differences in their designs, and all were determined to be safe and effective devices.

The AS3000 Anesthesia System incorporates an O_2/N_2O ratio device that assures that at least 21% O_2 is supplied in the Fresh Gas mixture when N_2O is flowing.

The AS3000 design allows a user who first adjusts N_2O flow to see the O_2 flow rise up to an appropriate level. The AS3000 accomplishes this via a gear drive system that is activated when the user turns the N_2O flow control. Competitive machines commonly use either a pneumatic control system that prevents N_2O flow until sufficient O_2 flow is present or a linked gear system that controls the O_2/N_2O ratio. The gear system in the AS3000 is designed to maintain a safe O_2/N_2O ratio by adding O_2 flow as the user increases the N_2O flow, not to maintain O_2 flow at the highest flow level achieved when N_2O is decreased.

When the user is adjusting N_2O and O_2 flow rates, redundant steps can be avoided by always adjusting the O_2 flow after adjusting N_2O flow if changing the desired ratio. This will assure that the desired O_2 flow is achieved. We see this focus on the O_2 flow control as being consistent with the clinician's primary desire to always provide appropriate O_2 flow to the patient.

Datascope Patient Monitoring frequently reviews its AS3000 Operating Instructions and In-service training materials. We will use this as an opportunity to make sure that we are informing our new users to always adjust the O_2 flow after adjusting N_2O flow.

We thank the reader and look forward to input from the clinician community that helps us continuously improve the AS3000.

Sincerely,

David T. Jamison
Director of Engineering, Anesthesia Systems
Datascope Patient Monitoring
Mahwah, NJ, USA

Q&A

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likelihood of contaminating the tubing inlet with unusual pathogens. Another solution may be to purchase filters that connect between the gas sample line and sampling port on the elbow. This may be particularly useful to help protect the biomedical equipment technicians who service the equipment as well as those machines that effuse the gas into the breathing circuit. Above all, more plastic pieces and more connections may actually introduce the unintended complications of extra connections, including leaks, misconnections, cracked filters, and split tubing.

One last suggestion may be to use a traditional breathing circuit filter between the circuit Y-piece and the endotracheal tube, with the gas sampling port on the breathing circuit side of the filter. Care must be taken to continuously evaluate the proper operation of the filter.

The Committee on Technology, APSF

The Anesthesia Patient Safety Foundation is pleased to announce the

BOARD OF DIRECTORS WORKSHOP

How Low (Cerebral Perfusion Pressure) Can You Go?
Friday, October 16, 2009

1300-1700 (Riverside Ballroom I-II), Hampton Inn Suites Convention Center, New Orleans, LA
Registration is not required for attendance.

AAAA Reports on Annual Meeting

by Chris Caldwell, AA-C

The AAAA 33rd Annual Meeting was held at the Hilton Clearwater Beach, FL, on April 18-22, 2009.

The AAAA strongly believes that the key to any successful educational meeting should be the quality of the speakers and the topics they present. I would like to take this opportunity to publicly thank all of our speakers for volunteering their time to educate our students and practicing AAs. They were truly the backbone of our Annual Meeting.

Shane Angus, AA-C, and Joseph Mader, AA-C, started the conference on Saturday with a great lecture on clinical education, and followed it up with a Clinical Instructor Workshop the next day. Dr. Gerald Maccioli, ASA director for North Carolina and chair of the ASA Section on Education and Research, gave us an eye-opening look at what it is like to be a part of a malpractice lawsuit. We were honored to hear from Dr. Alexander Hannenberg, ASA president-elect, with an update on the state of the ASA as well as how Washington, DC can affect all of us. Dr. Robert Morell, member of the APSF Executive Board and newsletter editor, reminded us of how important it is to properly position our patients in order to avoid injuries.

Dr. Ann Bailey, professor of Anesthesiology and Pediatrics at UNC Chapel Hill, gave us quite possibly the best 2 pediatric lectures we have had at our annual meeting in years. Dr. Tricia Meyer, director of Pharmacy and assistant director of Anesthesiology at the Scott and White Healthcare System, reviewed PONV and discussed medication safety.

Dr. Roy Soto, director of Anesthesiology Education at Beaumont Hospital, spoke to us about trauma and alpha-2 agonists. Michael Nichols, AA-C, AAAA director and past president, discussed the use of medical simulators in the training of AAs and its possible place in AA certification.

Our Annual Student Jeopardy event was moderated by Dr. Joel Zivot, medical director of the Cardiac ICU at St. Boniface General Hospital and the Winnipeg Regional Health Authority in Winnipeg, Canada. This event is always a huge success and a wonderful learning tool for our student members. Dr. Zivot also gave us an excellent lecture on pulmonary artery catheters and new cardiac output monitoring technologies.

This year, we were very fortunate to have Dr. Tong Gan, vice chair of Anesthesiology at the Duke University Medical Center and president of the Society for Ambulatory Anesthesia. His lectures on some of the drugs we might see one day in anesthesia and on fluid management were very insightful. We also heard from Dr. Matthew Zeleznik, anesthesiologist at St. Joseph's Hospital in Atlanta, GA, about the new development of using Intralipid in the treatment of local anesthetic toxicity. Claire Chandler, AA-C, gave an update on 2 very important organizations involved with AAs, the Commission on Accreditation of Allied Health Education (CAAHEP) and the Accreditation Review Committee on Education for the Anesthesiologist Assistant (ARC-AA).

Dr. Alexander Hannenberg, ASA president-elect, lectures at the 2009 AAAA meeting in Clearwater Beach, FL.

We were extremely fortunate to have Dr. John Ellis from the University of Pennsylvania School of Medicine and vice president of the Society of Cardiovascular Anesthesiologists Foundation wrap up our 2009 Annual Conference with his lectures about preoperative cardiac evaluation and myocardial ischemia.

In addition to all the wonderful speakers and educational lectures, we had an excellent group of sponsors and exhibitors for the weekend. On the social side, our Community Initiatives Committee arranged the 2nd Annual Blood Drive, which was hugely successful, and the 2nd Annual Golf Scramble with proceeds going to The Children's Cancer Center in Tampa, FL.

We look forward to our 34th Annual Conference at the Hyatt Regency in Savannah, GA, April 10-14, 2010.

Chris Caldwell, AA-C, was chair of the AAAA Annual Meeting.

Go Green with us and Donate Online!

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Wichita Anesthesiology

In Memoriam

In memory of E. H. Boyle, MD (Philip F. Boyle, MD)
In memory of Hank Davis, MD (Sharon Rose Johnson, MD)
In memory of Steve Edstrom, MD (Larry D. Shirley, MD)
In memory of Margie Frola, CRNA (Sharon Rose Johnson, MD)
In memory of Andrew Glickman, MD (Sharon Rose Johnson, MD)
In memory of Particia A. Hawkins, CRNA (Douglas B. Coursin, MD)
In memory of Patricia A. Hawkins, CRNA (Michael and Catherine Murray)
In memory of Dr. Ann-Bardeen Henschel (Eugene P. Sinclair, MD)
In memory of James Karnavas (Michael A. Olympio)
In memory of James Lantz, MD (Gustav E. Staahl, MD)
In memory of Joseph A. Lee, MD (Department of Anesthesia, University of Manitoba and Robert K. Stoelting, MD)
In memory of Paul A. Rookard, MD (Texas Society of Anesthesiologists)
In memory of Leroy D. Vandam, MD (Dr. and Mrs. George Carter Bell)

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