Silo Rescue

Agriculture Rescue Training 10/20/23

Agricultural Safety Statistics

- Each year, more people die while farming than serving as firefighters, emergency responders, and police officers combined
- Annual mortality rate from farm accidents:
 - Per the CDC, estimated to be 20 deaths per 100,000 compared to 3.6 per 100,000 workers for all US industries
 - □ Number of fatalities in the agricultural industry:
 - **Q** 2020: 511
 - **Q** 2021: 453
- □ Non-fatal injury:
 - In 2020 there were 11,880 REPORTED injuries, though there is well-known under-reporting in this industry
- Agricultural industry is the 3rd most dangerous private industry to work in

Case Presentation



Case Presentation

- Time of the year: October, when corn harvesting season is starting
- Dispatch complaint:
 - □ 33 year old male with his leg trapped in an auger
 - Buried in 4 feet of corn in the silo
- Patient called his father, who was on the far side of the barn, to get down to the silo room on the other end of the barn to shut the auger off because he just got sucked in
- Patient then called 911
- □ What additional resources are you going to call for immediately?
 - MedFlight
 - Technical Rescue Team
 - Additional first responders/FD personnel
 - Dairy/Farm Material Handling business:
 - Example: Field's Silo & Equipment has technicians familiar with a lot of the area farms

Important Considerations On Scene

- First and foremost, SLOW DOWN. Assess your surroundings and scene safety. "Never move faster than your ability to make good decisions"
- □ Is there gas?
 - Patient has already been working in the silo for a few hours
 - □ No concern for gas as the silo was almost empty, there were two open doors on top of the silo and the open door on the bottom allowed the gas to be sucked out by the barn fans
 - □ The silo/forage blower eventually was turned on for additional aeration in the silo as the barn fans could not suck as much air with the barn door being open for the rescuers
- □ How deep is it?
 - □ In this case it was approximately 3-4 ft, however it was packed down
 - Be sure to have access to long rescue ropes to tether in; if it's too short, it can inhibit your rescuer

Other Important Considerations

□ Safety switch/shut off to the auger/equipment:

- □ Important to make sure that this is turned off.
- Some pieces of equipment jam but aren't shut off which poses obvious risk if it un-jams

Age of farm equipment

- https://youtu.be/SsJ29jQluQw
- This sweep auger in this silo was 50 years old and did not have safety shields that are now on more modern equipment. Many farms still have older equipment



Other Considerations

- Door opening size: 24" x 18"
- Door is 6 ft above the ground
- □ Patient is 6'2 and ~230 lbs
 - How are you going to get this patient out?





Initial Assessment

Patient is in the middle of the silo with corn up to the waist

- □ Looks at you and states: "I am in so much effin pain" and "I feel like my leg is broken in at least 3 different places".
- □ What vital information can you get from this?
 - □ Protecting his own airway and breathing
 - Fully alert and oriented; you know he is perfusing the brain which means his circulation is ok right now
 - □ At this point, you know your patient's ABCs are intact

□ What is the biggest life threat at this point?

- Hemorrhage
 - Presume that while the auger is stopped, the leg is severely injured at this point and continuing to bleed

Hemorrhage and trauma

Hemorrhage is the leading cause of PREVENTABLE death in trauma patients

- □ Hemorrhage is responsible for 30-40% of trauma mortality
- □ Of these deaths, 33-56% occur in the prehospital setting

STOP THE BLEED

- The NUMBER 1 piece of rescue equipment is your tourniquet
- □ Where should the tourniquet go?
 - □ In EMS we are taught 2 inches above the wound
 - □ Your patient is buried up to his waist. Where do you go next?
 - □ Military training: "High & Tight" if the site is not readily visualized ("High or die")

Classes of Hemorrhage

Class I: 15% blood volume loss

HR minimally elevated or no change. Normal mentation, no change in BP, HR, or RR

□ Class II: 15-30% blood volume loss

- Tachycardia 100-120 bpm
- Tachypnea: RR 20-24
- Decreased pulse pressure, minimal decreased in SBP
- Cool, clammy, delayed capillary refill
- □ Class III: 30-40% blood volume loss
 - Significant mental status change
 - □ Significant drop in BP (SBP <90 mmHg)
 - While diminished anxiety or pain may contribute to the drop, the rescuer should assume that the drop is due to hemorrhage until proven otherwise

Classes of Hemorrhage

Class III hemorrhage continued:

- □ HR > 120 with thready pulse
- RR markedly elevated
- Urine output is diminished (kidneys have decreased function)
- Capillary refill is delayed
- Class IV hemorrhage: more than 40% blood volume loss
 - □ Significant BP drop: most are less than 90 SBP
 - Tachycardia is marked (greater than 120 bpm)
 - Urine output is minimal as kidneys start to fail
 - Skin is cold and pale and capillary refill is delayed (>2-3 seconds)
 - Significant mental status change
- Class III and IV hemorrhage should be considered SEVERE hemorrhage

Next steps in the rescue

- You are talking to the patient, knowing under that his leg is still entrapped and he is bleeding out
- Fire tells you not to go in and that you need to wait for tech rescue
 - Patient yells out "jeezus it's gonna take them at least 20 minutes to get here"
- You have asked the important questions:
 - How deep? "4 ft but it's packed" and you know where the bottom of the silo is because you're standing by it
 - □ Is there gas? "No, I've been in here all morning"
 - □ Is the safety switch off? "It's off"
- □ EVERY MINUTE COUNTS IN HEMORRHAGE
 - If you know you're scene is safe, get access to the patient to get the tourniquet in place

Fluid resuscitation

□ IV access

- Establish at least 1 if not 2 IVs
 - □ IVF resuscitation is aimed at restoring circulating volume, improving oxygen delivery to tissues and regaining tissue perfusion and organ function
- Previous pre-hospital trauma training emphasized "2 large bore IVs"; 18 gauge is sufficient, you don't need to place a 14 or 16 gauge
- Trauma care now focuses on blood products for trauma patients
- **D** Too many fluids can do more harm than good:
 - Lactated Ringers are a better choice due to it being more physiologic
 - □ Normal saline has been linked to increased acidosis and coagulopathy
- Trauma induced coagulopathy:
 - Caused by hemodilution (too many fluids and not enough blood), acidosis (why you should chose LR over NS), and hypothermia (keep your patient warm)

Gain Access

You need to STOP THE BLEED

The only way to get access for a tourniquet is to dig away the corn the patient is up to his waist in. There is a large, fairly stable pile to his left however, as you dig more corn will fall down. While it may or may not be dangerous, it can undo your progress so you need to be careful to move the corn so you can get access for tourniquet application

- You are going to cause a horrific amount of pain with that tourniquet
 - You need to set this thought aside and get the tourniquet as tight as possible. THIS WILL SAVE YOUR PATIENT'S LIFE



Gain Access

- How are you going to get your patient out? How do you get additional rescuer's in?
- Use your resources! Family can be helpful!
 - There are bolts, A LOT of them, that can be removed. But then there's thick adhesive that needs to be heated up and a special spring-loaded device to separate
 - The patient's father knew from the outside where the patient was located and where to safely make a cut in the side panel to gain access
 - DO NOT FORGET TO PROTECT YOUR PATIENT AND THE RESCUER
 - Sparks will fly when cutting metal
 - Running water on the blade can prevent sparks







Rescuing Your Patient

- Once you gain access to the silo you will need to get the patient out
 - Patient is still waist deep in corn and the leg is still entrapped in the auger
 - **G** Remember the corn that keeps falling down?
 - Rescue cofferdams can stop the downflow so you can clear that area around your patient
 - Think outside the box. Even a large piece of plywood can be effective
 - Again, utilize family. Patient's father brought the Bobcat to the silo opening so the firefighters could shovel the corn right into the bucket to clear it out









Support Your Patient & Family

Remember to support your patient

- Reminders to stay calm and keep breathing through the pain; this can go a long way.
- Your patient's blood pressure increases due to stress, pain, and panic which increases bleeding rate and contributes to quicker blood loss

Support the family

- Often the family is forgotten about and is wondering what is going on.
- They don't know if their loved one is still alive.
- □ If you aren't actively involved in the rescue, you can take an important role of updating family
- It's OK if you need to step away and have someone else take over if it becomes too much.
 - Often in these small communities you will know your patient or the patient's family



What do you notice in this photo?

Higher Level of Care

Once Medflight has arrived, your job isn't done.

- Firefighters successfully dug out the patient to gain access to the auger and the patient's leg
- Field amputation was performed by the Medflight MD, however the patient still needs to be extricated
- Longboards and scoop stretches can help with moving your patient. All hands on deck makes for lighter moving. Switch out as needed for rehab

Be prepared

□ The Medflight MD will administer pain medications, but also often a sedative such as ketamine. Patient's often dissociate and even the most stoic patient will suddenly start acting in a way their brain tells them they should respond to the injury. This can be very emotional for rescuers. IT'S OK! WE ARE HUMAN!

Things To Keep In Mind

□ BE AWARE!!

- While helping package the patient don't get tunnel vision or fall to routine. Remember what injury was just sustained!
- Protect the area that was just injured and don't forget it is under the blankets

Remember that your patient can still hear you, even if there are heavy medications on board.

□ Patients can still respond and later may remember bits and pieces

Minutes Matter

- Remember: Hemorrhage is the leading cause of PREVENTABLE death in trauma patients
- □ Time of dispatch: 0856
- Barneveld Area Rescue Squad arrival: 0904
- Barneveld Brigham FD arrival: 0904 and 0913
- Ridgeway FD arrival: 0914
- Dodgeville FD arrival: 0926
- □ Iowa Cty Tech Rescue arrival: 0929
- Tourniquet placement: 0930
- MedFlight arrival: 0930
- Extrication complete (Medflight en route to UW): 0954



Patient Outcome

- □ BP on scene: 180/100
- □ BP during Medflight transport: 70s/50s
 - □ What class or level of hemorrhage does this indicate?
- Transfused 2 units of 0 negative blood in the helicopter
 - Hemoglobin in the ED at 1044 was 11.8 g/dL (Normal adult male: 13.8-17.2 g/dL).
 - □ Note: there will be a delay in the actual drop compared to the lab results)
 - Hemoglobin in the OR at 1153 was 6.6 g/dL (transfusion level is less than 7.0 g/dL).
 - Reminder: this precipitous dropped occurred AFTER 2 units of blood
- Patient overall received 10 units of life saving blood
- Another 10-15 minute delay and this patient would have died pre-hospital

Critical Incident Stress Debriefing (CISD)

- Critical incidents are defined as "sudden, unexpected events outside the range of normal human experience"
- These incidents have a strong emotional effects on even the most experienced and trained first responders. THIS DOESN'T MAKE YOU WEAK, THIS MAKES YOU HUMAN
- Be sure you are involved in the debriefing session with your department
- Get additional help after the debrief. There are First Responder Therapist and Counselors available. YOUR MENTAL HEALTH MATTERS!
 - https://mentalhealthmatch.com/browse-therapists/wisconsin/first-responders

Key Points

STOP THE BLEED

□ Work together, use your resources, and think outside of the box

Small communities get impacted the most when this kind of thing happens. Not all of these cases will have a positive outcome. Even if it does there is still trauma involved and it's OK to be hit to your emotional core, but do NOT try to "tough it out" or go at it alone. Reach out and talk to someone, do debriefings, talk to a counselor, family members, coworkers/teammates. There is always that one call that will either destroy you or define you. It will destroy you if you bottle it up.

https://youtu.be/gWuBek6ALKw

"Keep doing what you do...because what you do matters"



