The Central Line

A NorthStar Publication

Hypothermia, Part 2

By Dennis Kerrigan

Hypothermia 'Potpourris': Induced vs. field hypothermia, compressions vs. ventilations-only resuscitation, AED vs. LP 12

Several forward thinking NorthStar staffers asked me after last month's newsletter article, "if hypothermia is 'bad', why is Lifeflight using induced hypothermia on cardiac arrest calls?" A great question – one that medical researchers and practitioners continue to hotly (coolly?) debate in evidence based research circles around the world. The short of it is that, depending on the setting, uncontrolled field hypothermia can have deleterious outcomes ('bad'), while also providing hypoxia protecting effects ('good', if not still controversial) when induced in a controlled setting as a treatment modality. For non-traumatic cardiac arrest patients with SROC (spontaneous return of circulation), the theory is that lowering brain and body temperatures, even by a few degrees, reduces the ischemic damage to cells following the global hypoxic effects of cardiac arrest. The operative word in Lifeflight's use of induced hypothermia is that the MOI needs to be *non-traumatic*. Given that one of the most deleterious effects of hypothermia is coagulopathy (clotting inhibition), besides profound metabolic, cardiac and vascular effects. This is when hypothermia effects become 'bad'. So, given the choice of the body being at 98.6 F core temperature or 88.6 F, we would certainly prefer the former, where we are awake and perfusing normally. But assuming a return of spontaneous circulation following a cardiac arrest incident, we have new considerations for using induced hypothermia as a treatment tool. Though not presently included in the proposed '08 MEMS protocol changes, keep your ears to the tracks on this, as I 'm sure we will be hearing more in the future about potential use of this in ground EMS post- cardiac arrest care.

Assuming most of the time then that hypothermia in our field setting context is a bad thing, it behooves EMS providers to review the current assessment and treatment principles for the spectrum of severity in hypothermia, where incorrect field treatment can result in bad patient outcomes. Mild hypothermia is considered, for practical field purposes, as any patient still awake on the AVPU

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EMS Week 2008

By Carol Pillsbury

I am sure you have all received several emails from me about EMS week. NO doubt maybe to the point you delete them without reading them.
As providers this is the one week we can be honored and recognized. Each year I try to come up with good ideas ad a good program but the program needs help from you.
Doing the work for the evening is rewarding to me. To see my coworkers have a night that truly belongs to them and only them is something I can not describe, This years theme is " Your Life is our Mission" I have a head full of ideas! Believe me I do not let up on Dave or Mike or Felicia about this week

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- Wade Browne
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Notes from the Director

Why We Do What We Do

By Dave Robie

NorthStar's Mission: "The professionals of NorthStar will adhere to the highest standards of respectful patient care, engage in positive community activities, and exercise good stewardship of our resources, all in the pursuit of excellence."

As we begin the new year, it's a good time to go back to some of the basics. There are five essential elements of our mission. A lot of thought went into the actual words and the placement of those words. Each of the elements is important and critical but they are also in priority order.

Professional. First, take care of yourself. Look the part, act the part, training for it, be professional. Be proud of your profession. Be the best you can be in every way.

Patient care. Respectful, timely (as fast as you can safely get there), thorough with assessment, complete in treatment, never losing sight of the fact that this is a person. She is someone's mom, he is someone's son. And patient care extends to family members as well. After you, the patient comes first.

Community. As professionals and as a tax subsidized part of the community we live in, we have a moral obligation to give back to our communities. Besides, the reality is, we often have the time for such opportunities.

Financials. A necessary part of the equation but which comes last in the priority order. When the number of billable runs cannot generate the revenue needed to meet expenses (like your salary), hard decisions need to be made. But still and always, within these constraints, professionalism and patient care are still #1-2.

Lastly, **Excellence**. Not that it is the last of the priorities but if we do #1-4 well, we will achieve #5.

The goal is an excellent service that fosters professionalism, focuses on great patient care, is a part of the community, yet is fiscally responsible to its parent and to the towns it supports and which support us. It is truly a balancing act but the mission and the priorities within it should always be our guide.

Enjoy the great Maine winter and be safe.

Operations Manager's Corner

By Felicia Harris

Laughter

Have you ever thought about what laughter does for you? Well take a look at the many benefits of "belly laughing" on your physical, psychological and emotional health.

-Physical health:

- Lowers blood pressure
- Increases vascular blood flow
- Blood becomes oxygenated
- Boosts the immune system
- Reduces stress
- Builds stamina
- Increases endorphins (natural pain killers)
- Physical workout for inter -nal organs
- Increases disease destroy -ing antibodies in the blood
- Increases natural cells that destroy tumors, & viruses

-Psychological health:

- Releases anger, fear & sad -ness
- Brings balance to immune system

-Emotional health:

- Builds self-confidence
- Makes us more creative
- Allows us to relax and let go of stress
- Gives us energy

But, more importantly…. "people who laugh together work better together".
So enjoy the company of your co-workers and relieve a little stress.

What's 710 Up To Now???

By Ed Strapp

Sugarloaf Ski Patrol joins forces with Carrabassett Valley Academy for a Unique Ski Patrol Junior Program

Next fall will bring a number of new faces learning the ways of the National Ski Patrol, and working with the Sugarloaf ski patrol. CVA announced in January 2008 that they would be rolling out a new athletic program for their student athletes. While CVA's Ski Patrol program will be under the direction of Sam Punderson, CVA ALPS program Director, they will be working hand in hand with CVA Athletic Trainer and Sugarloaf Ski Patroller, Ed Strapp, and the ski patrollers on the hill at Sugarloaf.

The Program will begin each fall with students starting the academic portion of the Outdoor Emergency Care (OEC) technician. This is the backbone of the NSP First Aid educational program. Students who have already completed this course, will continue to work on their evaluation and treatment skills, and challenge themselves with more difficult and unique situations while working as a member of the Sugarloaf Ski patrol. This educational program will transition to on snow training to further challenge the students and prepare them for the many scenarios they will face as a patroller. In the end, they will complete the national test for the OEC technician, and train with Sugarloaf's Ski Patrol handling rescue sleds, working with the Perfect Turn program to improve their skiing. After completing the program and passing the required testing and certification they will be full fledged members of the National Ski patrol.

Not all of the student's time will be spent here at Sugarloaf, the CVA Ski patrol program will also be working with members of the Mt. Washington Volunteer ski patrols shadowing their activities in Tuckerman's Ravine. They will train with the National Ski Patrol in mountain travel and rescue, avalanche training, and ultimately train out west.

All of this will be tied with vigorous dry land training mirroring the demands of all the student-athletes at CVA. While this is not a competitive program it will place numerous physical demands on the athletes similar to CVA's competitive programs when considering the needs of back country travel and rescue. Additionally, there will be some competitive aspects of this program during various "patrol competitions" which pair both first aid skills with skiing and riding challenges similar to those faced on hill during active duty ski patrolling.

This is a very unique program and a very exciting opportunity for those CVA students who want to stay within the ski industry. Outcomes from successful completion of this program include a very quantifiable skill, and a very marketable skill for future employment anywhere snow falls, and people play. It will also be a very strong development program for anyone interested in a career in Emergency Medicine.

For more information or to express interest in the program contact CVA's Admissions Director, Dawn Smith, at 207-237-4466 or dsmith@gocva.com or visit www.gocva.com/big_mountain_ski_patrol.asp.

EMS Week (cont)

Please take 10 or 15 minutes and write me a story great call, sad call, funny call, something funny that happened at your base EMS week may be months away but the evening does not happen without planning and work.
Reminder
Nominate this years 710 winner
Does you base have "the Call of the Year"
Tell me a story
Do you have an idea for another fun award?
Please……

Hypothermia (cont)

scale (but most often with impaired mental status), together with the presence of active shivering. Definitive core temperature readings in the field are difficult to adequately measure, with even rectal temperatures reflecting a lag time in relation to true core temps; showing warmer than true core temps as the body continues to cool, then colder than true core temps as it begins to warm back up. Or as one hypothermia expert I heard speak at a wilderness medicine conference said, "if you stick the rectal probe in a cold turd, you'll get a colder than actual reading", (so much for 'evidence-based' political correctness!!). The most accurate core temp readings are acquired from esophageal probes, inserted via an orogastric tube, (which is included for medics in the proposed '08 protocol updates). Generally, uncontrolled shivering is most pronounced down to around the 90 degree temp level, then is less pronounced prior to shivering cessation at around 86 F degrees, given the depletion of the caloric stores that are a required to sustain active shivering. Mental status changes for the patient in mild to moderate hypothermia present as "the umbles" – they mumble, grumble, fumble, tumble, etc., due to less brain perfusion and the resultant effects on the more complex motor and 'social lubricant' mediated areas of the brain. The patient should still be awake, but can certainly have significantly altered mentation, down to around the mid to low 80's core temp. Treatment for mild to moderate hypothermia is essentially anything you can do to minimize the 'cold challenge' while bolstering up the bodies heat production and heat retention capabilities. This should include removing / insulating them from their environment, removing cold wet clothing ("cotton kills"), adding water tolerant and vapor barrier insulation layers – dry clothing and a large recycling bag-sized vapor barrier, then wool blanket layers, Wiggies Bag or sleeping bag 'burrito wrap' with a tarp or body bag as an outside vapor barrier layer. Add towel or clothing insulated hot packs to the high heat loss areas where arteries come close to the surface – the neck, head and torso. Un-insulated hot packs can cause thermal burns if placed directly on poorly perfusing skin. Increasing the hypothermic patients caloric and hydration stores are critical to preventing further temperature drop, using oral glucose if the patient is conscious and gag reflex intact, or D50 via a patent IV line. Use towel insulated heat packs sandwiched around the IV bag and the coiled IV tubing to initiate some internal rewarming via heated IV fluids (300 – 500 cc fluid challenge, repeatable X 1 per MEMS hypothermia protocol). For Rangeley and Sugarloaf crews, remember you have the Ohio nebulizer's available for heated / humidified O2 administration; remember to plug them in to the inverter while enroute to a possible hypothermia call, as they take a good while to reach the optimum 105 – 108 F temp (monitor temps using the ventilator tubing temp gauge). If you don't know how to set up an improvised heated / humidified O2 system, aka the "GV 2000", using the cannibalized parts of a non-rebreather O2 mask, T-tube nebulizer, ventilator tubing and one way valve with a BVM, ask one of the recent WEMT course grads to show you.

Severe hypothermia, defined as below 82 F core temperatures, has much more dire potential for deleterious outcomes from incorrect treatments, too include rough patient handling. Until we get protocols for use of esophageal probes, reliable core temp readings will be difficult to accurately asses. So go with the more field - friendly assessment skills of absence of shivering and V, P or U consciousness states to best indicate severe hypothermia. When the heart is that cold it is literally 'a piece of glass', and any rough handling can precipitate v-fib in an irritable myocardium. EMS providers need to judiciously maintain a flat patient position (either recumbent or supine is OK), as vertical, sitting, or Trendelenburg positions can precipitate 'toxic sloshing' of cold acid-laden blood, which can also precipitate spontaneous v-fib. The presence of carotid pulses, even with warm rescuer fingers, can be difficult to assess, and ECG monitoring is often unreliable from both the diagnostic / artifact problems, as well as the temperature sensitive LP 12's limited computer capabilities to function in a cold environment. Any cardiac monitor trying to interpret heart rhythms through cold poorly conductive tissue is prone to artifact, so keep the gel ECG pads warm inside your jacket until you apply them, making sure of good skin to pad surface contact on the patient. Assuming access to the LP 12, I would use it initially in AED analysis mode to better determine the v-fib threshold, as it's diagnostically lots smarter than we are!! Given the weight and portability considerations, I would probably take an AED preferably to the LP 12 on a remote hypothermia call (AED's that display the cardiac rhythm are best). For any monitor you take out of the rig on a remote call, make sure you take spare batteries (cold reduces their discharge time) and enough extra hot packs to put inside the defib / monitor case to keep the computer and batteries functioning optimally. Since patient shivering can mimic v-fib, limb leads are better placed on the peripheral torso than the legs or arms, which are more prone to intense shivering responses. Absent a cardiac monitor, accurately determining functional cardiac activity on a severely hypothermic patient is a sketchy assessment at best. MEMS severe hypothermia protocols, modeled after the 'Alaska protocol' developed by Dr. Giesbrecht, (who I mentioned in the last article), include an initial 30 – 45 sec pulse check (proposed '08 guidelines), followed by 3 minutes of rescue breathing at ½ the normal ventilation rate (hyperventilation / hypocarbia can precipitate cardiac irritability), and then another 30 - 45 sec pulse check, in order to

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Hypothermia (continued, again!)

as best as possible determine the presence or absence of functional cardiac activity. Assuming it was available, running a 12 lead ECG during the 3 mins of rescue breathing would be very helpful in determining the presence or absence of functional cardiac activity. So if we determine there is no functional cardiac activity, appreciating that the heart is an irritable 'piece of glass', how does one do 'gentle' CPR compressions? The short answer, still argued about in professional research circles as we speak, is that we *generally* should not do compressions. The definitive treatment for severe hypothermia is hospital rewarming, not CPR compressions. Chest compressions in a moving litter or rescue sled, besides being ineffective, will significantly prolong extrication / evacuation times to definitive care, besides potentially precipitating v-fib in a cold but barely perfusing heart. One trial series of stacked defibrillations, (per the '08 protocol revisions), at 360 joules or the equivalent biphasic joules level is indicated if the monitor shows v-fib. If they are not shivering (<86 F core temp), discontinue defibrillation after the first shock, as at those temps the cold myocardium is generally refractory to repeated defib attempts. For greater than 86 F temps, defib as per normothermic v-fib guidelines. Anti-arrythmic meds should be deferred until the core temp is >86 F, i.e. the patient begins to shiver and / or reawake with rewarming, given the reduced to non-existent liver metabolism at <86 F core temperatures.

There are a couple of exceptions notable for ventilations-only severe hypothermia resuscitation. One would be if the incident site were so remote that evacuation time to a Trauma Center is greater than 3 hours. The 3 hour delineation mark, as determined by consensus of hypothermia research experts, is as much 'art' as it is science, as research medicine often is. Experts believe that for greater than 3 hour evacuations of severely hypothermic patients, the likelihood of survival until hospital rewarming could be initiated is extremely remote. So the MEMS protocol therefore advocates 30 mins of compressions (and ventilations at ½ normal rate), while initiating passive hypothermia packaging and warm O2 / IV rewarming methods. If there is still no spontaneous life signs (no detectable pulse or respirations) after 30 mins of rewarming and compressions + ventilations, then providers can discontinue all resuscitation efforts, with OLMC consult. Remember the protocol caveat that states the inability to contact OLMC (likely if >3 hours to definitive care) would allow the field provider standing orders to consider discontinuing resuscitation efforts. The other exception to ventilations-only resuscitation would be where both drowning and immersion hypothermia is involved, where the consensus is to treat the drowning preferentially to the hypothermia, initiating both compressions and ventilations simultaneously with rewarming methods. Taking the time to adequately assess functional cardiac activity is still warranted; with extended pulse checks (30 - 45 secs) followed by 3 mins of rescue breathing, again at ½ the normal rate, and then another 30 – 45 sec pulse check prior to initiating compressions. If there is no SROC after 30 mins, then all resuscitation efforts could be reasonably discontinued, (again with OLMC consult), as in the >3 hour evac scenario. For any protracted immersion incident, confirmed underwater 'down times' of greater than 1 hour indicate a 'recovery mode' as opposed to a 'rescue mode', thus resuscitation efforts can be reasonably deferred (ie don't start CPR) in those situations. For unconfirmed down times, 1 hour from the time of dispatch can be used as the reasonable guideline for when vs. when not to initiate resuscitation measures.

In closing, hypothermia, particularly in it severe stages, is a low frequency but potentially high acuity event. Certainly in this 'real winter' we have already seen our share of severe hypothermia on NorthStar calls, and others around the state as well. Lifeflight of Maine intercept considerations and transfer to specialty care centers like EMMC, CMMC or MMC should be a high priority, as those facilities have the cardiac-bypass and dialysis capabilities on site to best treat severe hypothermia and its secondary complications. We hope to see more ambulance friendly treatments, like derivatives of the hospital BAIR hugger blanket, as well as vest style heater / warmers coming to field EMS applications in the future. We may eventually be carrying cold saline to use for induced hypothermia, as LOM protocols already allow for, following non-traumatic cardiac arrest 'saves' in the field. "Medicine is dynamic" – so the problem in one medical situation may very well become the treatment of choice in a different situation!!

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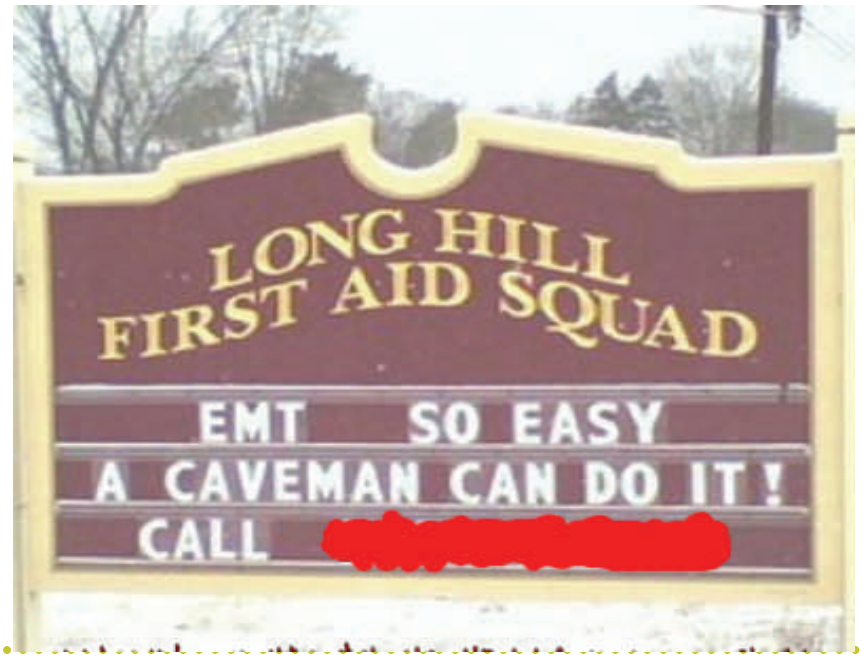
Always Tongue in Cheek...



I wonder how many applicants they got?

A re-dedication to preparedness is perhaps the best way to honor the memories of those we lost that day. —The 9/11 Commission Report , 7/22/2004