

THE RESPIRATORY TRACT



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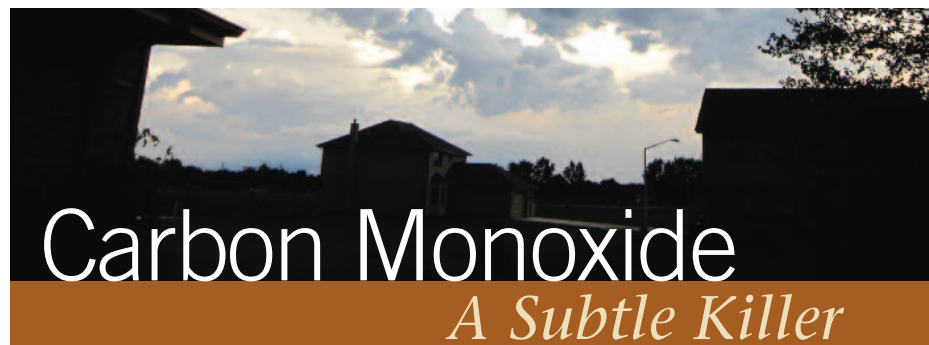


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LOOKING FORWARD

By Frank A. Paul DO FACOEP, FACEP, NM/OMM



Of the nonfatal, unintentional, non – fire-related carbon monoxide (CO) poisoning cases treated in emergency departments, most are caused by furnaces. The remainders are followed by motor vehicles, stoves, gas lines, water heaters, and generators.

Males represent an overwhelming 74% of unintentional non – fire-related deaths. Interestingly, intentional fatalities seem to show that race-specific rates for all racial groups are 87% lower than for whites. Fatality rates increase with age and are highest the population greater than 65. Nonfatal exposures are more common in older teens and young adults (15-34) and are most common in young children (0-4).

Patients with chronic obstructive pulmonary disease tolerate CO intoxication poorly and it is harder for them to tolerate treatment. Neonates and fetuses are more vulnerable to CO toxicity because of the leftward shift of the dissociation curve of fetal hemoglobin, a lower baseline PaO₂, and levels of HbCO at equilibration that are 10-15% higher than maternal levels.

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Visit ISRC
Online: isrc.org The current legislative report has been posted to the ISRC Forum at:
www.isrc.org/isrcbb/viewforum.php?f=8

ISRC Main Office: 1-800-698-6248 www.isrc.org Update your address online at www.idfpr.com

THE INSIDE TRACT:

News and Upcoming Events

Chapter 5: Emergency Medicine & Adult Critical Care Conference

Thursday, September 8, 2011. View the brochure at isrc.org/chapter5.html Springfield, IL, Prairie heart Institute next to St. Johns Hospital

White Sox Outing

September 13, 7:00 pm game. Contact Chapter 2 Chair Trina Schuch. Proceeds from this event are used to support Asthma Camp Please visit isrc.org for more information.

Chapter 1: Educational Offering

Saturday, September 17, 2011, 8 am -2 pm Do you still need contact hrs. for your renewal? Park Court Conference Center at Pekin Hospital 4-6 CRCE's will be awarded. We will be taking lunch orders, or bring your own! Please RSVP by email at chapter1.isrc@gmail.com or call the Chapter 1 Chairperson, Theresa Johnston, RRT at 309-573-3886.

Chapter 2: Pediatric Respiratory Care Seminar

Saturday, October 15, 2011. Presented by Chapter 2 and The ISRC's Neonatal/Pediatric Committee at Advocate Hope Children's Hospital Conference Center located on the campus of Advocate Christ Medical Center, 4440 West 95th Street Oak Lawn, Illinois 60453. Please visit isrc.org for more information.

AARC Membership Reduced Rates

The ISRC has purchased discount AARC membership vouchers for members of the AARC in Illinois. Contact: Doug McQueary, membership committee at 773-962-4086 or by email at dmcqueary@stbh.org.

Continued on page 3



Curtis Kretschmer | BS, RRT-RCP
ckretschmer@isrc.org



“So, what kind of costs are we talking about?”

A couple of weeks ago I received this email:

Hello Everyone,

We are requesting each state society consider sending the attached draft letter to your state Medicaid Director (revised as you see fit). The second attachment lists the mailing addresses for the state Medicaid Directors.

The issue is to bring to the attention of the Medicaid Directors is the cost effectiveness that could be available to Medicaid programs by encouraging participating physicians when clinically appropriate to prescribe to their patients generic albuterol solution used with a small volume nebulizer in lieu of or in addition to the more expensive brand name MDI inhalers.

The Issue

The United States was party to a worldwide agreement, the Montréal Protocols, a treaty that would ban the making and use of products containing achlorofluorocarbons (CFC). This agreement's objective was to reduce ozone depleting substances harming the environment. This ban included albuterol MDIs that used CFCs as a propellant. CFC albuterol was to transition off the market and into albuterol propelled by hydrofluoroalkanes or HFAs.

The problem today is there are only 4 albuterol HFAs inhalers on the market, all of which are still under patent by the manufacturers, thus there are no low cost generics available. The four HFA MDIs are Ventilon HFA, ProAir HFA, Proventil HFA and Xopenex HFA. It will be years before these brand name drugs come off patent and low cost generic HFA inhalers become available.

While there are numerous low cost generics available for albuterol in solution form there are no generic HFA inhalers.

Many large pharmacy chains (Wal-Mart, Target, CVS, etc) provide low cost drugs (Ex. \$4 for a 30 days supply). Albuterol in solution form is a generic and is available at a low cost. Using albuterol in solution form requires the use of a small volume nebulizer.

State Medicaid Drug Coverage

State Medicaid programs pay for the cost of drugs for qualifying recipients and this can total tens of millions of dollars every year. As we all know Medicaid programs are under severe financial pressure and most programs are either reducing benefits and/or raising qualifying criteria. Paying for Brand name HFA inhalers can cost Medicaid programs millions of dollars every year.

We believe Medicaid Directors may be unaware or perhaps need to be reminded of the savings to their Program if participating physicians were encouraged (not mandated) when assessing the patient to consider prescribing a low cost generic albuterol solution used with a nebulizer, rather than automatically prescribing or only prescribing the expensive Brand name HFA inhalers. Granted Medicaid programs would incur the cost of providing a nebulizer, however the cost could be recouped over a short period of time by paying for generic albuterol solution used in the nebulizer rather than the high cost of Brand name inhalers

The Objective of the Letter from the State Societies

The AARC leadership believes that a letter from the State Society to your State Medicaid Agency could point the Program to badly needed and potential cost savings, which in turn might mitigate by even a small measure potential benefit cuts to our most vulnerable citizens. The letter also directs them to the links to the AARC's Guidelines for Aerosol Drug Delivery.

Thank you for your consideration of this request.

*Cheryl
Cheryl A. West, MHA
Director Government Affairs
AARC*

If you would like a copy of the draft, send me an email. You can probably gather what it says from the explanation on the left. I am not sure what I wanted to do about this. The first question that came to mind was: So what kind of costs are we talking about? Nobody at the hospital pharmacy would tell me the prices of anything (which is ridiculous) so I went to my local Wal-Mart and got the following information:

Proair HFA 200 puffs \$40.33 or about 20 cents a puff / \$1.60 a day of recommended dose

Combivent 200 puffs \$201.84 or about \$1 a puff / \$8 a day of recommended dose

Unit dose albuterol neb 25 vials \$4.00 or about \$0.16 a puff / \$0.64 a day of recommended dose

Unit dose ipratropium neb 25 vials \$4.00 or about \$0.16 each dose / \$0.64 a day of recommended dose

Atrovent HFA inhaler 200 puffs \$187.54 or about \$0.94 a puff / \$6.25 a day of recommended dose

Advair 60 puffs \$232.78 or \$3.86 a puff / \$7.60 a day of recommended use

The pharmacist who provided this price quote mentioned that up until about a year ago Walmart offered a 120 puff Ventolin **HFA** Albuterol for \$9.00. That would be less than \$0.08 a puff or only \$0.60 a day for

recommended use. That product however was pulled from the market. The pharmacist there at the time could not explain why.

It would appear (even in my highly unscientific study) that there are significant savings in using nebs. Makes me wonder how much we throw away. Most therapists have probably mistakenly brought home hundreds of dollars worth of inhalers (at least at these prices) in their lab coat pockets. And I know when a patient goes home from our hospital we pitch whatever med they left behind.

The institution I currently work for has a respiratory protocol that permits therapists to transition qualifying patients to be switched back and forth from nebs to mdis and upon demonstrating proper technique to be turned over "bedside." The responsibility of charting is at that point turned over to nursing.

At any given time about half of the patients at our facility are "self administering" their bronchodilators, Advair, etc. When we were approached by pharmacy about perhaps switching everyone to nebs our director explained that if the hospital wanted to add 15 FTEs to our daily staffing that she would be happy too. That, of course, is not going to

happen so we continue right along teaching our patients to care for themselves using MDIs.

I tend to think that the market will eventually drive down the cost of the brand named mdi inhalers that are currently available, but what about the COPD, Medicaid patient that is being discharged later this afternoon? Am I doing this patient a disservice by pushing him one way or another? Do I feel right forcing a nebulizer leash on my asthmatics? If my tax dollars are paying for Eddie Emphysema to get albuterol, don't I want to administer it in the least expensive way possible? I suppose there is no reason why both methods of medication delivery couldn't be made available to the patients. Except that many of my patients would get confused and end up using both at the same time. I see both sides to this and would appreciate your feedback. Email me at ckretschmer@isrc.org and share your opinion.

Thanks for reading.

Curtis Kretschmer
ISRC President and occasional
Frank Sinatra impersonator

Continued from page 1

THE INSIDE TRACT:

News and Upcoming Events

A Special Thank You

The ISRC PAC Comm. wishes to thank everyone who participated in our annual fundraiser held last month at the convention. Whether you won or lost we greatly appreciate all of you who stopped by the table and played. The prize winners in the TV raffle were Ann Polito of Childrens Memorial hospital in Chicago, and Marlene Suvada of National-Lewis University. Congratulations to you both.

Educational Events:

Chapter 6: Don't Gamble with your CEU's
October 7, 2011 Rockford, IL
visit isrc.org/chapter6.html

Chapter 2: Pediatric Respiratory Care Seminar
October 15, 2011 Oak Lawn, IL
Visit isrc.org/chapter2.html for information.

The State of Illinois has issued the Respiratory Care Week Proclamation.

It can be viewed and downloaded at isrc.org/isrcbb/viewtopic.php?f=8&t=240
If you have any events or news for your celebration at this years Respiratory Care Week held October 23, through October 28, please consider posting at isrc.org/isrcbb/viewforum.php?f=26.

Reminder: You must be registered to post information to the forum. Forward to Craig Leonard at cleonard@isrc.org.

ATTENTION: All Respiratory Care State Licenses need to be renewed by October 31, 2011. With your renewal you will receive NBRC credentials for those that are expiring soon.

Visit aarc.org and isrc.org for the latest information on upcoming events, educational offerings.

Visit ISRC.org for AARC Membership at Reduced Rates!

THE RESPIRATORY TRACT

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The Respiratory Tract will accept all manuscripts for review. Once published, the article becomes the property of ISRC and may not be published elsewhere without the permission of both author and editor. Opinions expressed by authors are not necessarily those of ISRC. The editor reserves the right to edit for clarity and space.

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Carbon Monoxide

By Frank A. Paul DO FACOEP, FACEP, NM/OMM
ISRC BOMA, Board of Medical Advisers

A Subtle Killer

Story continued from page 1

Pathophysiology

CO toxicity impairs oxygen delivery and utilization at the cellular level. It therefore has the most profound impact on the organs with the highest oxygen requirement. Toxicity is caused primarily from cellular hypoxia due to impaired oxygen delivery. CO reversibly binds hemoglobin which causes a relative anemia. It binds hemoglobin 230-270 times



Dr. Frank A. Paul

more strongly than oxygen. A room with a CO level of 100 ppm can cause a HbCO of 16% at which is enough to produce clinical symptoms. The binding of CO to hemoglobin causes an increased binding affinity of oxygen molecules on the other 3 hemoglobin oxygen-binding sites. This causes a leftward shift in the oxyhemoglobin dissociation curve further lowering the availability of oxygen to the tissues.

CO binds to cardiac myoglobin with an even greater affinity than to hemoglobin resulting in myocardial depression and worsening hypotension. Studies have shown that CO may cause inflammatory changes in the brain. Following severe intoxication, patients do display central nervous system (CNS) pathology, including white matter demyelination. This leads to edema and focal areas of necrosis.

Symptoms typically begin with headaches at levels around 10%. Levels of 50-70% may result in seizure, coma, and death.

CO is eliminated through the lungs. The half-life of CO at room air temperature is 3-4 hours. One hundred percent inspired oxygen reduces the half-life to 30-90 minutes. Hyperbaric oxygen at 2.5 atm with 100% oxygen reduces it to 15-23 minutes.

Misdiagnosis is common. Because of how vague and varied the complaints are, symptoms often are attributed to a viral illness. Therefore, asking about possible exposures is important. This is even more important in the winter months. Another clue can be recognizing when more than one patient

in a house presents with the same complaints. Remember, severity of symptoms may not correlate well with HbCO levels. The most common symptom is usually headache (37%) followed by dizziness (18%) and nausea (17%). Other symptoms include:

- Malaise, flu like symptoms, fatigue
- Dyspnea on exertion, chest pain, palpitations,
- Lethargy, somnolence, weakness
- Confusion, depression, hallucination, confabulation,
- agitation, impulsiveness, distractibility
- Memory and gait disturbances, bizarre neurologic
- symptoms, seizure, coma
- Visual disturbance
- Syncope
- Fecal and urinary incontinence
- Diarrhea and abdominal pain

Chronic exposures may also present with a loss of dentition, gradual-onset neuropsychiatric symptoms, or recent problems with cognitive ability.

Physical examination is not very helpful because there is no one defining feature pointing to the diagnosis. Inhalation injury or burns should always make one consider the possibility of CO exposure. Vital signs would be consistent with a nonspecific acidosis and metabolic derangement; achycardia, hypertension or hypotension, hyperthermia, and tachypnea. The classic skin sign of cherry red is rare because pallor is actually more common. The chest x-ray may be negative or show non-cardiogenic pulmonary edema. Patients may have memory problems including retrograde and anterograde amnesia and may even confabulate. They demonstrate emotional lability, impaired judgment, and decreased cognitive ability. Stupor, coma, gait disturbance, movement disorders, and rigidity may be present.

Long-term exposures or severe acute exposures can lead

to long-term neuropsychiatric problems. Some individuals even develop delayed neuropsychiatric symptoms several days to weeks later. Two thirds of patients eventually recover completely.

Emergent Management

Since sudden death has occurred in patients with severe arteriosclerotic disease at HbCO levels of only 20%, all patients require continuous monitoring. Pulse oximetry: HbCO absorbs light almost identically to that of oxyhemoglobin. Although a linear drop in oxyhemoglobin occurs as HbCO level rises, pulse oximetry will not reflect it. Pulse oximetry gap, the difference between the saturation as measured by pulse oximetry and one measured directly, is equal to the HbCO level. Pulse CO-oximetry units are available which can screen for CO toxicity at the bedside. Patients need immediate and continuous 100% oxygen therapy until the patient is asymptomatic and HbCO levels are below 10%. In patients with cardiovascular or pulmonary compromise, lower thresholds of 2% are recommended. One can calculate an estimate of the necessary therapy duration by using the initial level and half-life of 30-90 minutes at 100% oxygen FIO₂. In uncomplicated intoxications, measuring

Another clue can be recognizing when more than one patient in a house presents with the same complaints. The most common symptom is usually headache (37%) followed by dizziness (18%) and nausea (17%)

venous HbCO levels and oxygen therapy are sufficient.

Hyperbaric therapy should be considered immediately for patients with levels above 40% or cardiovascular or neurologic impairment. Additionally, persistent impairment after 4 hours of normobaric oxygen therapy necessitates transfer to a hyperbaric center. Pregnant patients with carboxyhemoglobin levels above 15% should be considered for hyperbaric treatment. Serial neurologic examinations, including funduscopy, CT scans, and, possibly, MRI, are important in detecting the development of cerebral edema which require intracranial pressure and invasive blood pressure monitoring to guide therapy. Head elevation, mannitol, and moderate hyperventilation to 28-30 mm Hg PCO₂ are indicated in the initial absence of ICP monitoring. Acidosis should improve with oxygen therapy. Patients with HbCO levels of 30-40% or above 25% with associated symptoms will usually be admitted.

HbCO analysis requires direct spectrophotometric

measurement in specific blood gas analyzers. Bedside pulse CO-oximetry requires a special unit and is not a component of routine pulse oximetry. Elevated levels are significant; however, low levels do not rule out exposure, especially if the patient already has received 100% oxygen or if significant time has elapsed since exposure. Individuals who chronically smoke may have mildly elevated CO levels as high as 10%. Presence of fetal hemoglobin, as high as 30% at 3 months, may be read as an elevation of HbCO level to 7%. When interpreting an arterial blood gas, PaO₂ levels should remain normal. Oxygen saturation is accurate only if directly measured, not if calculated from PaO₂, common in many blood gas analyzers. One can estimate PCO₂ levels by subtracting the carboxyhemoglobin (HbCO) level from the calculated saturation. PCO₂ level may be normal or slightly decreased. The metabolic acidosis is caused by secondary to lactic acidosis from cellular ischemia.

Patients with preexisting heart disease can experience increased exertional angina with HbCO levels of just 5-10%. At high HbCO levels, even young healthy patients develop myocardial depression. Nontraumatic rhabdomyolysis can result from severe CO toxicity and can lead to acute renal failure. Lactic acidosis, hypokalemia, and hyperglycemia may be seen with severe intoxication. Methemoglobinemia should be considered in the differential diagnosis of cyanosis with low oxygen saturation but normal PaO₂. The most common abnormality on an electrocardiogram is sinus tachycardia. Arrhythmias may be secondary to hypoxia, ischemia, or infarction.

Hyperbaric oxygen therapy (HBO) for the treatment of CO poisoning is controversial. There is a true, increased rate of elimination of HbCO. Certain studies demonstrate large reductions in delayed neurologic sequelae, cerebral edema, and pathologic central nervous system (CNS) changes. But with all those positive findings, systematic reviews have not revealed a clear benefit of HBO, so no clear guidelines for its use have been determined. Furthermore universal treatment criteria do not exist. The most common selection criteria for use of HBO (regardless of HbCO level) include coma, transient loss of consciousness, ischemic ECG changes, focal neurologic deficits, and abnormal neuropsychiatric testing. HBO at 3 atm raises the amount of oxygen dissolved in the serum to 6.8% which can maintain cerebral metabolism. This reduces the elimination half-life to 15-23 minutes. Treatment regimens are usually provided at FIO₂ of 100% at 2.4-3 atmospheres for 90-120 minutes.

Respiratory Therapy Students Volunteer at Marklund Children Home Summer Games

This past June, Marklund Children's Home in Bloomingdale, IL hosted their annual Summer Games for their clients with student volunteers from the College of DuPage Respiratory Therapy Program at hand to assist with the festivities. The Marklund Children's Home is home for individuals under the age of 21 as well as adults with severe medical compromise. For many years now, the Summer Games have been a favorite of the individuals (clients) who live at Marklund. I also can honestly say the Games are looked forward to by the staff and volunteers as well!



The Summer Games is an opportunity for clients to compete in a full day of games for their enjoyment. Over the years, staff have modified and perfected an array of games that are appropriate for clients' participation. Activities range from a fun house, which provides sensory stimulation and is an all-time favorite, to bowling with a special ramp. Many of the respiratory therapy freshman class students



from the College of DuPage had elected to volunteer at this event to help the other staff and volunteers from Marklund create a fun filled day for everyone! The students helped to set up the games in the morning and then worked with the clients of the



home so that each one could enjoy the experience. At the end of each game, the clients received a colorful sticker for achievement so that their card for the day could be completed. It was so neat to see the expressions on their faces when they knocked down a strike at bowling or went underneath the parachute or threw the water balloon into the hoop!

After the games were completed, everyone had the opportunity to be treated to a

great lunch and live music. Then, unfortunately, it was time to help break down the tents, games and put everything away as we will wait 12 months for next years event.

All in all, the College of DuPage RT Students told me it was really lots of fun! They also said it was great to be a part of such an enjoyable event. Working alongside the RT students and spending this day with them will be a memorable one for me and my colleague at Marklund Children's Home, Kurt Meyer, RRT, RCP. I personally would like to thank the following RT Student volunteers: Archana Patel, Disha Darbar, Chandrika Gopal, Dan Bauler, Cheryl Liutov, Dian Diaz, Alice Utter, Sabrina Heline, Judy Narvaez and Michelle Vermeland. It's nice to know we have such great future respiratory care practitioners entering our profession!

If you are interested in learning more about Marklund, please visit www.marklund.org

Lisa Zaenger, RRT, RCP
COD RT Instructor
Marklund Children's Home

ISRC CHAPTER 2

White Sox Game Outing

Thursday, July 7, 2011

Thank you to everyone from Chapter 2 that participated in our July 7th White Sox outing/fundraiser. A special thank you to all the Chapter 2 members who sold tickets and to Perlie for making the arrangements for the tickets and picking them up. It was a very successful event. All 90 tickets were sold for \$25.00 each, which gave us a profit of \$5.00/ticket = \$450.00. The proceeds will go back to the ISRC and be donated towards Asthma Camp. It was a great evening, weather was awesome, and fun was had by all even though the White Sox did not win.



2011 Proclamation for Respiratory Care Week

You can view and download the 2011 Proclamation for Respiratory Care Week at the URL listed below. Please distribute it to your assigned hospitals.

www.isrc.org/isrcbb/viewtopic.php?f=8&t=240

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- Free tuition to state supported university
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POSITION AVAILABLE:

- **Supervisor Position:** Responsible for leading and managing the day shift. Must be RRT and licensed in the State of Illinois and have a bachelor's degree.
- **Leadership Opportunity as a Respiratory Care Coordinator in the NNICU/PICU:** Responsible for coordinating and assisting with all respiratory care activities. Must be RRT and licensed in the State of Illinois and have a bachelor's degree.
- **Critical Care Positions:** Must be certified, registered preferred and licensed in the State of Illinois. Must have at least two years of experience, good assessment and ventilator skills.

IN HOUSE AGENCY:

- Students are welcome after completing their first year of a 2-year respiratory program.
- CRT or RRT with two years of experience in the ICU with a good background in mechanical ventilation.



THE RESPIRATORY TRACT

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Jan/Feb 2012 Issue: Submit by December 1, 2011

March/April 2012 Issue: Submit by February 1, 2012
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