



Clinician Discussions

Significantly lowering costs, reducing harmful emission and improving the standard of care

DRÄGER
APOLLO[®]
LOW FLOW WIZARD[™]

Dräger spoke with three clinicians to learn more about their experiences with the use of low flow anesthesia. In this discussion, Michael Broennle, MD, John C. Lydon, MD and Carl Sisco, CRNA, MBA describe how they use...

Low flow anesthesia has been practiced for many years – why the renewed interest now?

Dr. Broennle: I believe it's because the technology now exists to support safe and intelligent use of lower flows. The Low Flow Wizard™ illustrates how low flows can go while maintaining sufficient fresh gas flow to meet patient demands.

Dr. Lydon: I suspect that the interest that has been generated is due to the Apollo® as well. We encourage staff to use the Low Flow Wizard to safely save on inhalation agents and all gases.

How does the Apollo support the use of low flow anesthesia?

Dr. Broennle: The Low Flow Wizard suggests lowering fresh gas flow. In addition, there's an integrated anesthesia gas monitor that measures FiO₂, PetCO₂ as well as inspired and expired anesthetic agent concentrations. The system also includes a display of age appropriate MAC for the highest concentration of potent anesthetic gas.

Carl Sisco: Yes, having that visual check is very helpful. In fact, we have the Wizard as one of the standard icons on display as a default. It reminds our clinicians to keep their use of anesthesia efficient. The built in safety monitors and integrated gas bench add a level of security to support this technology.

In the past, moisture accumulation has been cited as a limiting factor in the adoption of low flow anesthesia. From what you have told me, this does not seem to be an issue with Apollo?

Carl Sisco: Correct. Dräger incorporates a warming element in the Apollo breathing system. The warmer significantly decreases the amount of moisture accumulation that has an impact on low-flow anesthesia. You have been using the Apollo for a

little over a year now – what has been your experience with the Low Flow Wizard? Are any negative results?

Carl Sisco: We have not had any negative results to my knowledge. Pharmacy has run three separate reports that correlate with our acquisition of Apollo's. Each report indicated our use of inhalational agents was significantly less since we've begun using the Apollo with the Low Flow Wizard.

Dr. Lydon: We haven't had any negative experiences. However, there are situations that occur that have to do with patient factors. For example, when using a laryngeal mask airway rather than an ET tube, there will be greater leakage. When you have larger leaks, you can't use as low a flow, but the Wizard tells you this, so that you can increase flow to meet patient demands.

Dr. Broennle: My one observation is that when using two potent agents, for example, induction with sevoflurane, then maintenance with desflurane using low flows, on emergence both agents may be present. Dräger's algorithm for the gas monitor may only display the sevoflurane concentration when the desflurane falls below about 0.8%.

Carl Sisco mentioned the reduction in bottle usage that occurs with the use of lower flows. Can these savings also be applied to outpatient procedures?

Dr. Lydon: Absolutely. There are no limits regarding case length. In fact, low flow techniques would lead to cost savings with respect to agent utilization in any setting.

Dr. Broennle: That's true. I only work in pediatric outpatient units where most cases are less than one hour. I use low flow for all cases that are more than 15 minutes long.

Carl Sisco: I agree. We've seen significant savings in short procedures where sevoflurane and desflurane are primarily used.



Other than the apparent cost savings are there other benefits of low flow anesthesia?

Carl Sisco: Another benefit is that low flows help us maintain normothermia. This is especially pertinent since the National Surgical Care Improvement Project calls for anesthesia care providers to strive for optimal thermoregulation. The goal is to help prevent surgical site infections, which are associated with lower body temperatures. Of course, we warm the patient using forced air warming systems; we also warm their I.V. fluids. But we find that low flows definitely support the maintenance of normothermia.

Dr. Lydon: Anecdotally, it appears that we are better able to maintain normothermia in our patients with the use of low flow anesthesia. This is evidenced by higher PACU admission body temps.

Are there limitations or restrictions to the use of low flow anesthesia?

Carl Sisco: It's not necessarily a negative; however, one must remember

Apollo's® Low Flow Wizard™ to provide the highest standard of care while significantly lowering costs, reducing the emission of potentially harmful substances and to help maintain patient normothermia.



that when sevoflurane is used at low flows for longer than one to two hours maximum, a degradation product, Compound A may be formed. This can affect renal function. For this reason, you need to bring the flow up to two liters to prevent any harmful effects. [To minimize exposure to Compound A sevoflurane exposure should not exceed 2 MAC hours at flow rates of 1 to <2 L/min.]

Dr. Lydon: Yes, to truly use low flow to the limits that the Wizard takes you, you must use a weak base absorbent, not a strong base, to eliminate the possibility of developing compound A. This is supported by an APSF consensus of experts on absorbents. We have been talking in general terms about low flow anesthesia, how low are you able to turn down the fresh gas flow?

Dr. Lydon: I am using fresh gas flows as low as 0.4 liters on some patients, as indicated by the Low Flow Wizard.

Carl Sisco: I can go as low as one liter of fresh gas and sometimes less,

unless I'm using sevoflurane in cases longer than one hour.

Dr. Broennle: After induction, I use maintenance flows of 0.3L/min of O₂ and 0.4L/m N₂O.

Do you have quantifiable numbers that show cost savings?

Dr. Broennle: I am using one-quarter the amount of anesthetic agent that I used before I had the Apollo and Low Flow Wizard.

Carl Sisco: Well, I can tell you that within a month to six weeks after the use of our new Apollos, our reps for sevoflurane and desflurane were unnerved. They wanted to know if we were using more isoflurane due to cost considerations. Our bottle usage is significantly less. I would say that we are

using approximately 30 % less anesthetic agent.

We hear a lot about reducing the environmental impact of healthcare. Does the use of low flow support this?

Dr. Broennle: There is no question that it's ecologically better for the environment. I get a lot of provider satisfaction from safely sparing the environment from excessive anesthetic gases. Nitrous oxide is a potent ozone depleting gas, and is a leading threat to the future integrity of stratospheric ozone.

Carl Sisco: Yes, this is just common sense. If you're reducing your use of fresh gas flow and inhaled agents then less of these agents are released into the internal OR environment as well as the external environment.



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