American Association for Respiratory Care's

Adult Acute Care

November / December 2002 Bulletin

Notes from the Chair

by Nick Widder, RRT

As the International Congress drew closer this fall, I again had the honor of choosing a member of the section to receive our Specialty Practitioner of the Year award. I was proud to bestow this year's award on Keith Lamb, RRT. Keith is relatively new to the field, but has already risen quickly to the position of charge therapist on the night shift at a large teaching hospital. He has also shared both his personal and professional experiences with the section via several contributions to the Bulletin, and it came as no surprise when I found his name among the nominees.

While researching the nominees, I was struck by a comment Keith's department head made: he said he sleeps better at night knowing Keith is there at his institution to care for patients. Those of us who work nights know there is no deeper compliment that can be offered by an administrator. Keith demonstrates the best qualities of our section membership, and also offers an example we all can aspire to uphold.

Once again, the AARC hosted an extremely successful International Congress. The section business meeting went well and we are in the process of forming a program subcommittee for next year's meeting in Las Vegas. If you would like to recommend speakers or topics for the Las Vegas meeting, please email them to me by December 31.

The section meeting also featured a lively discussion on the AARC's recent white paper on concurrent therapy.

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Section Connection

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Adult Acute Care Section Business Meeting

by Nick Widder, RRT, and Jeff Whitnack, RRT, RPFT

It was a pleasure to meet and hear from various members of the section during the annual section business meeting held during the AARC Congress in Tampa, Fla., in October.

One idea discussed at the meeting was the development of a "Swap Shop" on the section homepage on the AARC web site (www.aarc.org). The Swap Shop would include various resources for section members to use in their daily practice of respiratory care. These resources could run the gamut —from a protocol for the nebulization of Prostacyclin to an RT contact with experience using HFOV on an adult patient. The Management Section already operates a similar area on its homepage, where offerings range from a "Policy and Procedure for Bronchopulmonary Hygiene Protocol" to a PowerPoint presentation on "Resolving the Human Resource Needs of the Profession: The Role of the Schools" to an "Anthrax Self-Learning Packet."

Members also addressed the need to increase membership in the section, noting the Adult Acute Care Section represents the "bread and butter" of the respiratory care profession. Since most RTs work in adult acute hospitals, our value to the Association as a whole cannot be underestimated. While AARC membership itself brings a wealth of benefits for the adult acute practitioner, section membership provides us with a targeted way to advance our specific issues at the national level.

Thanks to our current membership numbers (more than 1,000), we have a seat on the AARC Board of Directors. The section also affords us the chance to provide direct input into the program at the AARC Congress. But the greater our numbers, the greater our influence. Members were encouraged to recruit their colleagues into the AARC and the section. ◆

AARC White Paper on Concurrent Therapy

by Jeff Whitnack, RRT, RPFT

An interesting discussion ensued during the section business meeting in Tampa in regards to the recent AARC White Paper on Concurrent Therapy.

Concurrent therapy, or the "stacking" of treatments, has, in many hospitals, become the default mode. The reason for treatment stacking runs the gamut - in some places, it exists to help a manager attain good productivity numbers to present to administration, while in others it might be due to the staff wanting a longer breakfast break. But usually the reason for stacking centers on the ever-increasing problem of too much work and too little staff. The concerns regarding stacking run the gamut as well. Patients are, of course, the big losers, because the quality of care they receive often suffers. But hospitals and departments can also be at risk. For example, if the patient is being billed for the treatment, the stacking may constitute legal fraud. The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) is currently asking hospitals to develop policy guidelines on how and under what conditions treatments may be "stacked."

Across the country there is still a lot of RT therapy ordered which has little, if any, indication. Protocols (and conversion to MDI therapy, self-treatments, etc.) can usually reduce the occurrence of inappropriate therapy. But the assessment and teaching necessary to make such programs work take time - a commodity often in short supply, precious, and prone to evaporation.

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Send Us Your Email Address!

Beginning next year, the Bulletin will be published on a quarterly, rather than bimonthly, basis. But that doesn't mean we'll be communicating with you less often than before. The plan is to increase communication to members via a monthly email which will feature items of interest to the section. If you're already receiving email messages from the AARC, you will automatically receive these e-mails. If you aren't getting AARC email, that means we don't have your email address. To ensure you don't miss out on these timely publications, send your email address to: mendoza@aarc.org. ◆

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End-Tidal CO2 Monitoring: Numbers, Waveforms, and Alarms

by Jeff Whitnack, RRT, RPFT

The term "capnometry" refers to the CO2 number generated at the end of expiration. The term "capnography" is inclusive of the waveform generated by the CO2 during the entire expiratory phase. Both provide valuable information.

To quote from an article in the Journal of Cardiovascular Nursing, "The measurement of the pressure of exhaled carbon dioxide (PetCO2) via capnography has several useful hemodynamic applications . . . Capnography can be applied to hemodynamic assessment in three key ways: (1) identification of end-expiration during pulmonary artery and central venous pressure measurements, (2) assessment of pulmonary perfusion and alveolar deadspace and (3) assessment of cardiopulmonary resuscitative efforts."1

The amount of carbon dioxide in the atmosphere is very miniscule and can, for practical purposes, be thought of as essentially zero. CO2 is produced by cellular metabolism and is excreted by the lungs via ventilation. While this is elementary, the essence is that the CO2 being exhaled represents metabolism and perfusion. Indeed, a device by Novametrix called the Nicco (http://www.novametrix.com/nico/) uses exhaled CO2 to continuously measure cardiac output. To quote from the company web site, "It uses a method known as Partial CO2 Rebreathing, which is based on the well-accepted Fick principle. With this method, cardiac output is proportional to the change in CO2 elimination divided by the change in end tidal CO2 resulting from a brief rebreathing period." Leaving aside the issue of whether or not this technology has clinical merit, what is fascinating to me is that the use of exhaled CO2, combined with manipulation and measurement, can give us this information.

After intubation a CO2 sensor is often used to ascertain tracheal as opposed to esophageal intubation. Less appreciated is that an ETCO2 value of 10 or less is extremely well correlated with futile CPR efforts.2 With tracheal intubation, even with good ventilation and compression efforts, a state of zero perfusion (massive PE, for instance) will show zero ETCO2. Conversely, a CO2 level over 10 means that at least some potentially viable resuscitation is occurring.

Initially, ETCO2 monitoring was judged for its adequacy as a PaCO2/ABG substitute. "Correlation" was the buzzword. There is usually a difference between the ABG PaCO2 and the end tidal CO2. The nature of the difference can, of itself, be both diagnostic and guide ventilator strategy. The sicker the patient, the wider the gradient. The more optimal the therapy or ventilator manipulation, the less the gradient. The former focus on "correlation" as a PaCO2 substitute loses validity in this context.

Consider the following:

1. The PaCO2 is reflective of the total CO2 load after it has traversed the pulmonary circulation and is mixed in the arterial. The end tidal CO2 value of a patient with obstructive lung disease may be arising from the worst ventilated lung units and have higher PaCO2 values than the mixed PaCO2's - if enough expiratory time is allowed for these alveoli to empty. The end tidal CO2 may be higher than the PaCO2 in such circumstances. If such a patient is intubated for an exacerbation, he or she will usually have enough auto-peep and obstruction present that the PaCO2 will still be higher than the ETCO2.

2. The ABG PaCO2 is measured at 37 degrees C and reported as such unless the ABG is temperature corrected. However, the end tidal CO2 arises from the actual perfusion temperature of the patient. So PaCO2 -ETCO2 differences, when the patient is markedly hypo- or hyper-thermic, will thus be affected. For certain comparisons and calculations (see No. 7 below) the PaCO2 should be temperature corrected.

3. The term "deadspace" refers to ventilation without perfusion. We all have a certain amount of deadspace, as the gas in our upper airways doesn't contact any perfused alveoli. Increased deadspace can then be caused by reduced ventilation (airway obstruction or reduced open alveoli) and/or reduced perfusion. The ultimate example of 100% deadspace is the scenario in which a very unfortunate patient has his/her left bronchus totally obstructed by a tumor and his/her right pulmonary artery totally obstructed by an embolus. All the ventilation goes to the right lung, all the perfusion goes to the left. ETCO2 would be zero.

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4. If increased deadspace is arising from an obstructive process, the shape of the ETCO2 waveform will be tapered and rise slowly. Allowing a longer expiration time may then show an even higher ETCO2 value.

5. If increased deadspace is arising from a drop in perfusion then the waveform will be stable but the ETCO2 value (the size of the square) will drop. This can be helpful in differentiating if the cause of an increased deadspace is worsening ventilation (bronchspasm, for instance) or a drop in perfusion (PE or MI).

6. A patient with severe ARDS will also have a markedly increased deadspace. Many of the alveoli won't be open, with adjacent perfusion shunted by. Further, the open lung may be then over distended by high airway pressures, impacting negatively on adjacent perfusion and further increasing deadspace. A recent NEJM article described how the amount of deadspace in ARDS patients can be prognostic of outcome.4 Of perhaps very critical importance is that any beneficial or detrimental ventilator changes should show a corresponding decrease or increase in deadspace.

7. A rough estimate of a patient's deadspace can be obtained by the following formula: PaCO2 - ETCO2/PaCO2 (keeping in mind No. 1 and No. 2 above).

8. Several of the newer ventilators have what is known as "volumetric capnography." This means that the information arising from the ETCO2 waveform, ETCO2 values and the volume measured is combined to come up with a deadspace ventilation value for each breath and for the total minute ventilation.

9. Recent studies point out that combining a D dimmer and end tidal deadspace measurement may be a very clinically useful way to rule out suspected PE without having to do more expensive tests.5

For those interested in furthering their knowledge, I would recommend the following web site: http://www.capnography.com/. ◆

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Shorter Stays/Higher Costs

According to new data from the Agency for Healthcare Research and Quality, average hospital stays have dropped for many high-cost conditions. But that doesn't mean hospitals are saving money. The same research shows average hospital costs for these conditions - including several common respiratory diagnoses - are going up. Consider the following comparison of costs and LOS:

- Blood poisoning: costs rose from $17,909 to $24,365; LOS declined from 10.0 days to 8.2 days.
- Cardiac dysrhythmias: costs rose from $10,152 to $14,213; LOS declined from 4.7 days to 3.6 days.
- Stroke: costs rose from $15,365 to $19,956; LOS declined from 9.5 days to 6.7 days.
- Diabetes: costs rose from $11,021 to $14,779; LOS declined from 7.4 days to 5.6 days.
- Pneumonia: costs rose from $12,860 to $15,104; LOS declined from 7.8 days to 6 days.
- Congestive heart failure: costs rose from $11,995 to $15,293; LOS declined from 7.4 days to 5.6 days.
- Nonspecific chest pain: costs rose from $5,135 to $7,543; LOS declined from 2.5 days to 1.8 days.
- COPD: costs rose from $11,263 to $12,491; LOS declined from 7.2 days to 5.3 days.

The report attributes these discrepancies to new technologies and rising medication costs, which have increased average hospital charges while economic pressures have shortened the average patient stay. ◆

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NOTES FROM THE CHAIR

While concurrent therapy may be the norm in some institutions, it is certainly NOT optimum therapy, and I tend to wonder if we can even call it therapy at all. What benefit does a patient receive if a health care worker simply dumps some medication into a nebulizer, slaps a mask on the patient's face, walks away and comes back ten minutes later to find the mask on the patient's forehead or on the floor? How can any adverse reactions be noticed in a timely manner? How can therapy be modified to improve outcomes if we are not even seeing if the therapy is being done correctly? Finally, how many therapists want to be the one at the code saying, "He was fine ten minutes ago…"?

For more on the concurrent therapy debate, see Jeff Whitnack's article in this issue.)

On a final note: I won a certificate from Puritan-Bennett for a four-night stay in the headquarters hotel at the 2003 International Congress in Las Vegas. As your section chair, and a member of the Board of Directors, I have no need for the room. Puritan-Bennett is graciously allowing me to transfer this prize to the 2003 Adult Acute Care Specialty Practitioner of the Year, to help defray his/her costs when attending the meeting to receive the award. Hopefully, this will also provide one more incentive to encourage all of you to nominate a peer for our next Specialty Practitioner of the Year. A special thanks goes to Puritan-Bennett for allowing me to use their prize in this manner. ◆

Improving ICU Care

A new report details efforts by some of the leading hospitals across the nation to improve care delivered in the ICU.

"Care in the ICU: Teaming Up to Improve Quality" profiles 11 institutions that have introduced innovations in ICU care which have dramatically improved quality of care and can serve as models for the rest of the nation. Among the initiatives: systems approaches to improving patient safety, bridging the use of technology with "caring" components, addressing environmental issues and the use of telemedicine. The report notes that if these standards were implemented in all non-rural hospitals, they would prevent 54,000 deaths and save $5.4 billion annually.

The report was sponsored by the National Coalition on Health Care and the Institute for Healthcare Improvement, with funding from the federal Agency for Healthcare Research and Quality and The Robert Wood Johnson Foundation. ◆

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AARC WHITE PAPER ON CONCURRENT THERAPY

Many well meaning therapists are working in hospitals where stacking has become the normal routine. Indeed, many of them wonder how any department could do otherwise. When they are informed of a hospital in which stacking is strictly outlawed, they may understandably react with a mixture of jealously and resentment. But that's counterproductive.

I don't think anyone really expects stacking to disappear overnight. What I hope everyone realizes is that the stacking of treatments is a practice which needs to be, if not eliminated entirely, then at least limited or controlled. The AARC white paper, along with pressure from Medicare and JCAHO, can help to reverse or at least curtail this questionable practice. All of us who work with patients everyday can do our part by actively promoting the delivery of responsible, high quality care.

You can read the entire AARC white paper online at: http:// www.aarc.org/headlines/concurrent_therapy/concurrent_therapy.html. ◆