

## **Anaphylaxis**

Instructor:

**Bruce Flint, O.D.**

**Ken Eakland OD**

Section:

**Pharmacology**

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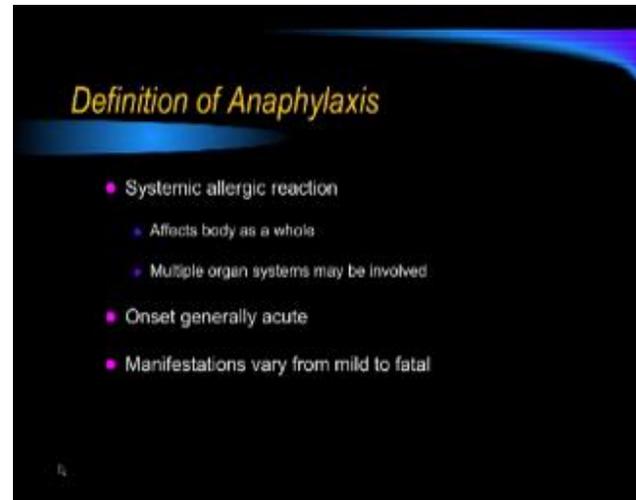
**23.00 credits - \$1800.00**

### **COURSE DESCRIPTION:**

The Advanced Ocular Therapeutics (AOT) course is a 23-hour certificate course on systemic and injectable medications used in eye care. This course currently meets the didactic requirements for optometrists in Oregon, Washington and Alaska. After viewing all 18 segments of the course, the doctor will take a written exam over the course materials. This exam will be administered through an approved proctor site (state board offices, university, or at Pacific University College of Optometry). Doctors will have 30 days to view the 18 segments of the course from the time their registrations have been processed. To register for Advanced Ocular Therapeutics (AOT), please complete the registration form and email to Jeanne Oliver at [jeanne@pacificu.edu](mailto:jeanne@pacificu.edu) or by fax at 503-352-2929. Online registration is also available (below). Upon receipt of your completed registration form and 50 percent deposit (\$900), you will receive a password to access the video courses. After you've completed the 18 segments, the balance of the registration (\$900) will be due and the written exam will be sent to your designated proctor. The exam will consist of 50 multiple choice questions. The exam is returned to Pacific University College of Optometry for scoring. A passing score is 75 percent. Course materials were recorded August 16 – 18, 2010, during the PUCO/OOPA AOT course at Pacific University in Forest Grove, Oregon. The instructors are: Ken Eakland, OD (Course Master), Bruce Flint, OD, Blair Lonsberry, MS, OD, MEd, Dennis Smith, OD, MS, Jeffrey Urness, OD, Lesley Walls, OD, MD. Washington requires an additional eight hours of supervised clinical workshop and four hours of injections workshop for licensure. Please contact Optometric Physicians of Washington for information on upcoming workshops. Alaska requires an additional 7 hour injections workshop.

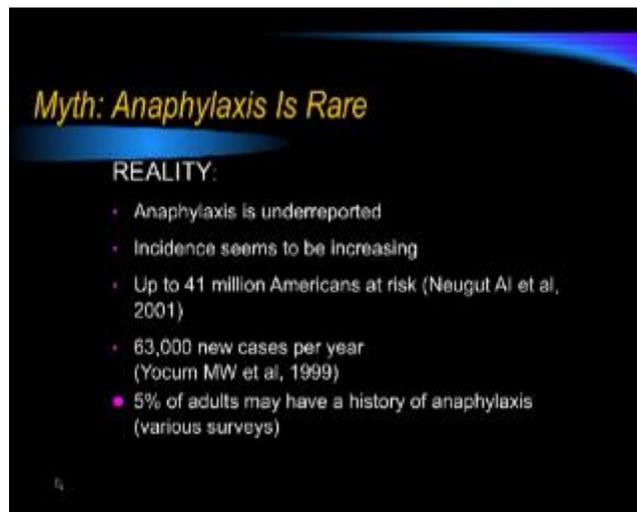
By the way this is three different subjects tied into one. The main one we're going to be talking about [Anaphylaxis] can be a little boring, but I take responsibility for that. I created it, and it should be a good one. It should be, it's not, but it should be.

What is Anaphylaxis? It's a systemic allergic reaction. That's it. So when we have an allergy that affects the whole body or multiple organs at a time, that's anaphylaxis. Does that mean you're going to die from it? No, that's not the definition. The definition is the body is being involved. Usually it's an acute onset, it hits hard. It can be fairly mild and it can be fatal. Of course that's the reason we all get worried about it. But mild is a possibility, but it still hits multiple organ systems.



**Definition of Anaphylaxis**

- Systemic allergic reaction
  - Affects body as a whole
  - Multiple organ systems may be involved
- Onset generally acute
- Manifestations vary from mild to fatal



**Myth: Anaphylaxis Is Rare**

**REALITY:**

- Anaphylaxis is underreported
- Incidence seems to be increasing
- Up to 41 million Americans at risk (Neugut AI et al, 2001)
- 63,000 new cases per year (Yocum MW et al, 1999)
- 5% of adults may have a history of anaphylaxis (various surveys)

There's a myth that anaphylaxis is quite rare. That's not true. Anaphylaxis is grossly underreported because if they're not close to death nobody worries about it. The incidence does seem to be increasing, there are lots of different reasons out there. A lot of people will talk about maybe natamycin being in bread products. It does seem to be something with diet or exposure that we have that's causing the increase to come on. We'll go into some specific examples of that.

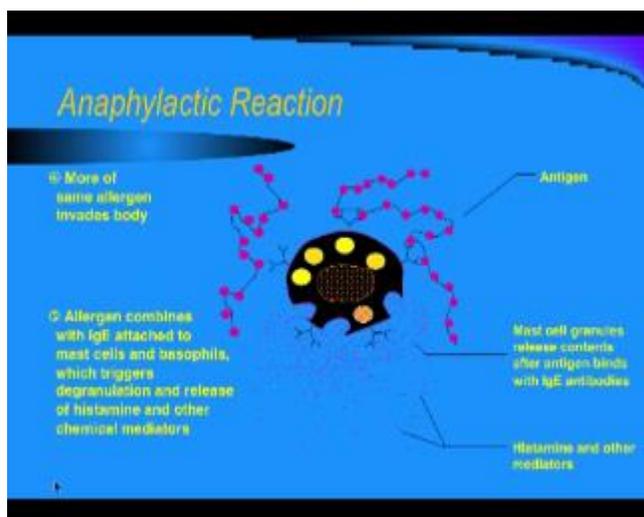
Up to forty-one million Americans are at risk. That's going to put them in your office. Sixty-three thousand new cases per

year. This is the one that killed me, I just thought "Wow!". Five percent of our adults may have had a history of anaphylaxis. So five percent of your adult population coming into your office may have already had some anaphylactic reaction. That doesn't mean it was severe, and it certainly means they didn't die from it since they're in your office. No laughter there. That would be a dying practice right?

Pathogenesis of anaphylaxis. How does it happen? Well the one that we understand the most is Type I hypersensitivity and that is immunoglobulin-mediated. There has to be a sensitization stage, so you have to get exposed to it before you can have the anaphylactic reaction. Then you have the anaphylactic response to it.

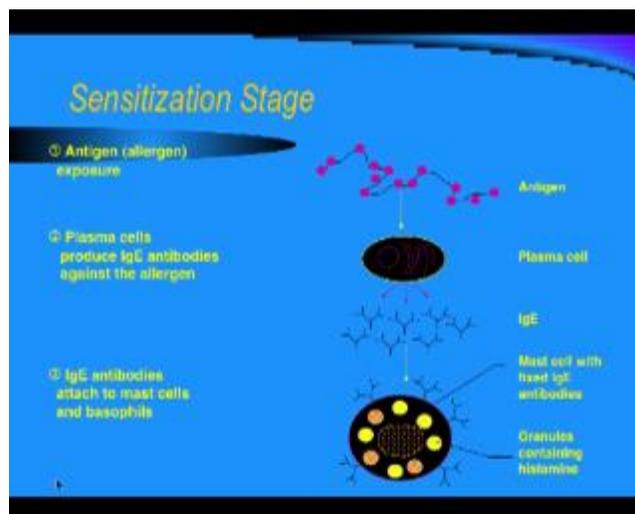
### Pathogenesis of Anaphylaxis

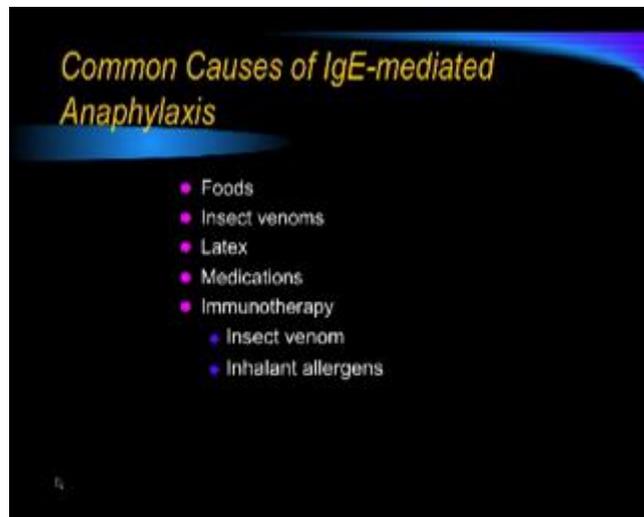
- IgE-mediated (Type I hypersensitivity)
- Sensitization stage
- Subsequent anaphylactic response



How does this work? Well, you have an antigen exposure. This will represent the antigen. It comes down and gets into the plasma cell. The plasma cells will produce immunoglobulin E antibodies that are supposed to go against that and the plasma cell lets them be released. They go and they attach to mast cells and basophils. They attach out to the sides here, and then there's granules that are developed that has histamine that go out and kill or help take care of anything that invades.

So, we have more of the antigen exposed it comes up to these mast cells and attach on to these, and immediately that cell wants to discharge all of the histamine so it can go out along with some other mediators. Once that hits on there it triggers this cell to release its contents to go out and hit. So that's how it happens and it can happen extremely quickly.

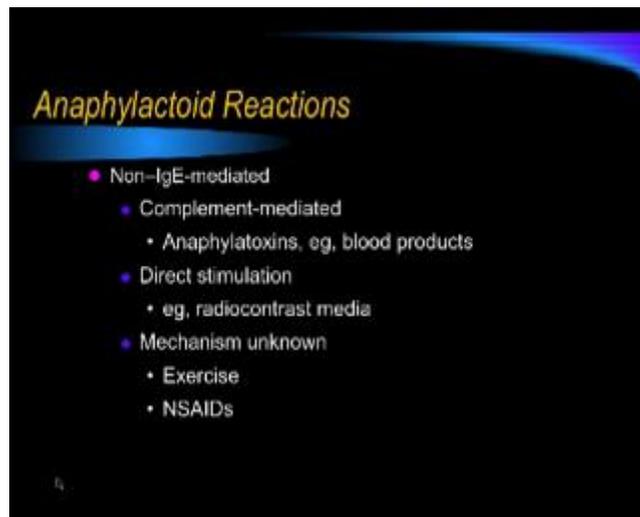




What are some of the common causes? Foods. We all know that, we all saw Misses Doubtfire, right? I can't remember what Robin Williams put on that food, but Pierce Brosnan took a little bit and his mouth swelled up and he can't breath and he was gonna die. We'll show you why in a second. Insect venoms. Well, bee stings is one of the big ones that people get worried about. Latex gloves. That's a big, big one. Not just gloves, but all latex and that's one that's growing a lot. Certain medications can cause it. We know that when we order an FA, the fluorescein may cause an anaphylactic shock. It's not highly likely, but certainly it can. Usually with medication,

again if there's a shell food allergy, they have a higher risk of having an anaphylactic shock from fluorescein. Immunotherapy is where they're getting from the doctor, injections to be able to work against allergies or against the bees. They can build up their own immune system by taking these minute quantities to begin with and over a series of weeks/months they can become more tolerant because their bodies are able to accept it better.

This is the other type, Non-IgE-mediated. It can be complement-mediated, which means you're getting it from some other type of blood product, from anaphylatoxins. There can be direct stimulation of cells. That's radiocontrast media, again we're going into like the fluorescein and other things maybe you'll do for radiology. This is one we just don't know about. In some people non-steroidals can cause a reaction and we don't know why. Exercise in some people can cause anaphylaxis. We don't know the mechanism we just know it can happen. So those are the other reactions we can have that are anaphylactic.



A myth, that the cause of anaphylaxis is always obvious. Well, if it was always obvious we'd know what it was, and we'd know how to be able to avoid it and treat it. The fact is most of the time we don't know what they got exposed to, or how. It was a big deal with people being allergic to foods that brought about the labeling, like getting the natamycin on food products. Rightly so, if you're producing the product, the ingredients should be there in case the person has an allergy to it. But we eat a lot of things that we don't know what exactly is in there. I'm trying

## Myth: The Cause of Anaphylaxis is Always Obvious

### REALITY:

- Idiopathic anaphylaxis is common
- Triggers may be hidden
  - Foods
  - Latex
- Patient may not recall details of exposure, clinical course

to think what they used to put on salad, monosodium glutamate (MSG), and people react to it. They used to do that in the food services all the time, but they didn't tell you. There were a fair number of people that are allergic to it. We're talking about foods, but latex. People that have a latex allergy, they'll start figuring this out but a lot of us wouldn't think about latex being in our underwear. People would have a rash from the waistband. I know there can be latex in socks. It helps keep them stretchy and rebound. Frankly when you go into anaphylaxis you don't remember the details, you forget what you were doing. Well, that happens with anything

that is high stress and you panic.

The manifestations of the skin, as I've talked about with having latex where it touches the person will have this contact reaction to it. You have the upper respiratory and lower respirator. Upper meaning the mouth and ear, and lower is down below into the lungs. Gastrointestinal tract and cardiovascular system are just different organs that are there. Anything that is causing the body to react in either way, it can shut it down and it just doesn't work.

*(series of incomplete slides)* Does it show in your handout? *Yes.* Ok, I think I played around with the background and because it's printed in black it doesn't show up. I thought I saved it but I put it on the other one. They lost my material from yesterday and I gave them a new one and I didn't save it on the new one. Could I look at somebody's hand out for just a second? Ok, it's the same thing as what I was saying.

The gastrointestinal of course you can have the oral, the cramps, the diarrhea, nausea, we already discussed that. On the cardiovascular, what is interesting is with anaphylaxis it can do either bradycardia or tachycardia. So either the speeding up of the heart, or the slowing down of the heart. Of course we worry about hypotension, shock, arrhythmia. On these clinical manifestations I want to make sure we cover some of the big ones. It does not say the percentage here, that's what I don't like. Urticaria and angioedema is about eighty-five percent, it's in the eighty percentile, and that's a big one. Upper airway edema. That's the reason you know they're going in. Their skin will turn very flush. The running nose is a very big deal, not that they suffer from it, but you will just about always have that, and headaches. All of those through there with the bottom one being seizure are big deals. They all kind of lead up to the seizure, where they'll just go under.

## Myth: Anaphylaxis Always Presents with Cutaneous Manifestations

### REALITY:

- Approximately 10%-20% of anaphylaxis cases will not present with hives or other cutaneous manifestations
- 80% of food-induced, fatal anaphylaxis cases were not associated with cutaneous signs or symptoms

Another myth, anaphylaxis always presents with cutaneous manifestations. It is common, but not always. Ten to twenty percent of them will not present with hives or other cutaneous manifestations. Eighty percent of food-induced, fatal anaphylaxis cases were not associated with cutaneous signs or symptoms. Well, I don't know why it's eighty percent. Maybe it's because they didn't have those [cutaneous] signs, that people didn't get the treatment they were supposed to. I don't know. But that horrible figure, eighty percent of fatal cases of food-induced, were not associated with cutaneous. Let's see why.

Before we go into that we have to talk about how this works, because it affects how we're going to treat it. For anaphylaxis there's a uniphasic, there's a biphasic. Uniphasic means it hits and then it's gone. Biphasic, you can have a reoccurrence after you have that initial jolt. And that reoccurrence can happen up to eight hours later. So just because you get somebody through one of these reactions doesn't mean you're out of the woods. Protracted, you may not have the reaction for hours to days. Now days is not as common by any means.

## Clinical Course of Anaphylaxis

- Uniphasic
- Biphasic
  - Recurrence up to 8 hours later
- Protracted
  - Hours to days

## Myth: Prior Episodes Predict Future Reactions

### REALITY:

- No predictable pattern
- Severity depends on:
  - Sensitivity of the individual
  - Dose of the allergen

There's also a myth there that prior episodes will predict the future reaction. For some reason that's not true. There is no predictable pattern on it. You may have a horrible reaction, then a light, then a light, then a horrible one. It's not predictable that way. Now this is different than what I was taught, severity depends on dose of the allergen. It makes sense doesn't it? Depending on how much they're exposed to. But that was a myth that I was taught that it didn't really matter how much there was. There could be just trace amounts and they would still react. Well, that's true they can

still react, but it won't be as complete a reaction as if we had a higher dose of the allergen and, of course, sensitivity of the individual.

It is estimated that five hundred to a thousand deaths happen annually from anaphylaxis. What are the risk factors? Remember, we did this in lab.

Epinephrine. For anaphylaxis you give epinephrine immediately. It's in that self-contained injector. A person can do it to themselves. You can do it to them. I've heard people say "Wouldn't it be quicker to give it to someone by IV?" Well, yes if their arm was already set up with an IV, and you had it ready to inject it right then it would be quicker. But by the time you got a line in and were able to draw it up and inject it you've already lost precious time.

As you inject it from the epi-pen directly into the muscle, it starts reacting very quickly, it doesn't take that much time. So no, I wouldn't put a line in just to give them epinephrine. Being on a beta-blocker or with ACE inhibitor therapy, either one of those can cause more of a risk of having an anaphylactic fatality. Asthma, cardiac disease, rapid IV allergen. So, if something goes in intravenously, it makes sense that they would react quicker to it wouldn't it? So if they get something in a bolus being injected into them, then they have a higher risk of having a fatality from it.

**Anaphylaxis Fatalities**

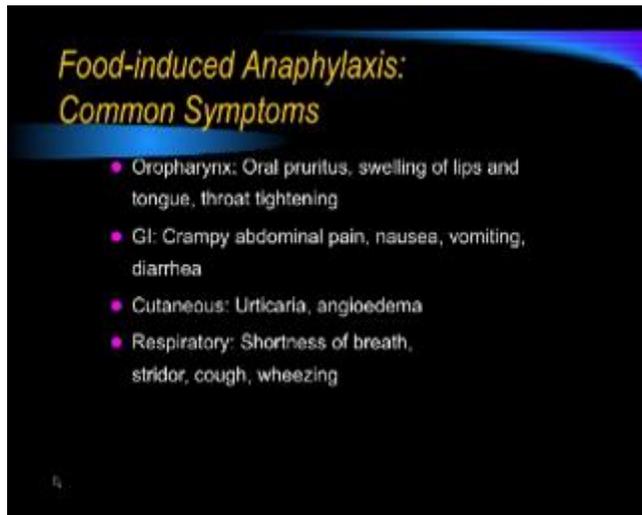
- Estimated 500–1000 deaths annually
- Risk factors:
  - Failure to administer epinephrine immediately
  - Beta blocker, ?ACEI therapy
  - Asthma
  - Cardiac disease
  - Rapid IV allergen

**Food-induced Anaphylaxis:  
Incidence**

- 35%–55% of anaphylaxis is caused by food allergy
- 6%–8% of children have food allergy
- 1%–2% of adults have food allergy
- Incidence is increasing
- Accidental food exposures are common and unpredictable

Food-induced anaphylaxis. Thirty-five to fifty-five percent of anaphylaxis is caused by food allergy, certainly the biggest category of causing anaphylaxis. Six to eight percent of children have a food allergy. Remember when I said five percent of the adults probably had something? While six to eight percent of children have a food allergy, only one to two percent of adults have a food allergy. Well that either means they get killed off as a child or they get over it, right? Well, the fact is most of them get over it, but this instance is increasing. Accidental food exposure is common, it's very common. They don't know what was in that food.

Ok, what are some of these? The children that have these types of allergies- peanuts, tree nuts, shellfish, fish- those tend to be life-long. So the adults are going to have that as well as the children. Children kind of outgrow a lot of these: milk, egg, soy, and wheat. So they can have those, and there is a high hope that they can get over that as they develop.



Alright, what's going to hit the upper respiratory here? Oral pruritus. Who knows what pruritus is? *Itchiness*. We want to be able to scratch around our lips and throat, it drives you nuts. We also have swelling. That can involve the lips, tongue, the throat swells up. The GI tract cramps up because there is swelling and everything's reacting. As that happens, that's going to kick in that stimuli that goes up to the nausea and vomiting center. The urticarial is a fancy word for a welt, those red spots there. Angioedema. Shortness of breath. Some of these terms, when I first heard them I go, "what does

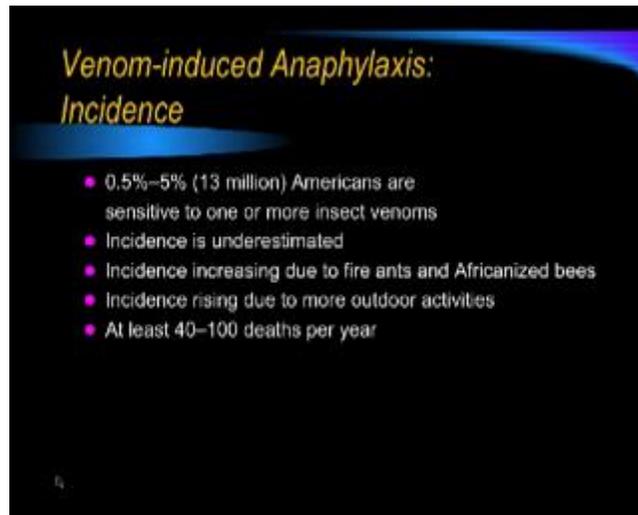
stridor mean, is that taking big strides?" Stridor is kind of that high pitched sound that you hear. Coughing, of course, and wheezing. The wheezing is not that high pitched sound, that's what they're calling the stridor.



As I said I had a fully paid vacation, thanks to Uncle Sam for a year and a half. This is over at Camp Anaconda, the largest base in Iraq. Before I got there, about a month, there was a mortar that hit that part of the cement and you can see all the pits there. This is a road block and there's just hundreds and hundreds of small little holes there. And that's just a plastic container that they fill with water and works very well as a barricade. I have this there for a couple

reasons-you gotta to think, you gotta have protection. This is full body armor here-it's got a ceramic plate in there, it's got a ballistic vest, you've got a Kevlar helmet. So, you're trying to protect your vitals. If you have that, these won't penetrate there. It can sure mess up everything else, but your vitals are more protected there. So, what does that have to do with it? I wanted to see if you were awake. I'll pull that back in in a minute.

Venom-induced anaphylaxis. Well the incidence is still fairly high, between a half to five percent of Americans are sensitive to some type of insect venom. Incidence is underestimated. It's increasing, part of that is due to the Africanized bees. By the way, that's a serious problem we have with bees. They're declining in number and they are so important for pollination. Do you know how come we have Africanized bees? Because somebody brought them from Africa into South American and tried to make them stronger bee, so they can withstand and pollinate more. As such they have these horrendous bees that want to attack in force, even though they may die from giving you a stinger. Most honey bees will only sting when they feel threatened. Also, an increase in fire ants, too. We also have a lot more outdoor activities, so that exposes us more too.



**Venom-induced Anaphylaxis:  
Incidence**

- 0.5%–5% (13 million) Americans are sensitive to one or more insect venoms
- Incidence is underestimated
- Incidence increasing due to fire ants and Africanized bees
- Incidence rising due to more outdoor activities
- At least 40–100 deaths per year

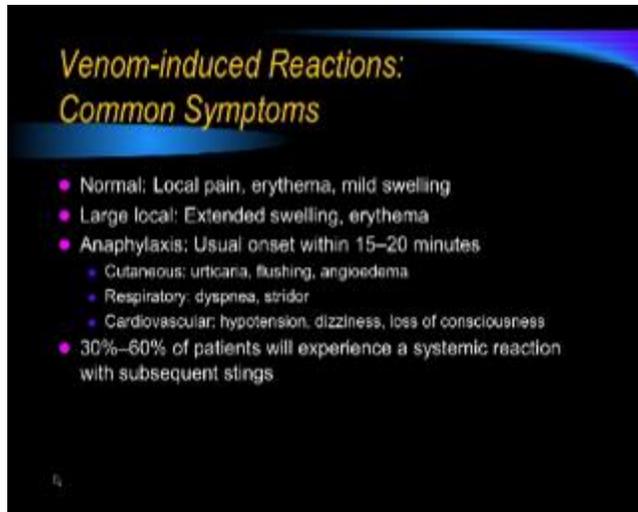
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This is my son. He just graduated, so this is a few years ago. We live just outside of city limits, so we're able to raise animals. For fair projects he would raise lambs. So he's washing this lamb up. Now the reason I have this picture there is because he's scared of bees, he still is. He got stung and he swelled up pretty big. My comment is, I'm a dad and he's a boy, "Buck up, buttercup." The next time it happened, I wasn't around and my wife took him to the doctor and he goes, "Ah, he's having a real reaction here. This could turn into anaphylactic shock, you need to have an epi-pen." Again, dad wasn't too concerned about it but you can't just go,

"se la vie." These are serious things and we need to make sure our patients are taken care of.

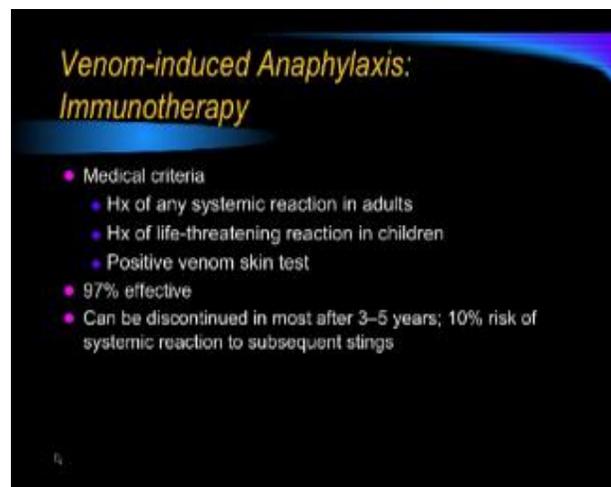
Venom-induced reactions. There's pain when that happens. There can be a fair amount of swelling, it doesn't have to be extreme. It will almost always turn red, because the body is trying to react to it. It doesn't like it. Then it becomes more large and, if that's true, it's getting more and more swelling to it. Usually the anaphylaxis will have an onset within fifteen to twenty minutes. Now, I already told you that you can have a variation in how a person reacts. So if a person gets stung, there's a little welt right there but nothing else is happening, the chances are it probably won't react to much. But if they start to get more and more swelling, what should we do? If you have an epi-pen, and there's a known reaction to it, then you ought to be using it. A cutaneous response is again that red raised lesion, flushing, angioedema, respiratory problems, cardiovascular. Thirty to sixty percent with have a systemic reaction without subsequent stings. So just that one sting and they'll go ahead and have that.



Now I put some pictures in here. These are the little welts I was talking about. That's very common with a reaction, hives. There's one of the torso. You can see why they're having difficulty breathing with the swelling inside the mouth there. Look at how that mouth is being swollen, the tongue is swollen. Everything back here—all of a sudden you're trying to breathe through a straw. Of course they're having a problem. Is that quite a bit of swelling? Can you see why that might be real itchy? I mean there's such a reaction going on there. Most of us, the only thing we've really experience with allergies is maybe we

rub our eyes. And of course that always does a lot of good right? We release a lot more histamine, it just keeps swelling, and it's a vicious circle. This is a pretty extreme case, but look at those lips, cheeks, eyelids. I mean, this person is really having a severe reaction. She opens that mouth and it's probably going to look like that.

Again, for venom-induced. You can have therapy to help the body not react to it as vehemently. So if there's any systemic reaction in an adult, then that's a reason to start this immunotherapy. Or if there's any life threatening reaction in a child, that's a reason to start. They can do the venom skin test. Of course, they usually do that on the back because



if they did it other places, it would look horrible. They usually make some sort of graph or grid, and they do that in different parts and different venoms to see what your reaction is to it. Immunotherapy is effective ninety-seven percent of the time. That's pretty effective, isn't it? So for venom it can be very good, most of them can be discontinued in three to five years. All of a sudden the risk drops down to ten percent to subsequent stings.

Risk of anaphylaxis. Ten to fifteen percent will still experience a systemic reaction during the early weeks of treatment, usually within twenty minutes of having the shot. So, if you go into the doctor's office and they give you the shot, they're going to have you wait around for thirty minutes before you leave. Patients that are more at risk are ones that have asthma, prior reactions, beta blockers, or the ACE inhibitor therapy. We already talked about that. That's true for all anaphylaxis. By the way, when I start giving injections in the arm. I had a receptionist who was working for me who

was on immunotherapy. She came to me and says, "My doctor says to just have you give it to me. Would you be willing to do that for me?" I says, "I would love to do that for you, but guess what? My state licensure won't let me give a shot." She goes "Really? He said you could." I told her, I can do it under his licensure. So if he wants to say he's authorizing me to give injections under his licensure, I'm happy to give them. It's not a big deal, it's just subcuticle. So she called him up because he lived in another town, and said "He says his licensure doesn't cover it, but he's willing to under your licensure." He laughed, and said "Go ahead and do it." Well, the important thing is we don't do it at the end of the day. We do it at the first of the day because if she's going to have a reaction to it I want her immediately around me.

**Venom-induced Anaphylaxis: Immunotherapy**

- Risk of anaphylaxis
  - 10%-15% of patients experience systemic reactions during early weeks of treatment
  - Sx generally occur within 20 minutes
  - Patients at risk: asthma, prior reactions, beta blocker or ACEI therapy

**Latex-induced Anaphylaxis: Incidence**

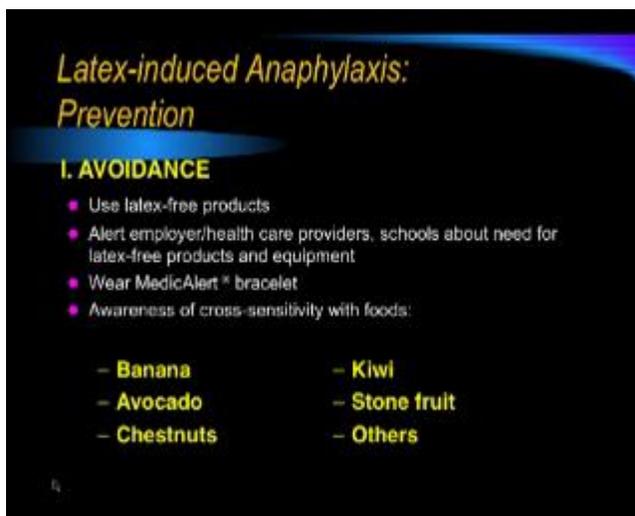
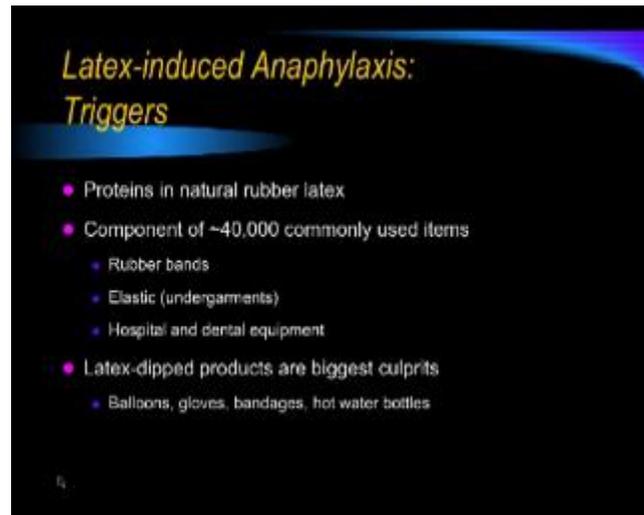
- 1%–6% of US population (up to 16 million) affected
- 8%–17% incidence among health care workers
- Repeated exposure leads to a higher risk
- Incidence has increased since mid 1980s
  - Latex gloves, especially powdered gloves

Latex-induced. One to six percent of the US population is allergic to latex. Notice the variation here: eight to seventeen percent of health care workers. Why? Because repeated exposure leads to higher risk. So who has exposure to latex more, and why? Well, healthcare is always gloving up with latex. Now I oughta tell you, I like latex gloves. I don't like the vinyl ones. I mean, who can blow those up into a nice rooster with vinyl? I had a dental friend, with every kid that came in, he'd grab one of those and put it over his head. Pull it down over and blow into it, have the comb sticking up and ask, "How does this look?" The kids loved it.

They will really stretch. Latex are very thin, they have a nice feel to them. That's the reason latex was used so much, but a lot of the patients will be allergic to it. It will put you at higher exposure to becoming allergic to it, especially powdered gloves. So if you are going to use the latex gloves, don't use the powdered ones. We don't know why, but for some reason the powder from that when it gets on your skin has a higher incidence of becoming allergic to it.

If it is latex-induced the proteins in natural rubber latex is what you're allergic to. It's the proteins. There are over 40,000 commonly used items, rubber bands, elastic like in the undergarments, hospital and dental equipment. I mean latex, they used to have those rubber dams. The reason they do is because they go, "We shouldn't have stuff like amalgam going down into the body." There are some that believe that amalgam in the teeth is what gives you lead poisoning and causes all sorts of different problems. It hasn't been proven, but certainly in the removal of it you have more risk than having it in the body itself. So the vapors

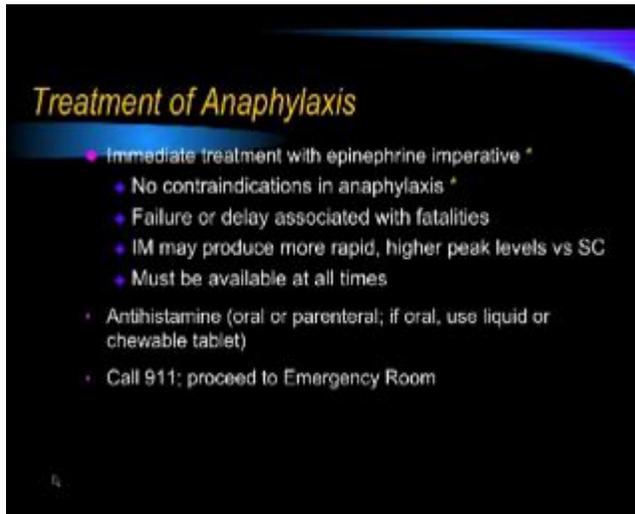
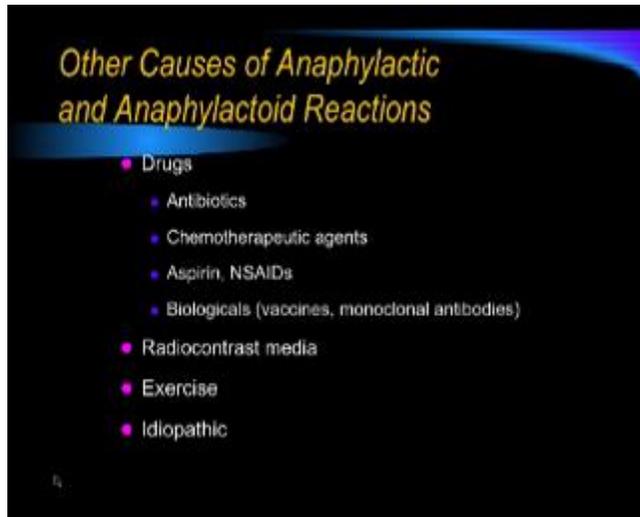
has been linked with that. This became a very common thing to be done, some still use it. But you're exposed to [latex] more, so if you're allergic to it that takes that away. Latex dipped products-balloons, gloves, bandages, hot water bottles. So things that we might not even think of we get exposed to and, anyway it's on the rise.



Well the best thing to protect against that is avoidance. Same thing's true with insect bites right? You never get bit by an insect or stung by an insect; you're not going to have a reaction to it. So if you can avoid it, that's a wonderful thing. But you need to alert the different offices you go into, and we hope that patients, if they're allergic to latex, hopefully they tell us. By the way most people that have a severe reaction will tell you, because they don't want you using latex gloves. They should be encouraged to wear a medic alert bracelet that says that, and when they are allergic to latex they tend to have a lot of cross sensitivity to certain foods. A lot

of the stone fruits. That just means they have a nut inside, like peaches, things like that. Banana, avocado, chestnuts, kiwi, those are the more common ones there that they can be cross sensitive with.

Other causes of anaphylactic and anaphylactoid reactions. We're just going to throw these in together here. We know that you can have an antibiotic reaction, chemotherapy, aspirin and NSAIDs. Even though there's a minority that can have this type of reaction, it can happen. Other things such as vaccines, antibodies that are injected into the body. You know every time you get your flu, supposedly nobody is going to have a reaction, but it can always happen. Radiocontrast media, exercise, idiopathic.



Let's get down to some of these things we really need to be keeping close tabs on. Immediate treatment with epinephrine is imperative. No contraindications in anaphylaxis. We went over this in the lab section of it, but epinephrine is the treatment for anaphylaxis. As we said the other day if a person's going to die, what's the bad part of giving them epinephrine? Are they going to die? Then that's the worst that can happen. So epinephrine is what you give them, there's no contraindications. So it doesn't matter if they're allergic to anything else. "I can't take epinephrine, I react to it." Ok. So during anaphylaxis, it doesn't matter if they've had a

past history of reaction to epinephrine. That reaction will take if they live. If you don't give it or delay too long with it, it can cause death. IM is probably quicker than subcutaneous. Again, if you can give it as a bolus in an IV, it would probably be quicker still but it takes too long to get there. If somebody does have this history, it's a good idea to carry an Epipen with them. Now in your office, I suggest you have an Epipen. They're not that expensive. You keep a fire extinguisher in there, don't you? Are you expecting to have a fire? With a fire you can run out the door. If you run out the door while someone is having an anaphylaxis, you're going to be in trouble. We do use antihistamines. Now those can be given a different way, but usually orally. You don't necessarily want to have them swallow a pill or capsule, because they may not be able to swallow it too well. And, remember the stomach can be reactant where it's not processing either. So if you use a liquid or a chewable, it gets absorbed much quicker. Time is of the essence. Call 911. Get them to the emergency room. It's like an AED. If you're going to use a defibrillator, time is of the essence. If you're going to put that on there, for every minute you delay ten percent more will die. The epinephrine, if they're starting to do it, the epi comes

immediately and then you dial 911. It's kind of the reverse of a lot of things, where it's always 911 first.

I think everybody went through it in the lab, but I'm going through this anyway. You have to remove the cap. If the cap's not removed, it doesn't hit and inject. So the cap comes off. Firm action, right into the thigh and you hold it there. Now if you hit and bring it out, it continues to come out of there and it didn't get in you.



**Myth:**  
*Epinephrine is Dangerous*

**REALITY:**

- Risks of anaphylaxis far outweigh risks of epinephrine administration \*
- Minimal cardiovascular effects in children (Simons et al, 1998)
- Caution when administering epinephrine in elderly patients or those with known cardiac disease

Ok, there is a myth that epinephrine is dangerous. The risk of anaphylaxis way outweighs those risks. Don't get caught with the myth that epinephrine is too dangerous for some people. It really has minimal cardiovascular effect in children. So the question was what if all you have is an adult and it's a child? What are you going to do, kill them? They're already dying. It's like CPR. Caution when administering epinephrine in elderly patients or those with known cardiac diseases. Yes. Again, there's no contraindication when they're dying. But we do need to be a little more aware.

Additional measures may include corticosteroids. That makes sense. Their airway is closing down, so supplemental oxygen. You can get IV fluids in with vasopressor therapy. You're getting fluids in, you're getting the vasopressor, all help. Repeat the epinephrine if within ten to fifteen minutes you are not getting any kinds of results with that. Repeat the antihistamine or H2 blocker. They need to be observed for a minimum of four hours. They need to have follow-up care and provide a prescription for the EpiPen for them. You gotta educate.

**Treatment of Anaphylaxis**

- Additional measures may include
  - Corticosteroids
  - Supplemental O<sub>2</sub>; airway maintenance
  - IV fluids, vasopressor therapy
  - Repeat epinephrine if Sx persist or increase after 10-15 minutes
  - Repeat antihistamine ± H<sub>2</sub> blocker if Sx persist
  - Observe for a minimum 4 hours
  - Arrange follow-up care, provide EpiPen® Rx and education

## Myth: Anaphylaxis is Reported

### REALITY:

- Most individuals do not inform their personal physician of an anaphylactic reaction either at the time of the reaction or during routine exams

Myth: anaphylaxis is reported. I already told you, it's underreported. Most individuals do not inform their personal physician of an anaphylactic reaction either at the time or even after. They just don't relay that it's in their history.

Atopy. Ten percent of children with asthma have food allergies. However, thirty to forty percent of children with atopic dermatitis have food allergies. Wow, three to four times as many. Seventy-five percent that have had a previous reaction are going to have another one. Fifty-seven percent are going to have three or more. Good reason for an Rx for an EpiPen, isn't it?

## Risk Management for Anaphylaxis

### • SCREEN

- Atopy
  - 10% of children with asthma have food allergy
  - 30%–40% of children with atopic dermatitis have food allergy
- Previous reactions
  - 75% will have more than one
  - 57% will have three or more

## Myth: Anaphylaxis is Easy to Avoid If You Know What You are Allergic To

### REALITY:

- Most cases of anaphylaxis are due to accidental exposures

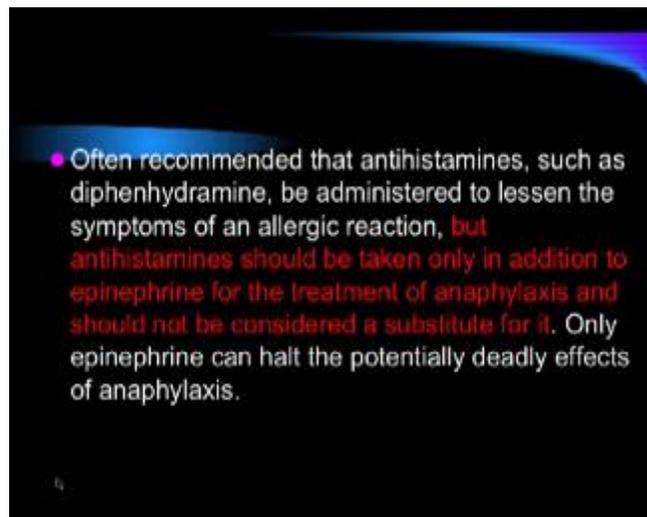
Myth: anaphylaxis is easy to avoid if you know what you're allergic to. Not true. Most cases are due to accidental exposure. Let's go back to epinephrine. Does it sound like we're emphasizing the same thing over and over? Epinephrine is the most important medication for the treatment of anaphylaxis. It is injected under the skin or into a muscle. It works rapidly to make the blood vessels contract. It keeps it from becoming more swollen because it prevents leakage of more fluid. It's relaxing the airways. It's helping the individual breathe easier. Relieves the cramping in the stomach. It even helps with the

itching and the hives. So epinephrine is a great product. Should we give them antihistamine first? No. It's the most important, epinephrine.

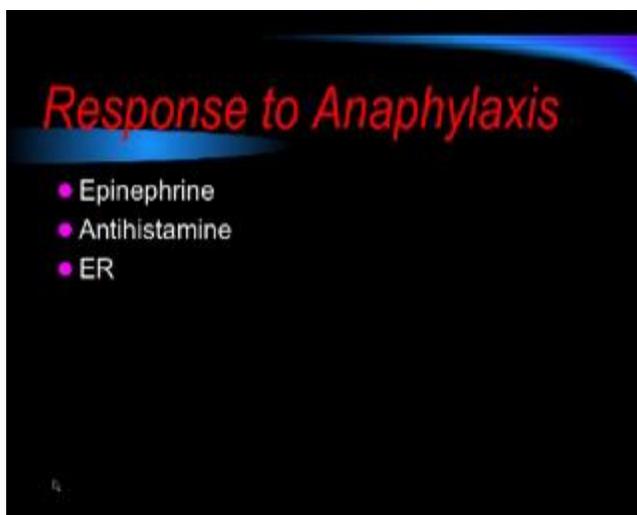
Now we're getting into more of this. I think you have that treatment. We got them stabilized. Twenty-five percent of those people, even though they're stabilized, will experience a recurrence, that biphasic, in the hours following. So are we done once they're stabilized? No. They still have to go to the ER.

What does epinephrine do that's a side effect we don't like? The side effects of epinephrine may include palpitations, tachycardia, sweating, nausea, vomiting, respiratory difficulty, cardiac arrhythmias. All those things have to do with epinephrine. Now on the other hand sometimes when they can't bring a patient around, they'll inject epinephrine into the heart. Are we going to do that? Last time I checked, the heart wasn't part of the eye. So, no, we're not going to do that, but we can do the Epipens for the others.

Alright, we talked about antihistamines. They do not replace epinephrine, but they can be taken in addition. And I think it should be. Driving this home again and again, to the ER even after your treatment. Other treatments can be given, most of us don't carry oxygen. But, you know getting plugged in for a little fill up is always good. It's hard on the body when it has this and just to have an IV and refill our fluids. It can help out that blood pressure tremendously. You can give a lot of saline and it immediately fills up all the vessels more and helps alleviate the passing out effects.



- Often recommended that antihistamines, such as diphenhydramine, be administered to lessen the symptoms of an allergic reaction, **but antihistamines should be taken only in addition to epinephrine for the treatment of anaphylaxis and should not be considered a substitute for it.** Only epinephrine can halt the potentially deadly effects of anaphylaxis.



## Response to Anaphylaxis

- Epinephrine
- Antihistamine
- ER

Three steps and they should be in that order. Epinephrine, then you call 911. Antihistamine and then follow up to the ER. If you're prepared you can save a life.

Another view from Iraq, same base. This was not a mortar. This was a rocket that came. As you can see there was pretty extensive damage even on this building. The reason there's so much water there was a big water container, like one of those mini grain bins, there was a water container off to the side there. It destroyed it and water flooded everywhere. This is about two to three days later. And this happened to be the base exchange store. So it was just outfitted that way. So this was one of Saddam's air force bases and that was a building already there. There's some sad things with this particular one. This one caused the most injuries and fatalities of any that hit at Anaconda while I was there. The biggest problem there was when there was a threat there is a siren that goes off, everybody is supposed to go into a hardened facility. This would be considered a hardened facility. There were a lot of tents and things like that, and that was not hardened unless it was sandbagged everywhere. And that still wasn't considered because it didn't have the roof. So everybody was supposed to get in their body armor and get inside a hardened facility. The problem was like most things, it's terrible to say, most things that are government reacts after the fact.



So we'd get the mortars and the siren would go off. I remember this one time the siren went off and our troop medical clinic wasn't too far from this facility. So we're all supposed to be inside the hardened facility with all our gear on. Then there was the big boom about fifteen minutes later, which was the rocket. We went running over there and there were twenty-seven injuries from this and three fatalities. They were all standing out the PX. Now I'm sure someone thought "This is ridiculous, I want to smoke, I want to talk," they went outside and didn't have their armor on. At this particular time, there's times on base we had to have our full body armor on

wherever we walked when we were on high alert. When we weren't then we didn't have to and we weren't at that alert at this point.

That was really a rough one for me because one of the soldiers that I worked on he ended up dying. And I thought how terrible this was that with some smarts and following the design we could have avoided these tragedies. Now I want you to think about that in anaphylactics and everything else we've talked about in this course. Forethought and following the plan can save lives. Now when you're in the middle of an emergency our brain kind of goes into gaga. That's not just OD's. In fact the one prior to this, which was a mortar which wasn't too far from this one I responded to. There was an MD and he was a newbie, and the reason I knew he was a newbie was because he had his Captain's bars and they come out as Captains. He was there, a soldier was injured, and just because of some of the background I had I felt like I was able to respond as well as most of the people on post. They're carrying this soldier who is bleeding profusely from his leg and upper thigh. I said "Where are you taking him? Get pressure on his leg!" "We're taking him to the TMC where we're set up to treat better." And he has his Captain's bars here, and his caduceus on the other side. "Ok, I'll leave it up to you." I went over and was helping some other soldiers, we had two EMTs that were working on this soldier that got some shrapnel in the back of the neck. Doing a beautiful job of holding the head still, getting the C-collar on.

Even though it didn't look like it was a serious injury they were not going to take that chance. Wonderful. They were doing great, I didn't step in. I turn around and look over at the soldier they were carrying, they carried him for about another thirty yards and set him down and put pressure on him. I returned there and I looked and they cut away the pants, put the pressure on there, they were doing pretty good there. I look down and where there was a piece of shrapnel that went through the back of the boot and came out off to the side, they took the boot off. Now these are the things that are stupid. We have an MD there that was fresh, he wasn't used to this, he's used to being in a hospital. He didn't think. You do the same thing in the field that you do in the hospital. You put pressure on a large wound and stabilize him before you move him. Somebody pulled that boot off, they cut the pants off, but they pulled the boot off. Well they saved the life, and I was talking to one of the MDs at the hospital there, and I said "How did this soldier turn out?" "Well, the leg wound was fine. We got that stabilized, but he's never going to walk right." I said, "You know they pulled that boot off?" and he says, "You've got to be kidding me." I looked at that and I thought "What were they thinking?" I was watching them as they picked him up to put him on the stretcher. Now he's not complaining about his leg, he's complaining about his foot. It's busted up, there's tendons sprayed out. As they lift him up to put him on there they drag him with his foot dragging on the ground. I mean, things just kept getting worse and worse.

Well they put him on the stretcher, but they didn't put him up far enough. So his feet were dangling out there so I grabbed onto the foot as they put him on there. "Now I'm going to get out of the way when you lift up this stretcher, but the leg's sticking out so when you put him in the ambulance make sure the door doesn't close on him." So they load him up and they start closing the door without anybody grabbing onto his foot. Now these are common sense things, but when you're in the midst of a panic you don't think.

Number one they teach you, stop and gather your information. Don't go off running "We need an EpiPen, we need an EpiPen!" if there's no EpiPen. Think through everything that you're going to do have your plan of attack and be able to follow through on it. I see a few that have been shaking their heads. [...] You know the MDs get this time and time again. I mean, how many of us were worried when we first did our corneal foreign body removal? That was scary stuff, wasn't it? Is it scary now? No, it's old hat. It's become routine. Go through these exercises so that they become routine. It's like a fire escape, if you're doing a fire drill you practice it, you drill it. If you're prepared, you will save a life. You won't always know where but you will

