EMS Farming Accident Response

• This webinar will address farming hazards, equipment, and EMS response tactics.

• An educational gap has been discovered when it comes to EMS farming accident response. There is very little training available specifically focused on farming incident response for EMS personnel.

• The complexity of farming equipment, hazards, and rescue is diverse.
EMS Farming Accident Response

• 21/10,000 farmers will die each year from a work related injury
• After tractor and equipment related deaths the most common cause of fatalities were grain bin accidents.
• Many agricultural workers are unable to address farming related illnesses due to a complex set of socioeconomical factors including inability to take off from work, transportation, language and cultural barriers, lack of health insurance, scarcity of available community health services and fear of loosing employment.
Common Farming Accidents

• Over turning machinery.
• Animal injuries
• Asphyxiation
• Falls
• Entanglements
Characteristics Associated with Farm Related Injuries and Emergencies

- Unusual structures
- Confined spaces
- High rise structures
- Heavy machinery
- Livestock
- Chemicals
- Toxic environments
- Remote locations
Tractor Accident Response

- Tractor over turns contribute to more farm related fatalities than any other farm related injury.
- Nearly 85% of tractor overturns are to the side
- Rear over turns are less common and tend to result in fatality more frequently.
- A range of injuries can occur from tractor accidents.
Tractor Shut Off, Diesel Tractors Can be Challenging

- Gasoline tractors can be shut off by the ignition
- Diesel tractors can be more challenging to shut off. Find the key and turn it to the off position and remove it. This **may** shut off the tractor. You may need to find the fuel shut off valve and turn it to the off position. If the fuel shut off cannot be found or does not work find the throttle lever and place in the idle position.
- As a last resort if none of the approaches to shut off the diesel engine are successful, you can plug the air intake with a towel. Do not use your hand.
Handling Tractor Incidents

• Removing a victim from an overturned tractor will depend on the position of the victim, soil conditions, and the weight of the tractor.

• If the ground is soft it may be possible to dig the victim out. This will reduce the amount the tractor must be lifted. Care must be used in stabilizing the tractor, a method called cribbing can be used.
Cribbing

• Careful cribbing as you lift the weight of the machinery is essential.
• Use of hydraulic lifts or mechanical jacks can be used to carefully lift.
• Use materials such as hardwood oak or maple that will not split. Do not use concrete. High pressure bags can be used for cribbing.
• As a last resort, the tractor can be lifted with another tractor.
Power Take-Off Driveline Entanglements

- The PTO on the tractor transfers power from the tractor to trailing equipment.
- All tractors are designed to operate the PTO at either 540 or 1,000 revolutions per minute in a clockwise direction.
- PTO’s lacking the proper shielding and protective equipment can grab the victims hair or clothing causing catastrophic entanglements.
Power Take-Off Entanglement

- Secure the PTO drive line on both ends so it cannot rotate
- Be sure the tractor is off
- Secure the wheels
- Consult with a near by farm dealer or neighbor farmer for help with freeing the victim, don’t use trial and error
- It may be better to transport the patient still entangled.
Hydraulically Operated Equipment Failure

- Hydraulic systems operate at high pressures and can support tremendous weight
- Hydraulic failure can cause equipment to lower unexpectedly, resulting in injuries and/or spills.
- Hydraulic fluid from hydraulic hoses is very hot and damaging to the skin.
Hydraulic Failure

• Once the equipment is secured the hydraulic pressure may need to be released to free the victim.
• Always assume hydraulic failure.
• Do not cut hydraulic hoses, the fluid is hazardous and can cause fire if ignited.
• It’s generally safer to crib and dig the victim out
Auger and Elevator Entanglements

- Portable farm augers transport grain, feed, or fertilizer quickly and easily.
- Common injuries involve: entanglements, auger collapse trauma, and electrical injury.
- Augers are responsible for most farming related amputations
Auger and Elevator Related Incidents

- Check for power lines and turn off the power if possible
- If possible lower the elevator or auger for stability. Keep in mind the auger may be loaded with grain. Consider unloading it.
- Block the wheels
- If extricating a complex entanglement physician supervision may be necessary.
- You may need to disassemble or cut the auger to get the victim out.
Agricultural operations use a wide variety of harvesting equipment that is designed to cut, chop, compress, grind, and blow crops for transport or storage.

Equipment includes:
- Balers
- Combines
- Cotton pickers
- Corn pickers
- Potato diggers
Farm Harvesting Equipment Injuries

- Injuries to the hands are feet are common.
- Fatality can result due to factors such as blood loss and remote locations.
- Shut off the tractor and remove the key.
- Consult with an equipment expert (dealer or neighbor) for disassembly.
- Consider cribbing and digging if need be.
- Depending on the machine you may need to disconnect the power take-off.
Farming Accident Video - Potato Harvester
Farm Grain Bin Entrapments

- Generally there is little risk from stored grain but flowing grain presents risks for engulfment and suffocation.
- Most full engulfment's in flowing grain result in fatality. ~90% of full engulfment rescues are unsuccessful.
- The rate of grain flow in the center of a grain bin is so great that escape is almost impossible (whirlpool)
- Survivors report covering their mouth and nose and not panicking.
- Partial entrapments have much better outcomes
Farm Grain Bin Incidents

- A grain bin rescue should be treated as a confined space. Wear an SCBA and harness.
- Always assume the victim is alive.
- Do not start the unloading auger.
- If the patient is partially submerged stay out of the bin, do not disturb the grain
- Dust and mold spores can cause allergic reactions
Farm Grain Bin Incidents

- Turn on the grain bin aeration fan to circulate air
- Time is critical
- Find the access door towards the bottom of the bin for entry.
- It may be necessary to cut holes in the grain bin to remove grain.
- Send only one rescuer in the bin for BLS.
- For a partially submerged victim consider using a coffer dam
Farm Silo Incidents

- Silos preserve and store livestock feed.
- There are 2 types of farm silos: 1. conventional and 2. oxygen limited
- Silos are confined spaces
- There common types of silo incidents:
  - Medical emergencies inside the silo
  - Exposure to silo gas
  - Silo unloader entrapment
Farm Silo Incident Response

• Silo gas can be toxic. Assume silo gas is present and there is insufficient oxygen within the silo before entering. Wear a SCBA/SAR. Consider using a pulley system or cutting a hole in the container for rescue.
• An gas detection monitor is essential.
• Turn the silage blower on to circulate the air and dispel gas.
• Turn off the unloader
• Treat the rescue as a confined space rescue.
• Treat anyone exposed to silo gas immediately. Move the patient to fresh air.
• Contact poison control
Farm Manure Storage Incidents

- Generally farmers use three types of manure storage systems:
  - Large holding tanks
  - Open lagoons or ponds
  - Silo type above ground storage

Manure pits present many risks such as drowning, bacterial growth, and toxic gas production.
Farm Manure Pit Incident Response

• Below ground manure pit rescues present the greatest risk to first responders. A person can enter a pit and become unresponsive in seconds due to high concentrations of hydrogen sulfide gases.

• A good indicator of poor air quality is the state of the livestock near-by. Use a SCBA mask and full body harness when entering. Air quality devices can be helpful.

• Confirm the well being of all employees and farmers.

• Ventilate the facility.

• Remove the patient as quickly as possible. Manage the airway.
Gases Commonly Released By Manure

1. **Ammonia (NH₃)**: a strong alkali that has a pungent odor like that of household ammonia. In small concentrations, ammonia can severely irritate the respiratory system; and in high concentrations, it can be fatal. In cases of ammonia exposure, flush the irritated skin or eyes with large quantities of water and provide oxygen.

2. **Carbon dioxide (CO₂)**: is an odorless, colorless gas that is slightly heavier than air. If the concentration of carbon dioxide in air exceeds 40,000 parts per million, it can cause death by suffocation.

3. **Methane (CH₄)**: is a highly flammable, nontoxic gas. There are reports of fires breaking out in confinement buildings when methane pockets beneath the structure were ignited by welding sparks or open flames. Asphyxiation is also possible in a confined space with a high concentration (5–15 percent) of methane. Methane is extremely difficult to detect without gas-detection instruments because it is odorless; as a precaution, anticipate its presence in all manure storage areas.

4. **Hydrogen sulfide (H₂S)**: is a very poisonous gas with a strong, detectable “rotten egg” odor. At high concentrations (above 50 parts per million), however, it deadens the sense of smell; so do not assume it is gone just because you cannot smell it after a few minutes. Hydrogen sulfide is the most dangerous by-product of manure decomposition. If the concentration of hydrogen sulfide in air exceeds 300 parts per million, death from respiratory paralysis can occur with little or no warning.
Pesticide Spills/Exposures

- Assume the spill is toxic
- Wear PPE and SCBA until known and contained
- Investigate the label and call CHEMTREC
- Isolate and contain the spill
- Remove the patients clothing and decontaminate
Farm Animal Accidents

• Frightened, injured, sick or protective animals can cause serious injury. Approach these animals with caution. If time allows call animal control.

• It may be difficult to move an animal from the scene to get a victim. You may be left with no other option but to shoot the animal to reach the injured person.

• Certain animals can become possessive over their prey. Pigs will eat human flesh and are able to smell blood.
Farming Accident Response CE Quiz and Evaluation Link

• https://msu.co1.qualtrics.com/jfe/form/SV_byLrfx4ahoy4cXr
Bibliography

1. Farm Rescue: Responding to Incidents and Emergencies in Agricultural Settings, NRAES-10 By L. Dale Baker, William E. Field, Rollin Schnieder, Clair W. Young, and Dennis J. Murphy Published by NRAES, 1999