

LIGHTNING DATA CENTER MINUTES
July 11, 2014
ST. ANTHONY HOSPITAL WEST, LAKEWOOD, CO
www.stanthonyhosp.org/ldc

Monthly Quote: “Gotta enjoy every day...” “Love the people you love, because too soon, they could be gone on you.” A neighbor commenting on a man killed by lightning in Oregon. Article on the web at:

<http://www.kptv.com/story/23256963/lightning-strike-kills-man-injures-wife-in-central-oregon>

Meeting began at 11:45 AM and adjourned at 1:05 PM. Members Present: Clark, Collier, Elder, Claus, Wells, Nibbe, Wachtel, Gift, Swanson III, Adler, Gravning (Heather & Damon), Neister and Yarnell. Steve Clark moderated the meeting.

1. The LDC website was still unavailable as of press time for these minutes while Centura continues to migrate its web content. Also regarding the website, the LDC is seeking approval of the content of the “Lightning Incident Report”, a copy of which is attached to these minutes. We envision lightning strike survivors submitting their case histories via the Internet using a web portal. The data so collected would be used for research purposes after obtaining permission. Survivors sending us their reports could also request direct communication with the LDC.
2. LDC has taken a step closer to being reaccredited for CME credits. Paperwork was submitted to the Medical Staff office at St. Anthony Hospital and is currently being evaluated.
3. The motorcyclist we spoke to in May sent an e-mail with a follow-up question. He wanted our opinion on what type of strike he was hit with, e.g.: direct strike, side flash, ground current, etc. He thinks it was a direct strike because of: a) distinct entry and exit wounds (head/neck and upper thigh), b) his being the highest point around for some distance, and c) a witness saw him get hit. His only doubt about this being a direct strike, was he thought a direct strike would be invariably fatal. He also thought burns may be less common in lightning strikes because of the higher charge/current of a direct strike.

Howard Wachtel reminded us people die from lightning strikes, even from relatively weak flashes, when the strike occurs during the most vulnerable part of the heart beat cycle, which he says is over about 6% of the heartbeat cycle. Also, the magnitude of the voltage is not much of a concern if the strike happens during the vulnerable portion of the heart stroke. Phil Yarnell thought the vulnerable period was closer to 25% of the cycle. Phil suggested if the vulnerable period is one-tenth of the cycle, that it follows that one-tenth of the lightning strike victims are killed. Howard questioned the mathematical accuracy of Phil's statement.

Howard thought the more beats per minute there are, the greater the number of vulnerable periods, but the fraction of each heartbeat would remain the same.

Members present generally agreed this was most likely a direct strike. While the question of burning was not discussed, burns typically occur either from the lightning itself, or from the heating of objects in contact with the skin, which then leads to burning.

4. The survivor in the previous paragraph appears to have had a case of delayed myelopathy from the strike. Al Nibbe and Karen Wells presented two other cases from the literature where people hit by lightning had the same condition.

In the first case, a young man was thrown to the ground from his motorcycle after being struck by lightning. He presented to the hospital with burns on his head, trunk, and thighs. He was deaf, blind, and disoriented, and had some difficulty in speaking. Although the deafness appeared to be permanent, he regained his sight in a few hours. His mental state returned to normal in a few days, and after surgery on his burns, he left the hospital with only deafness and mild postural vertigo.” Over the next few weeks, his condition had deteriorated, with paraesthesiae in the legs and later, his fingers. Weakness and loss of coordination soon followed. Seven weeks after the accident, he was weaker in his right leg than his left and he had T4 sensitivity to pain and temperature. EEG was normal and there was conduction delay in the posterior columns. A CT scan of the brain and MRI scan of the spinal cord were normal. Eight weeks following the accident, he had no voluntary movement in the legs and severe distal weakness in the arms. By week 10, he showed spastic paralysis in the legs, severe flaccid weakness in the arms and urinary incontinence. He was totally deaf in the left ear and had minimal hearing in the right ear. Tests showed either cochlear or auditory nerve lesions. Four months following the accident, he developed pyelonephritis and died suddenly.

In the second case, a middle-aged man was struck by lightning while sleeping in a tent during a camping trip. After a brief period of unconsciousness, he was unable to move his arms or legs. A few hours later, he was able to move his arms, legs, and fingers somewhat. At the hospital, 2nd-degree burn marks were found on his right occiput and upper cervical skin, suggesting an entry wound. Exit wounds were found on the inferior aspect of the left chest wall. He left the hospital two days later, with the only apparent deficiency being difficulty walking. About 6 weeks following the strike, he began to notice numbness, tingling, and dyesthesia in both hands. The dyesthesia moved further into his elbows and arms, and also was noticed in his feet. Other symptoms included weakness in his hands and legs, severe shocks going through his arms, trunk, and feet. He was treated with aspirin combined with other medications. Six weeks later, he reported some improvement, with less stiffness in his hands, improved sensation, and improved grip.

5. Phil Yarnell gave a quick synopsis of the Lightning Strike & Electric Shock Survivors International's (LSESSI) annual meeting, which was held in Pigeon Forge, Tennessee in late June 2014. Three LDC members gave presentations at the conference. There were approximately 35-40 attendees.

First, Dr. Mary Ann Cooper presented “Managing Medical Issues”. She began her presentation by noting the most important components for recovery are the support of friends and family, knowledge, a doctor that will work with them, and a sense of humor. She then addressed three main topics: finding a doctor, independent medical exam (IME), and keeping records. When looking for a doctor, the prospective patient should find a physician with an interest in lightning and electrical injuries. This is important, as there is no specialized training in these areas, and thus, no board certification in these areas. Once that has been identified, the next question to ask would be if the doctor has expertise in a related field, for example, brain injury, rehabilitation, pain management, or the survivor's more immediate area of need. During this evaluation, the survivor needs to determine if the doctor will listen, work with the survivor and the survivor's family, and be willing to research and learn about germane issues. She recommended finding a doctor through friends, family, or perhaps other individuals with the same medical issues. Before seeing the doctor, Dr. Cooper recommends rounding up medical records for review, making a list of complaints. Finally, during the appointment, the patient is encouraged to ask questions and take notes. An IME should be requested as the doctor who examines the patient will have no ties to the patient or the treating doctor. Thus, the evaluation will be truly independent. Finally, patients are encouraged to keep records of medications, treatments, procedures, and tests. Also patients should keep records of bills. She also recommended patients talk with other survivors.

Ron Holle gave a presentation on Vaisala and what it does and also presented a few lightning statistics and data, based on some handouts presented at the conference. Here are some of the highlights.

- Over the last ten years, the number of lightning fatalities in the U.S. is estimated to be around 33 per year.
- No one has been killed inside a house due to a lightning strike for over 20 years, except elderly or disabled people inside a structure that caught on fire afterwards.
- The notion of lightning striking the tallest, most isolated object is not really accurate. What is on the ground has nothing to do with where lightning strikes, but it does affect how it travels once it hits.
- He emphasized the only safe places to be during a storm are either in a car with the windows rolled up or in a building with modern wiring and plumbing.

Dr. Philip Yarnell presented “The Neurologic Evaluation – What to Expect from a Visit to the Neurologist”. He noted strong similarities in both lightning-stricken and electrically shocked patients: persistent emotional and cognitive complaints, some traumatic brain injury, “whiplash concussion”, and PTSD. He postulates there may be a “final common pathway” for these complaints. Treatment includes any combination of: psychotherapy, medications (sleep, antianxiety, anti-depressant, hypnotic, and psychoactive), cognitive therapy, and group support therapy. These treatment methods are useful to both lightning and electric shock survivors.

6. A video was presented on a man that had been recording video of a storm in Arvada, Colorado. Lightning struck nearby knocking the man down. The man's daughter called 911, seeking help. The media reported the daughter said she had been advised by the 911 dispatcher not to touch the man as he might still carry an electrical charge. Howard felt this needed to be addressed as any delay in treatment could result in a worse condition for the patient. Howard also emphasized the daughter may have mis-communicated what she was told by 911.

POST-MEETING FOLLOW-UP: Carl Swanson called the Arvada 911 Fire dispatch. The dispatch supervisor reviewed the audio record of the call and found the dispatcher did advise the daughter not to touch the man, as he was conscious and alert, to avoid the risk of further injury. There was no mention of the man possibly carrying a charge. Carl was told all 911 dispatch operators work under a national protocol called “Priority Dispatch”, which has been around for 35 years. Part of the protocol involves training for calls about lightning strikes. The protocol is reviewed and modified annually as needs dictate. Carl thinks if the man had been unconscious, the operator would have walked the daughter through emergency procedures until help arrived.

7. Another video was reviewed about a man in Georgia being blown out of his shoes as a result of a lightning strike. He was holding a rake near a 55-gallon drum (a fire barrel), when he heard a loud noise and found he had been thrown some 6 feet away from where he had been standing. He had a metallic taste in his mouth and his leg was burning. He was able to capture video of his boot still smoldering. His doctor told him that people who are struck by lightning get struck again. Heather Gravning wondered if people who are outdoors and initially struck, and not critically injured, are more apt to be putting themselves at risk, rather than being “more attractive” to lightning a second time. Another point of discussion: the lightning (or ground current) was thought to have moved up the man's leg and out of his mouth. Rich Collier recalled the work by Colin Andrews in Australia where the lightning would exit sheep through the moist parts of their faces (nose, mouth, etc.). Yet another point of discussion: Al Nibbe recalled a man that had been struck and his shoe was smoking. The smoking was attributed to the sweat in the foot. Rich Collier thinks the shoes blow up due to the resistance of the sole of the shoe, rather than moisture in the footwear.

8. Carl asked why the Colorado Rockies and the San Diego Padres were still playing baseball on Monday night, June 7, 2014. A thunderstorm was in the area at the time and fans on the upper deck and the Rockpile (high, cheap, outfield seats) were told to evacuate. Yet fans on the lower decks and players on the field were not told to evacuate. Carl was especially concerned about the mixed message the Rockies were sending. Steve Clark recalled the field trip the LDC took to Coors Field three years ago. Lightning safety and systems were touched on during the trip, albeit briefly. A vivid photograph of lightning flashing behind the left-field scoreboard was in the Tuesday morning Denver Post.
9. Carl told us the swimming pool at Aurora's Utah Park has been upgraded to include a plumbing system, which allows the water to fall into the pool, so that there is not a continuous channel of water into the pool. In addition, the pool has a static charge detector that will shut down the pool's electrical system and the plumbing when the charge potential reaches a certain limit.
10. Carl wondered if smoke from distant wildfires would contribute to the lightning. Steve Clark said the smoke could be condensation nuclei, which would increase the thunderstorm potential.
11. LDC Disclaimer: These minutes do not represent official positions of the LDC or its members. They simply reflect the comments made at the meeting. Furthermore, the LDC does not implicitly or explicitly recommend or endorse any product or service. Any service or product presented in these minutes is done so for purposes of discussion and analysis. The merit (or lack thereof) is open for the consideration and review by the entire membership.
12. Next meeting: Friday, August 8, 2014 at 11:45 AM at St. Anthony Hospital West. Conference Room TBA.

Respectfully Submitted,
Steven E. Clark, Consulting Meteorologist

In Case You Missed It...Lightning Links

This is a monthly listing of periodicals, websites, and videos about lightning and allied areas as reported in the media. A headline or description is listed, followed by the link. Please note that some of the links are perishable, which means you'll need to go to the source for the information. Enjoy!

"Arvada Man Knocked Out by Lightning While Videotaping Monday Night's Storm from Inside His Garage" VIDEO on the web at: <http://www.thedenverchannel.com/news/front-range/arvada/arvada-man-knocked-out-by-lightning-while-videotaping-monday-nights-storm-from-inside-his-garage>

"7 Firefighters Struck by Lightning Battling Fire" <http://www.wcvb.com/news/seven-firefighters-struck-by-lightning-battling-fire/26768616?tru=bcF62a#ixzz36TgMzd4d>

"Lightning Strike Caught on Camera". CNN Newscast – Video shot at Yellowstone National Park. <http://www.cnn.com/video/data/2.0/video/weather/2014/06/25/dnt-kxxtv-close-lightning-strike.kxxtv.html>

"Three Hotspots for Lightning Fatalities in Colorado"
<http://denver.cbslocal.com/2014/06/22/three-hot-spots-for-lightning-fatalities-in-colorado/>

"Lightning Strike Blows Man out of His Shoes, and He Took Pictures to Prove It"
<http://kdvr.com/2014/06/23/lightning-strike-blows-man-out-of-his-shoes-and-he-took-pictures-to-prove-it/>

"Lightning Bolt Severely Damages Thornton House"
<http://kdvr.com/2014/05/22/lightning-bolt-severely-damages-thornton-house/>

Here are citations for the two articles Al Nibbe cited in his discussion.

Davidson, G.A. and J.H. Deck, 1988: Delayed Myelopathy Following Lightning Strike: A Demyelinating Process. *Acta Neuropathologica*, 77, 104-108. Abstract available at: <http://www.ncbi.nlm.nih.gov/pubmed/3239371>

Freeman, C.B, B. Goyal, and P.R. Bourque, 2004: MR Imaging Findings in Delayed Reversible Myelopathy from Lightning Strike. *American Journal of Neuroradiology*, 25, 851-853. Full article available at: <http://www.ajnr.org/content/25/5/851.full.pdf>

“Strong Storm in Denver Topples Trees, Cuts Power, Minor Flooding” Shows image of lightning behind the left-field scoreboard of Coors Field on Monday, July 7, 2014. http://www.denverpost.com/news/ci_26108178/strong-storm-denver-topples-trees-cuts-power-minor

“Two Dead in Two Days of Lightning at Rocky Mountain National Park” http://www.denverpost.com/news/ci_26138260/more-people-injured-by-lightning-rocky-mountain-national

“Lightning Kills One, Injures Seven at Rocky Mountain National Park” http://www.denverpost.com/news/ci_26133429/1-killed-7-hurt-by-lightning-rocky-mountain

“Lightning Survivor Has No Memory of Deadly Strike” http://www.denverpost.com/news/ci_26146144/lightning-survivor-has-no-memory-deadly-strike?source=rss

“Lightning Deaths at National Park Concern Visitors” http://www.denverpost.com/breakingnews/ci_26150349/lightning-deaths-at-national-park-concern-visitors?source=rss

“Hardrock Athletes Explore the Limits of Endurance” Ultrarunners survives lightning strike. <http://www.durangoherald.com/article/20140712/NEWS01/140719822/0/SEARCH/Hard-rock-athletes-explore-the-limits-of-endurance>

Medical Data

Age: _____ Sex: _____

Injuries - Immediately After the Strike

Were you treated at the scene?	Y	N	Unk
Did you receive CPR?	Y	N	Unk
Were you taken to the hospital?	Y	N	Unk

Where did the lightning enter and exit your body? _____

Were there skin burns? If so, where? _____

Were there any unusual burn patterns? If yes, describe. _____

Was there loss of consciousness? If so, how long? _____

Was there weakness in the arms and/or legs? If so, how long? _____

Was there tingling or numbness? If so, where and how long has it lasted? _____

Was there pain? If so, where and how long has it lasted? _____

Was there loss of hearing? If so, for how long? _____

Were there any broken bones? If so, which ones? _____

Post-Strike Medical Issues

Is there still loss of consciousness? If yes, please describe. _____

Is there still weakness in the arms and/or legs? If so, please describe. _____

Is there still tingling or numbness? If so, please describe. _____

Is there still pain? If so, please describe. _____

Is there still loss of hearing? If so, please describe. _____

Do you have heart problems? If so, please describe. _____

Have your eating habits/preferences changed since the strike? If so, how? _____

How do you sleep? _____

Has your vision been affected? If so, how? _____

How are you doing emotionally? _____

Some survivors say they are more sensitive to the presence of storms since they were struck. Are you? If so, how do you feel, or what do you feel, when storms are nearby? _____

Has your overall condition since the strike improved, remained the same, or declined? Please describe. _____

To conclude, would you characterize your medical treatment to date as comprehensive and effective, or, inadequate? Please explain if inadequate. _____
