

Severe Trauma on the Farm

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Objectives

- Most common incidents paramedics respond to
 - Tractor Incidents
 - PTO/auger Entanglements
 - Corn Pickers / Combine incidents
- How to respond to these incidents
 - applying commercial tourniquet
 - what not to do before paramedics arrive
- Prevention
 - guard maintenance



Ag Health and Safety

Agriculture is a dangerous occupation

People who work in agriculture are

7 times more likely to die

on the job than the average U.S. worker.

More **children/youth** die working in agriculture than in all other industries combined.

About every three days, a child dies in an agriculture-related incident, and each day, an estimated **33 children are seriously injured.**

Injuries

- Many small to moderate injuries happen daily on farms, most of these we aren't called to, they are mostly managed at home.
- Sprains and strains are very common and account for 50% of crop worker injuries including youth aged employees.
- Focus will be on the more severe injuries.

Tractor Incidents

#1 Danger on a farm



Tractor Incidents

- Transportation incidents, including tractor overturns were the leading cause of death for farmers and farm workers within the last 3 years. (CDC)
- Agricultural Vehicles are the most common source of injury according to Hospital records
 - Most common is the farm tractor
 - With hospital records indicate about 37% of all cases

Approximately 24,000 tractor cases were reported in the last 50 years.



First Response

Stability of vehicle first,
before rescue patient

Assessing need
for Life flights

- Lack of specialized trauma center

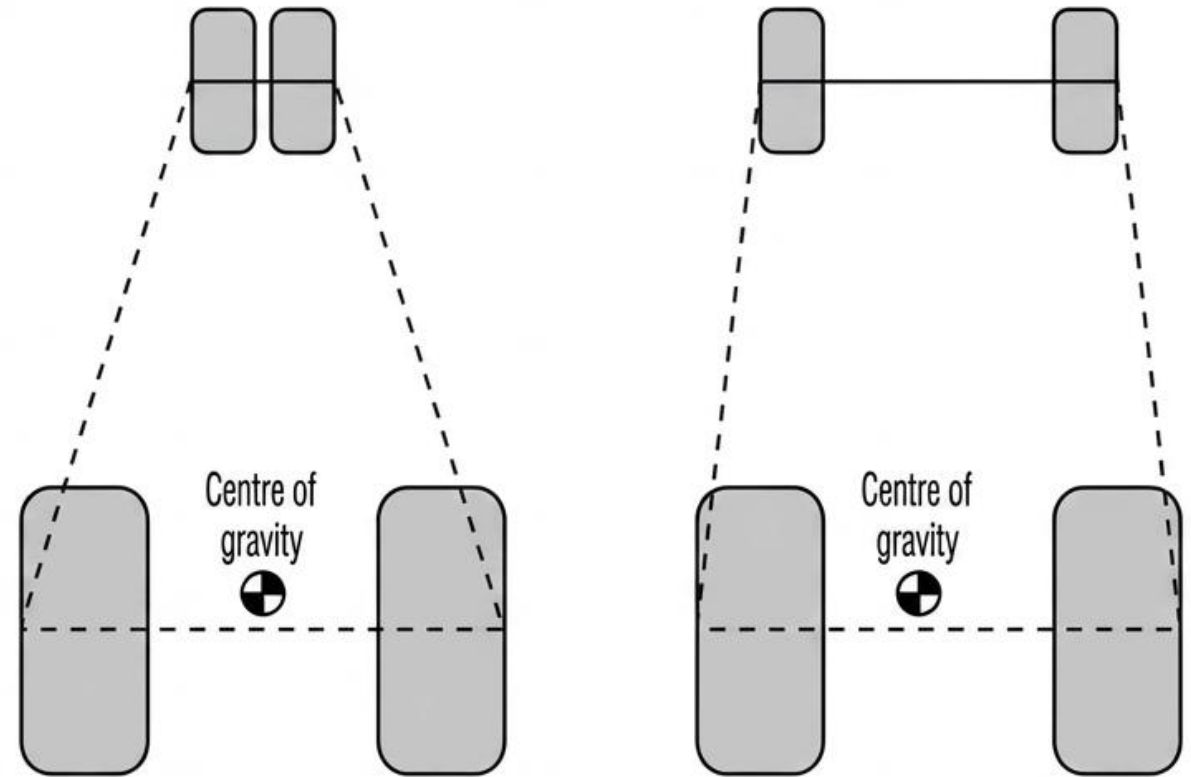
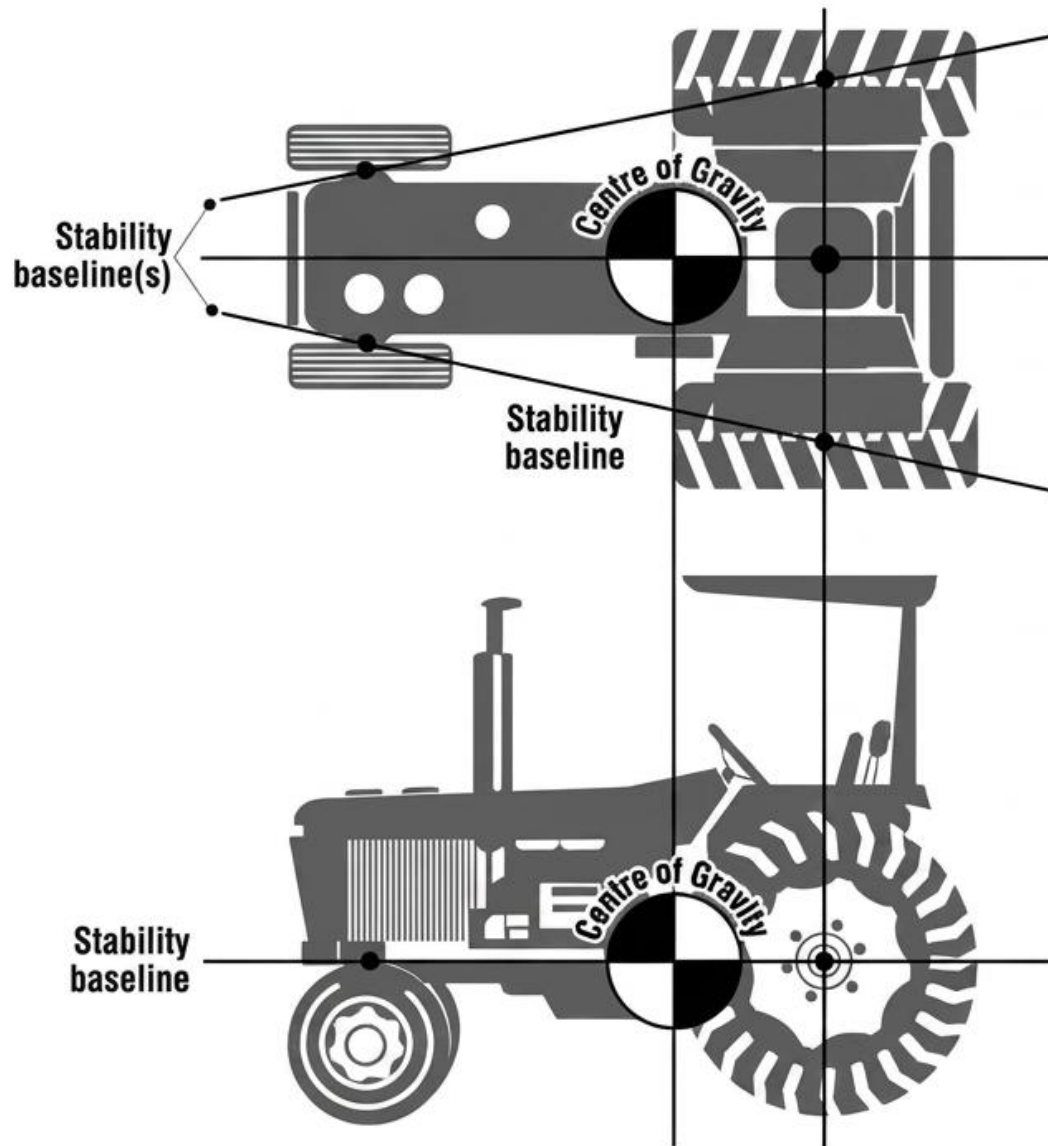


Alexis' Story

“I remember looking up and seeing the riding lawn mower on top of me, and my brother and sister on the other side.”

– Alexis Mason, M.D., family practice physician, Rogersville, Alabama

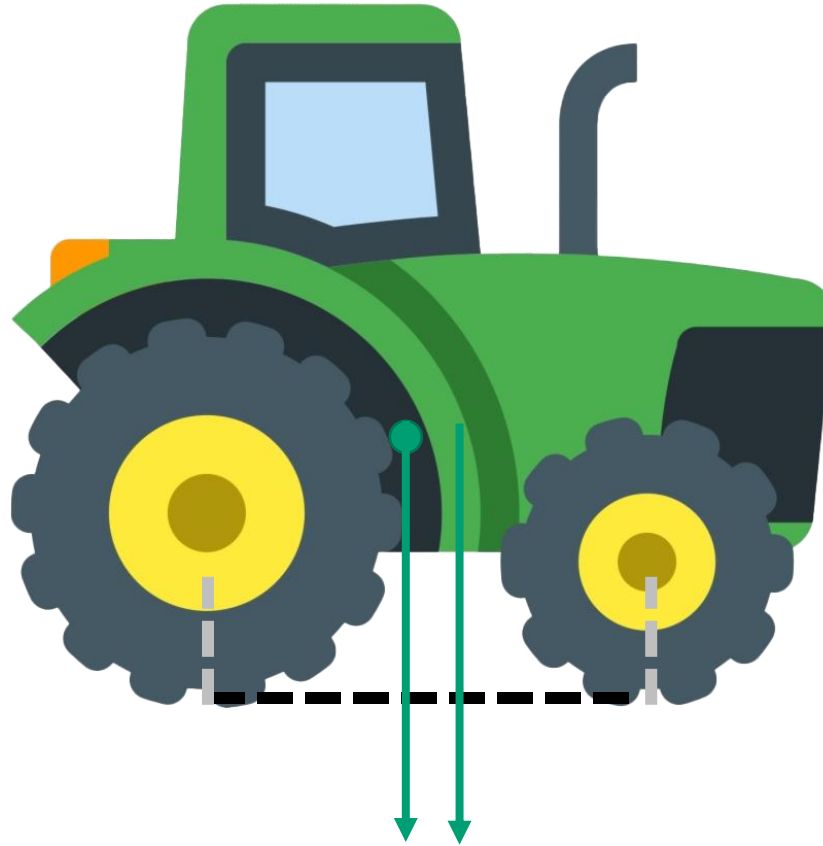




Center of Gravity is typically 10 inches above and 2 feet in front of rear axle

Source: Deere & Co. 1994

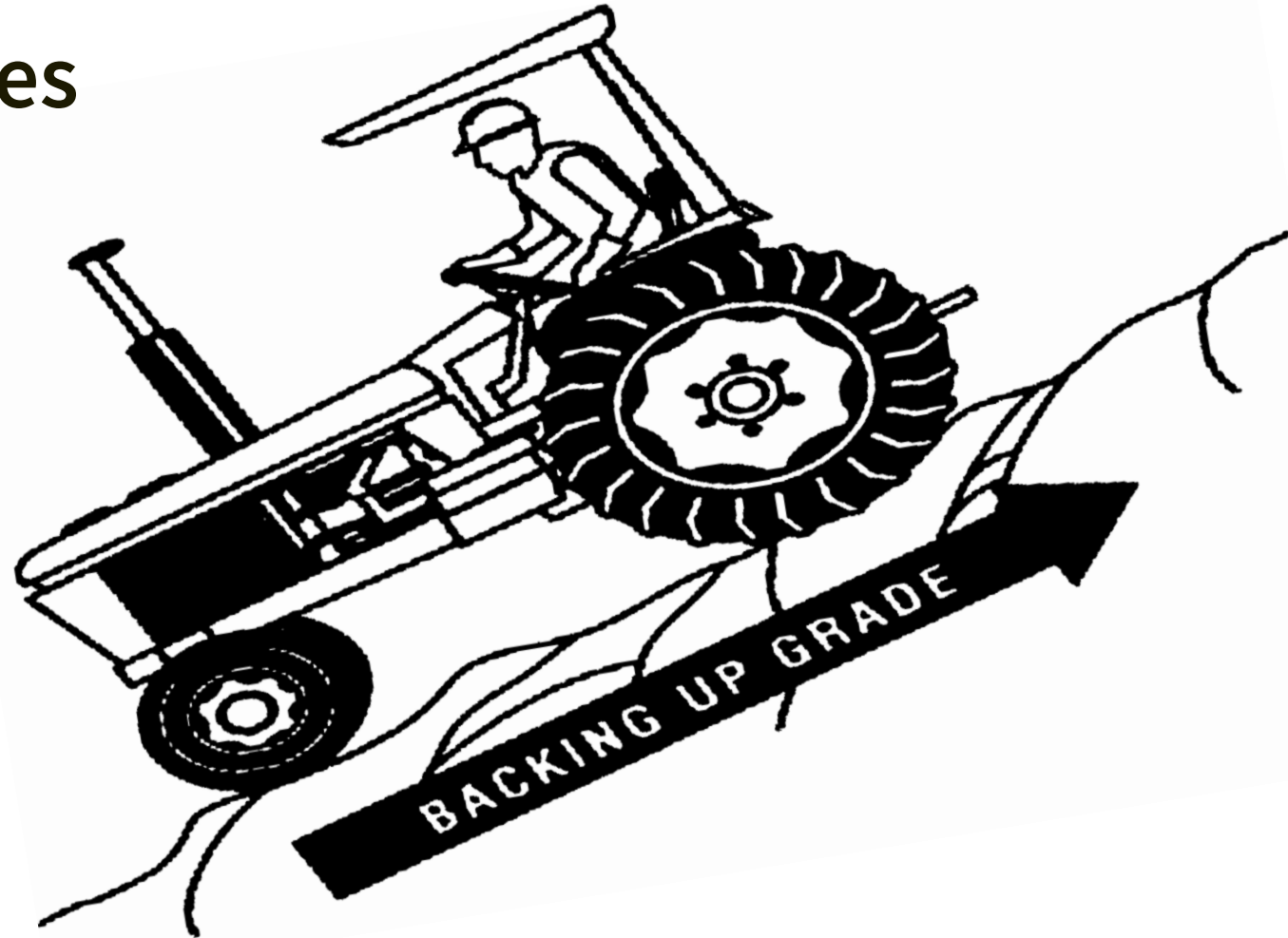
Tractor overturns when Center of Gravity crosses baseline



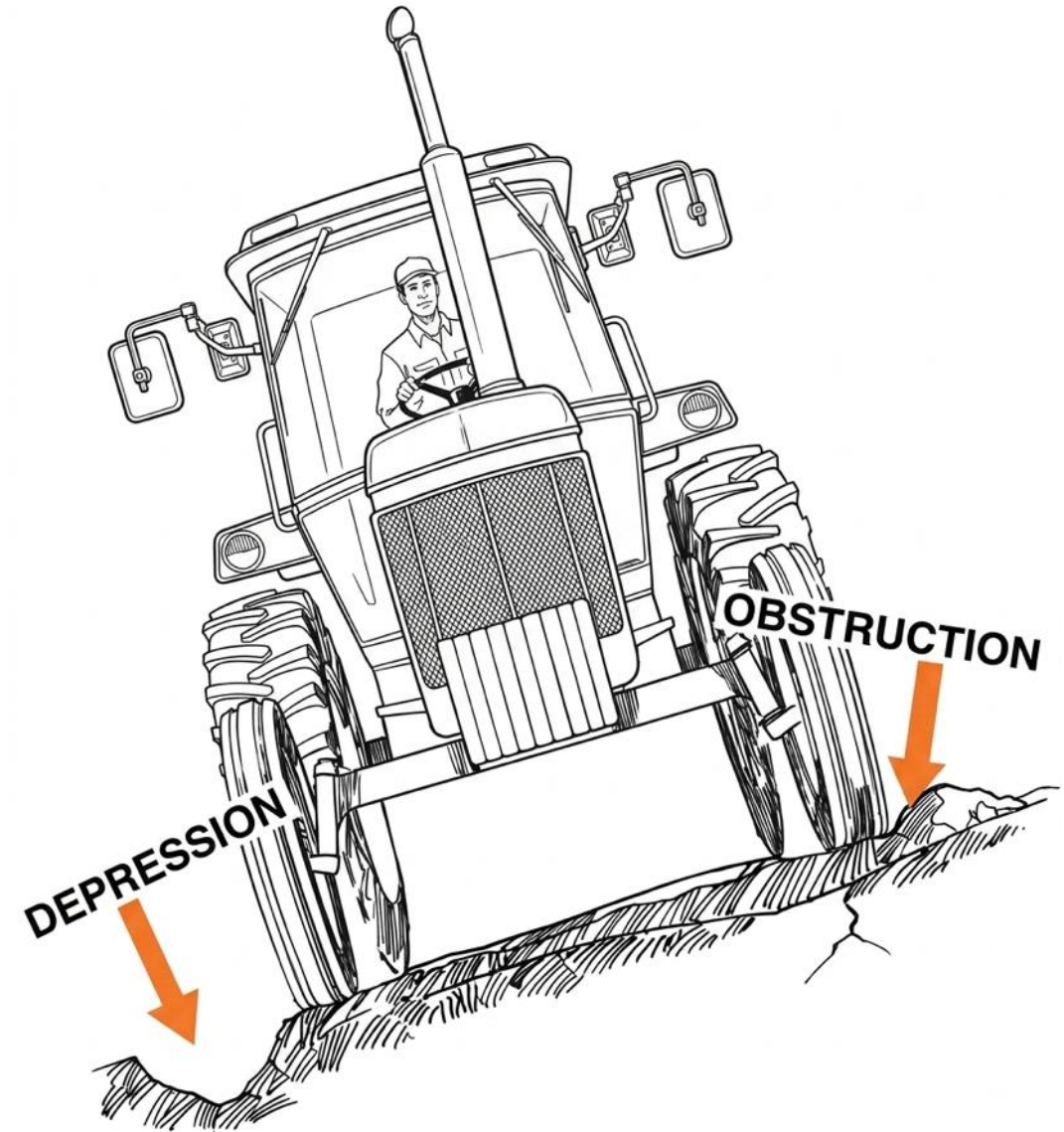
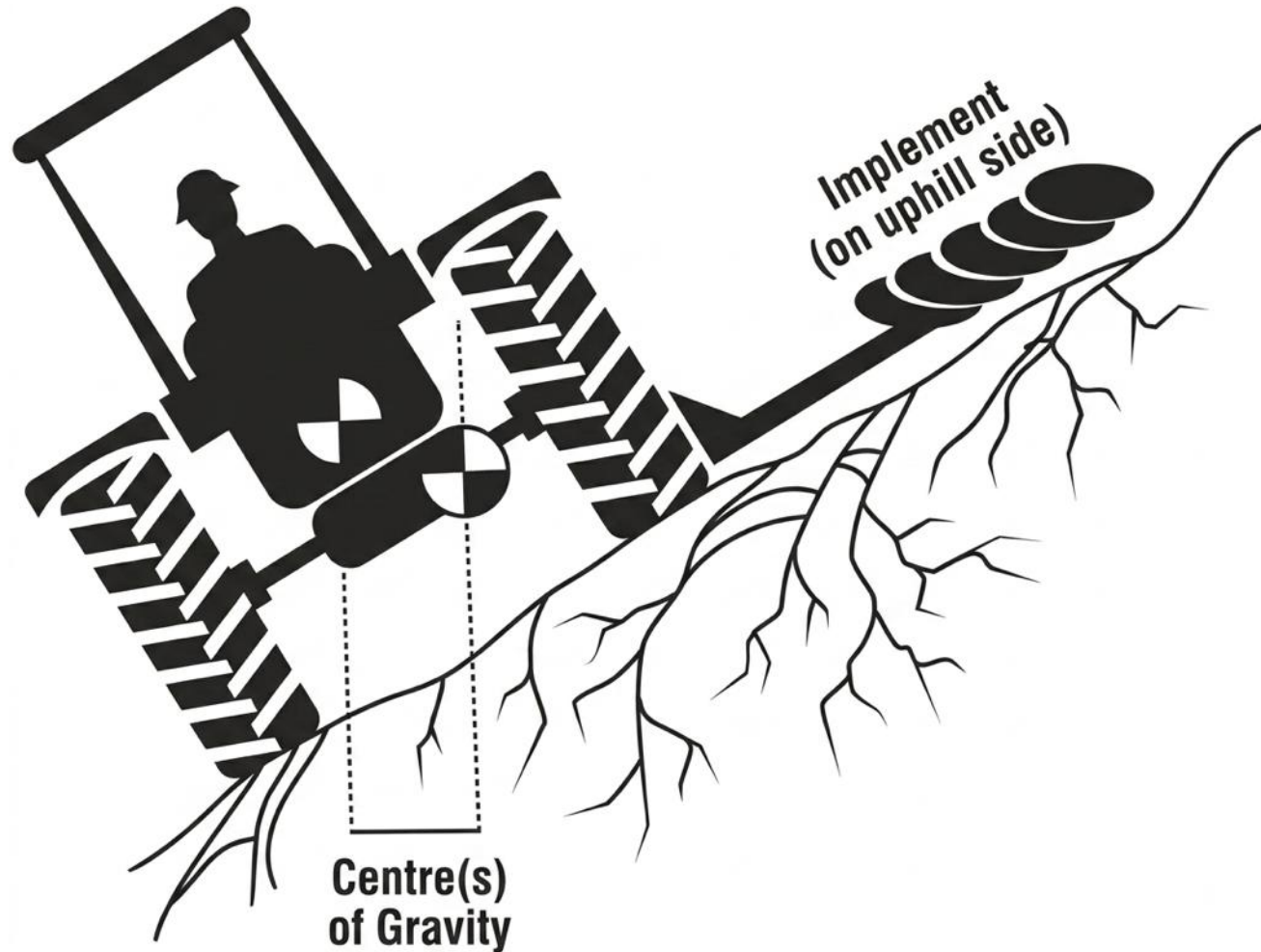
Slopes

Whenever possible,
back tractors up steep slopes
and come down forward.

If you have to back down
a slope, do it slowly
in a low gear.



Operating on Sloped Ground



Make sure you have ROPS

- Rollover Protective Structure
- Protects operator in the event of a rollover
- Not offered until 1965
 - Many older tractors do not have a ROPS
- Meets ASABE Standards



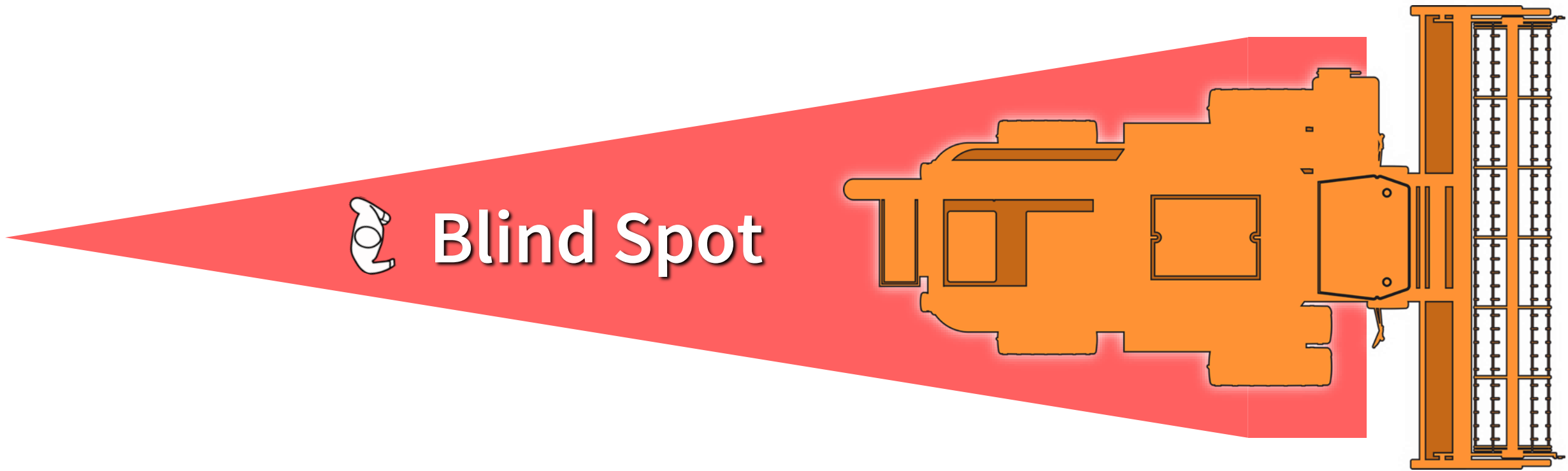
Visibility

- Keep windshields clean
- Use rear cameras when possible
- Be aware of equipment blind spots



Be aware of equipment blind spots

If you can not see the operator,
the operator can **NOT** see you



PTO-Power Take Off & Augers

2nd biggest danger on a farm



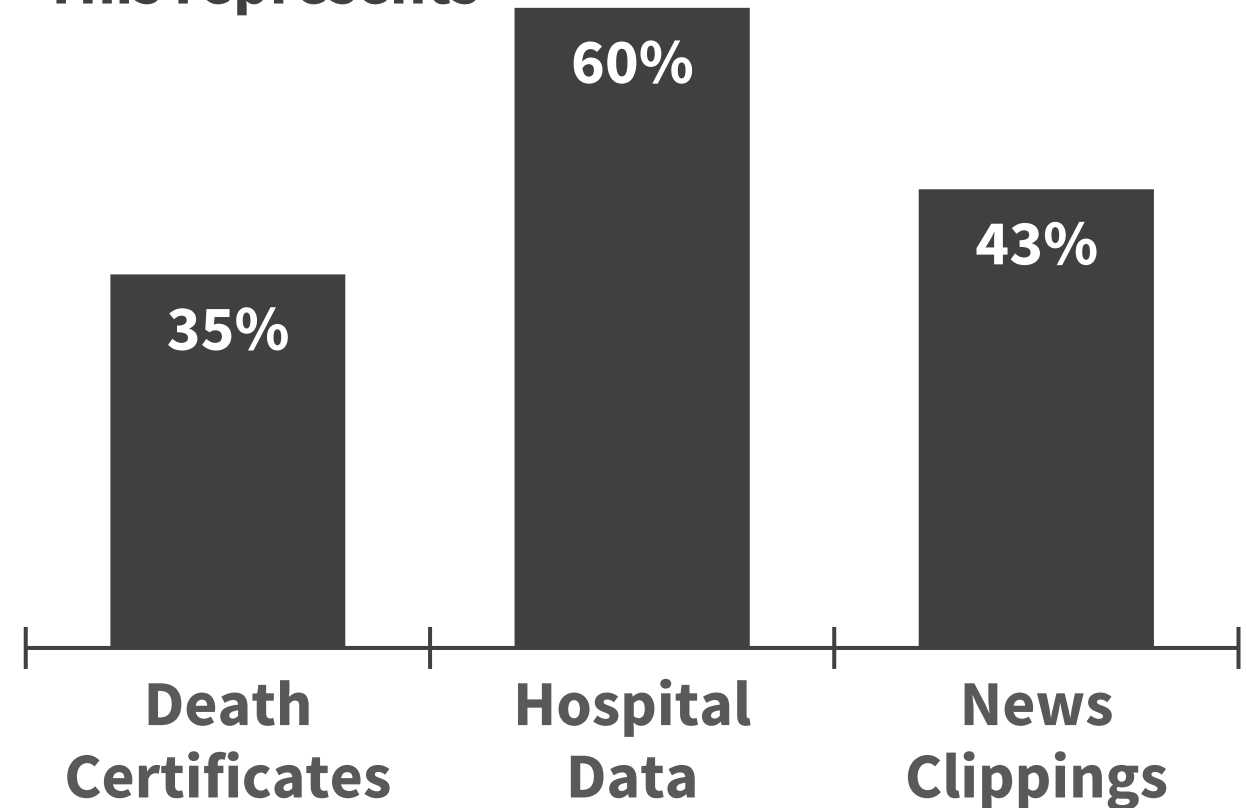
Rotation &
Entanglement Risk

Entanglement Cases

- Clothing Caught in PTO and pulls their arm or leg (extremities) and they get entangled in PTO or auger
- Usually an extremity is mangled
- This represents the second most prevalent source of fatal injuries (26%)

Contact with object or equipment is the most common event to occur on a farm with 250,000 incidents documented.

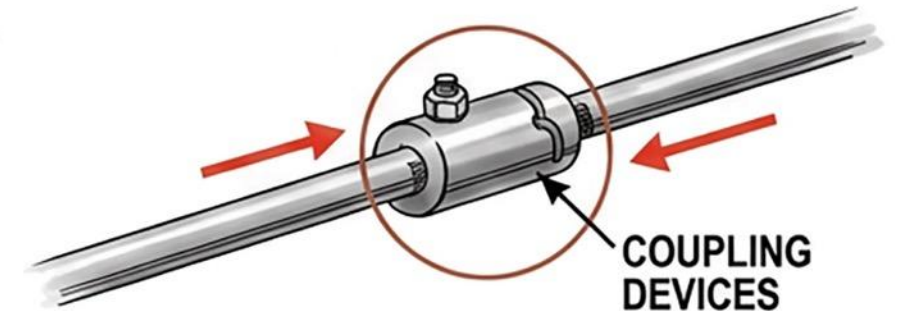
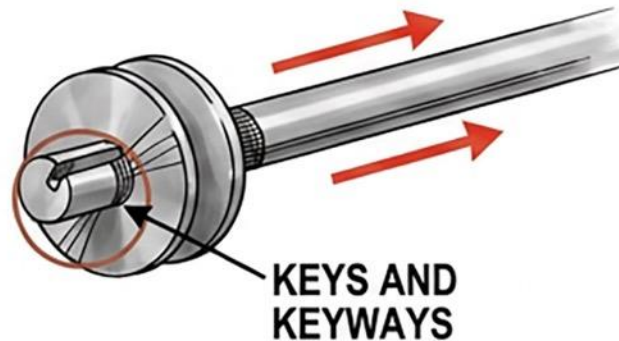
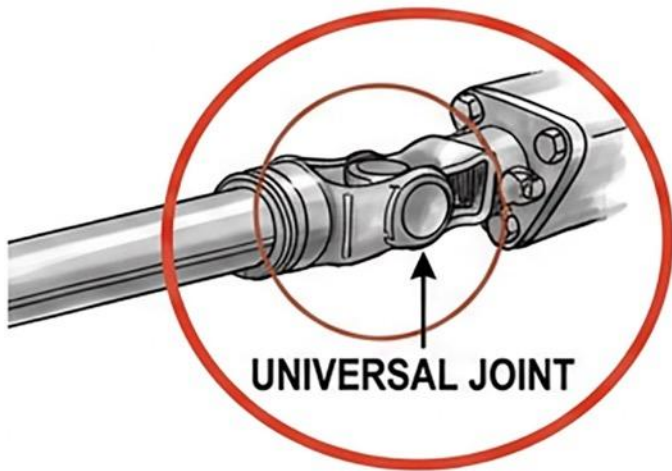
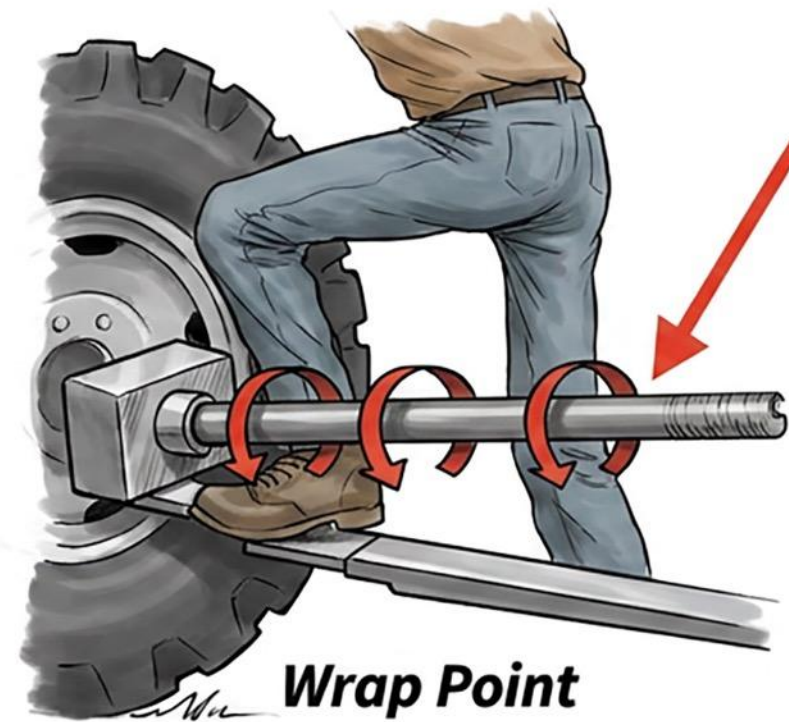
This represents



Wrap Points

Examples:

- PTO – prime example
- Augers
- Motor drive shafts
- Pulley attachments



Lapsed Time vs Distance Traveled

Based on relationship of tractor PTO with a shield/shaft diameter of 3"

Time lapsed in seconds	540 RPM		1000 RPM	
	Revolutions turned	Distance Traveled (ft)	Revolutions Turned	Distance Traveled (feet)
0.1	0.9	0.7	1.7	1.3
0.5	4.5	3.5	8.3	6.5
1.0	9.0	7.1	16.7	13.1
2.0	18.0	14.1	33.3	26.2
4.0	36.0	28.3	66.7	52.4
8.0	72.0	56.5	133.3	104.7
10.0	90.0	70.7	166.7	130.9
60.0	540.0	424.1	1000.0	785.4

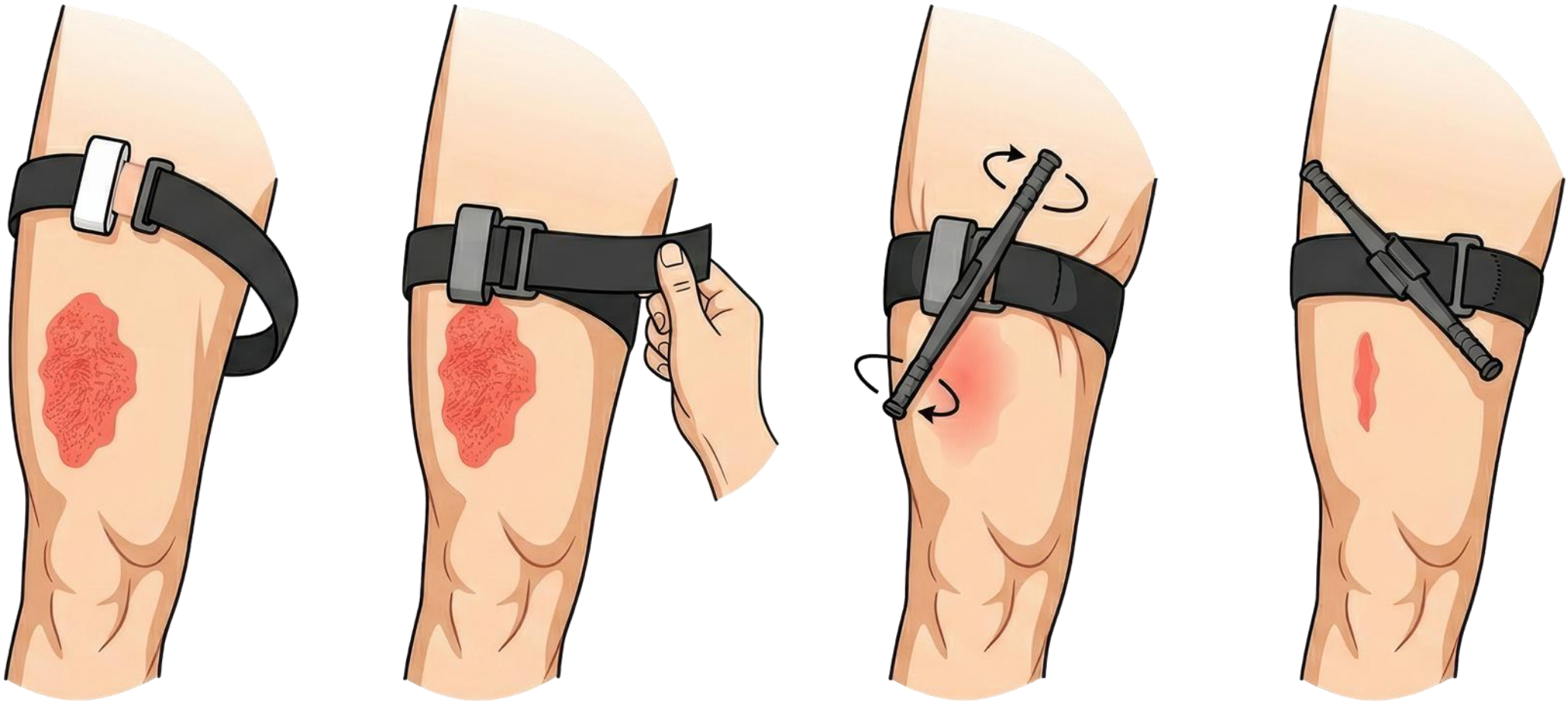
First Response

- Needs to disassemble what is entangling
- Bleeding concerns
 - Use Tourniquet
 - Hemostatic guard



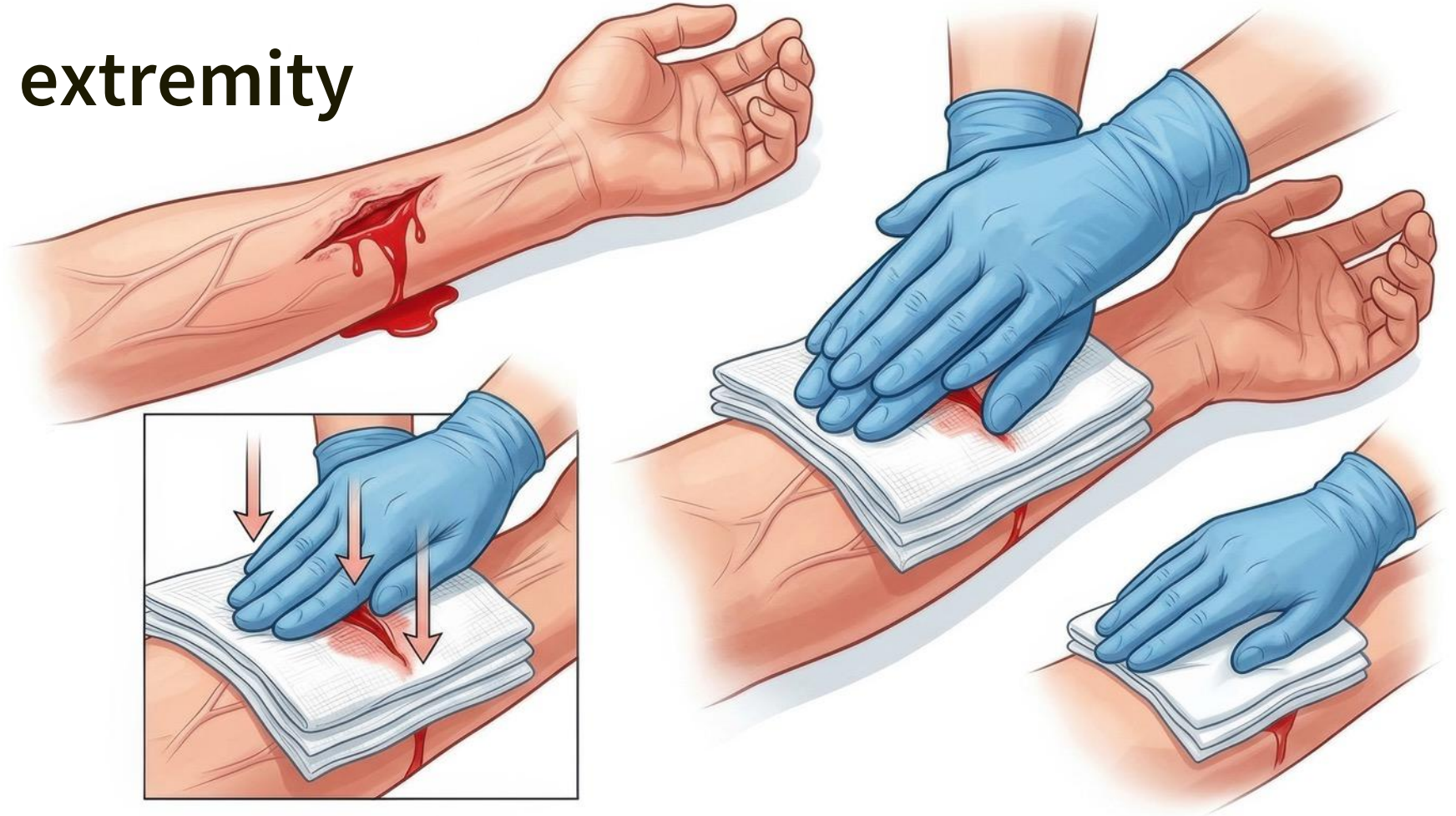
How to use Tourniquet

If not available farmers can improvise with belt or similar solution



Bleed Control

- Apply Direct Pressure
- Elevate injured extremity
- Keep it Clean



Brian's Story

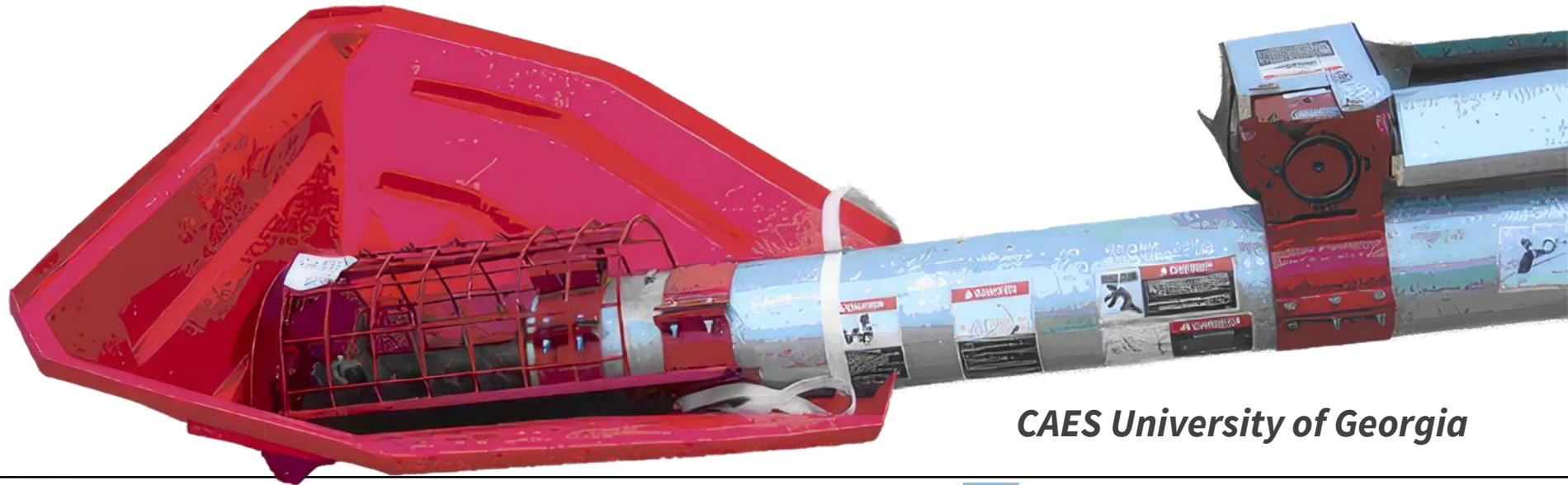
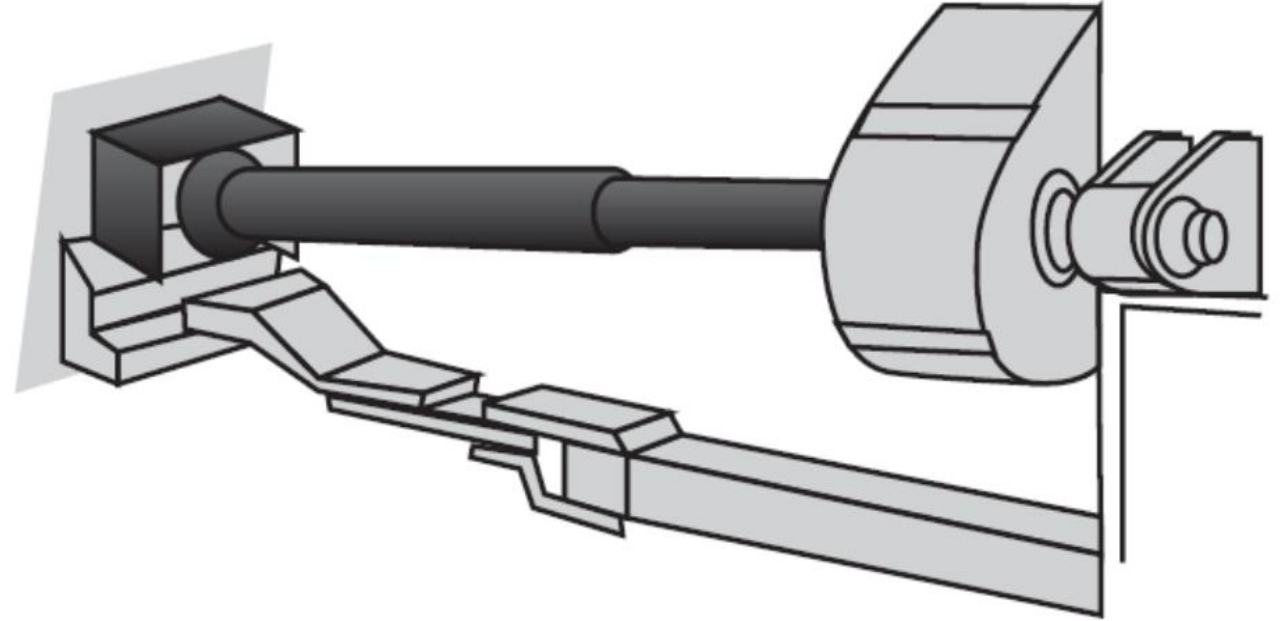


“People don’t realize that farming after injury is expensive. I don’t get things done as fast because everything takes me longer to do.”

- Brian Egel, farmer, Muscatine County, Iowa

Machine Guarding

**Ensure PTO
drivelines are
fully shielded**



CAES University of Georgia

Reduce PTO Injuries & Deaths

NEVER attempt to step over rotating PTO drivelines

NEVER operate tractor controls from the rear

Stay well clear of rotating PTO drives

KEEP long hair pulled back

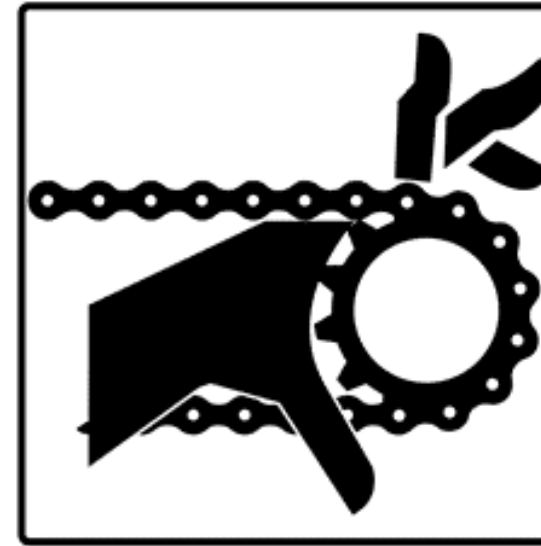
NEVER wear loose, baggy clothes around PTOs

Bind, tuck, cut -laces, cords, ties, flaps, loose threads

Avoid jewelry – bind, tuck, hide



Visual Safety Signs



Pictograms



Corn Picker & Combines

3rd biggest danger on a farm



Type of Events

- Entanglements, Burns or Crush asphyxiation.
- Over 25,000 agricultural machine related incidents were reported between 1970 – 2019.
- Second leading cause of fatal incidents with approximately 5,600 cases documented.



Crush Point

Two objects move toward each other
OR one moves toward a fixed object and the gap between both decreases.

Example: hitch



Pull-in Points

- Operating point catches object & drags it in
- Mechanisms that take in crops or other material for processing
 - Conveyors
 - Feed rolls
 - Feed chambers
 - Grinders
 - Harvest Equipment



First response

Entanglement/Crush

- Disassemble the area that has the entanglement
- Bleeding control
- Determine nearest trauma center to re-attach amputated parts
 - Or those that specialize in hand injuries

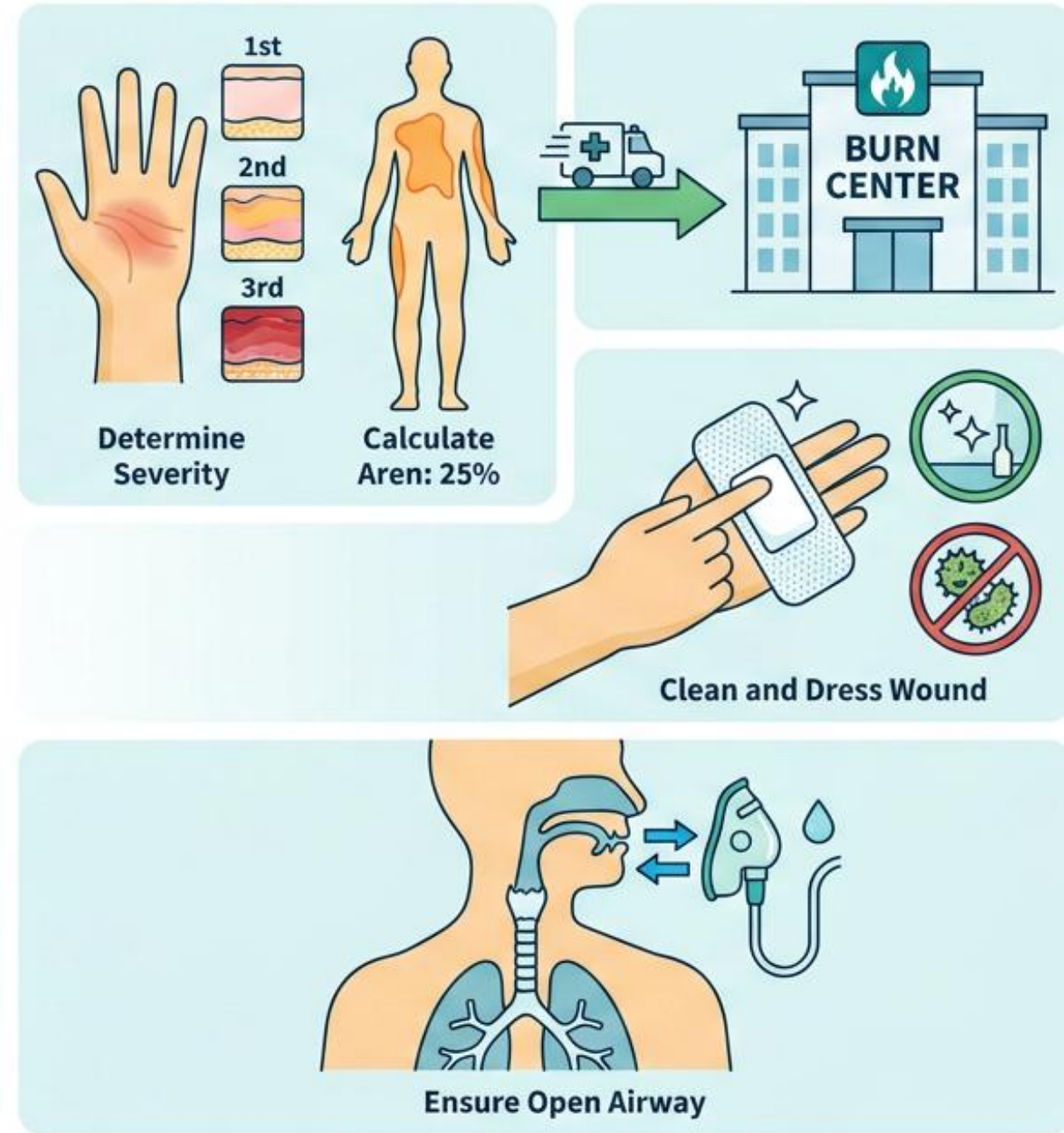


Wikiwand

First response

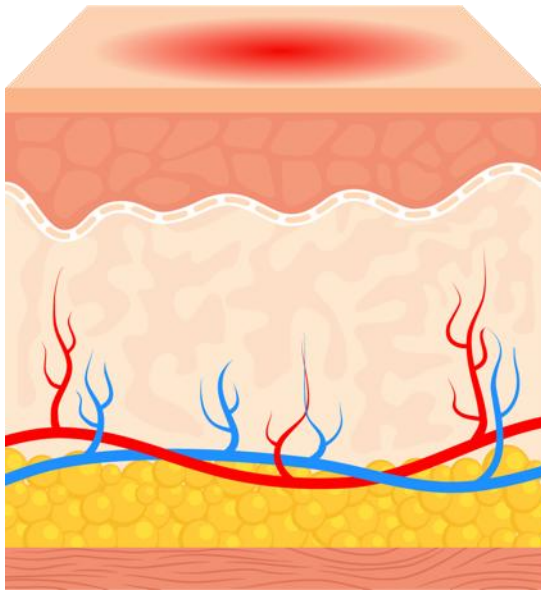
Burns

- Severity, area of burns and getting them to a burn center
- Main concern is keep area clean
- Airway management

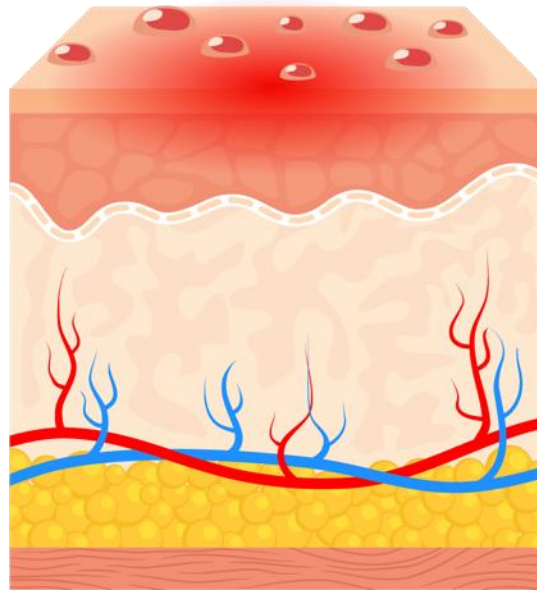


Burn

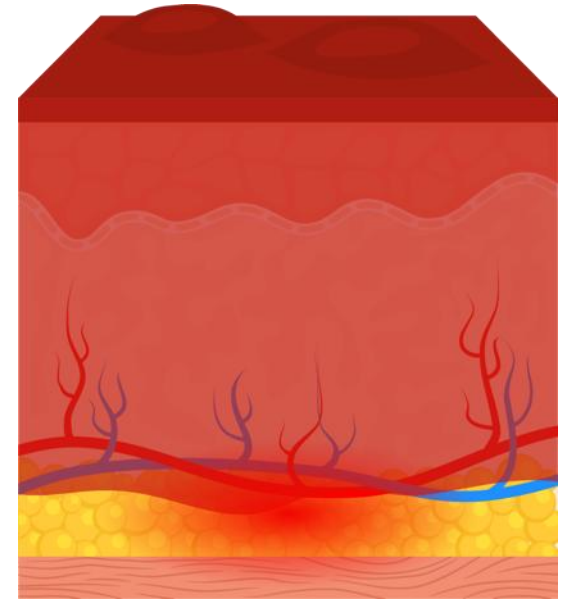
- Clean and flush with cool sterile water
- With open burn type of injuries there is high chance of infection



1st Degree Burn



2nd Degree Burn



3rd Degree Burn

Brad's Story

“It seems like many of us can start a farm accident story, or any accident story for that matter, with the statement, ‘it all happened so fast.’”

- Brad Guse, hobby farmer and ag lender, Arpin, Wisconsin



Prevention

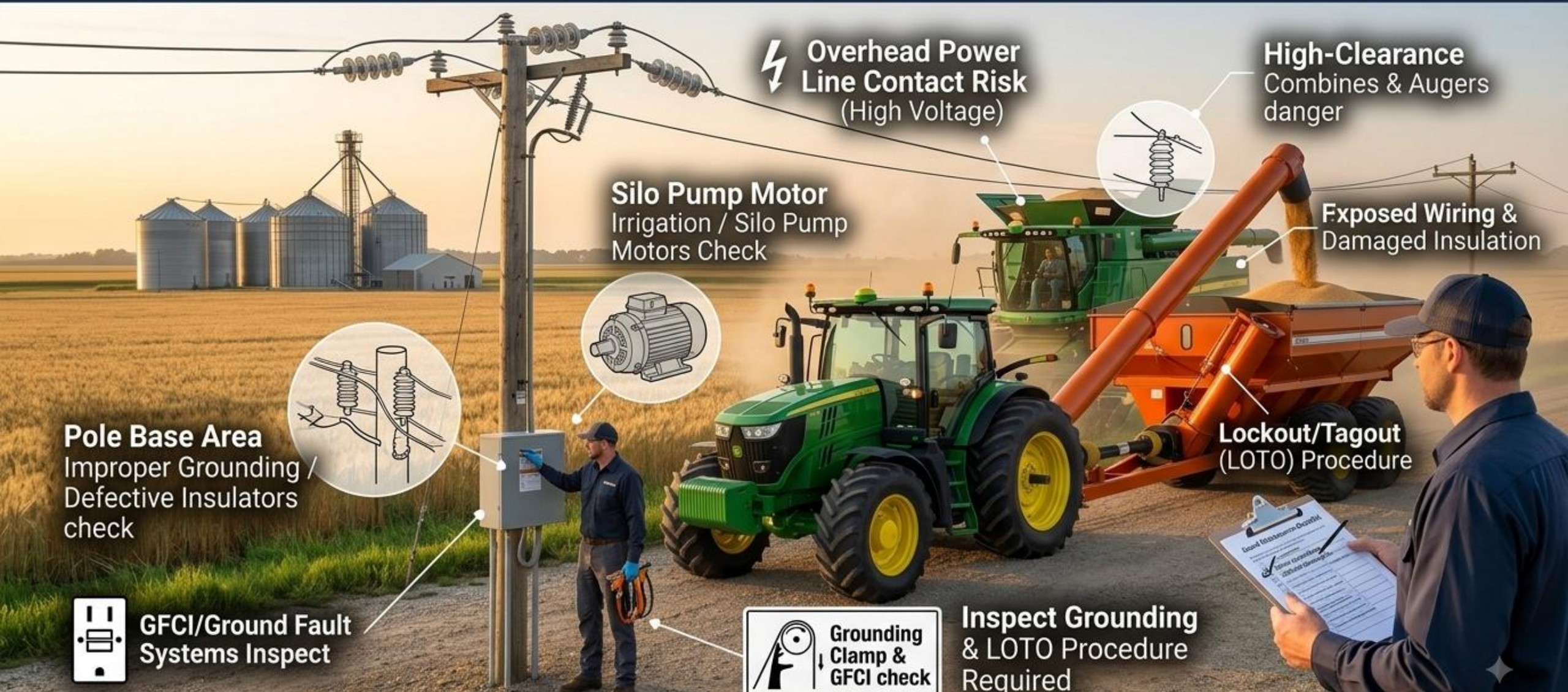
- **Education**

- Do not wear loose fitting clothing.
- How the machinery is used
- Are all the safeguards in place

- **Slow Down**

Electrocution

4th biggest danger on a farm



Agricultural Electrocutions

- Nearly 1 in 10 farmers will be electrocuted on the job
- Most common risk of electrocution is contact with an overhead power line
 - Even though the farm equipment has insulated line, it may have worn away in areas due to exposure to the elements
- Exposed underground power lines also pose electrocution risk, and defective wiring and extension cords are other common causes of electrocution, along with internal wiring in farm buildings

Paramedics will wait for power company

- Most important is remain in place.
- If you notice someone is being electrocuted
 - Do not grab them





Spray boom of tractor hits power line

66-year-old male was electrocuted when he was driving a tractor spraying his wheat field at approximately 1300. He raised the 45 left spray boom and steel boom made contact with a 7,200-volt electrical line which energized the tractor with electricity.

He attempted to get off while holding onto the rails of the tractor's ladder. When his feet made contact with the ground he was electrocuted.

Prevention

Be aware of your surroundings



Final Advice

Recognize Farm Dangers



(Tractors, PTO, Power Lines, Bins)

Have a Maintenance and Safety Checklist



Call 911 Quickly



Cultivating a Culture of Safety

Farm Safety Plan



Train ALL Staff
Safety, First Aid, and
Emergency Procedures



Review and Update Checklists
(New Equipment and Farms)



**Share Stories, build respect, and
prioritize shared safety plans**

Paramedics

Quick call of 911 is essential



CultivateSafety.org



More than 50 tasks



National Children's Center
for Rural and Agricultural Health and Safety



Operating a Tractor

Can youth do this job safely?

Youth must be able to do/have all of the following to perform this job safely:

- Reach and operate controls while wearing a seatbelt
- Strength to repeatedly operate controls
- Tall enough for **good field of vision** when seated on tractor
- Understand and consistently repeat a 10-step process
- Recognize a hazard, problem solve, and respond appropriately
- React quickly to hazards
- **Mature** enough to consistently do what is expected
- **Think through** actions and consequences before acting
- Avoid loose clothing, clothes with strings, tie back long hair
- Comply with the [working outdoors guideline](#)
- Safely demonstrate the job 4 to 5 times
- Maintain [two-way communication](#) link



Adult Responsibilities

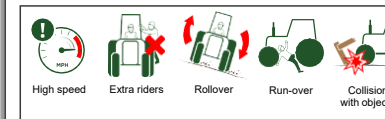
- Ensure tractor is mechanically sound and safety features are in place, including ROPS
- Review [developmental guidelines](#) to verify youth's ability to operate tractor
- Demonstrate how to safely drive tractor
- Provide appropriate training
- Educate youth to mount tractor using 3 points of contact
- Ensure work area is free from as many hazards as possible
- Educate youth on avoiding/addressing remaining hazards
- Ensure youth does not operate tractor after dark/in bad weather
- Train youth to call an adult if equipment malfunctions

Supervision

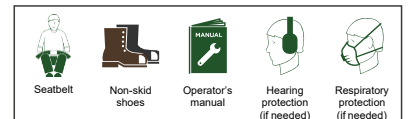
Note: Ensure tractor is sized appropriately for youth. Youth must be 16+ years to drive an articulated tractor. See [Tractor Operations Chart](#) for guidance.

- | | |
|------------------|--|
| 14-15 yrs | Intermittent supervision progressing to periodic |
| 16+ yrs | Periodic supervision |

Hazards



Protective Strategies



www.cultivatesafety.org

<https://doi.org/10.21636/infmc.nccrths.youthwork.operatetractor.g.2017>

Telling the Story Project

The **Telling the Story Project website** features farmers, agricultural workers, family, and community members who've been impacted by injuries, fatalities, or close calls.

Their experiences provide valuable information to learn what went wrong and how to prevent similar outcomes.

The common thread:

"We don't want this to happen to anyone else"

Telling the Story Project is a collaboration of four agricultural safety centers, three of which are funded by the National Institute for Occupational Safety and Health (NIOSH).



Tell a Story, Save a Life...

The **Telling the Story Project** is creating injury prevention messages that highlight personal stories and first-hand experiences.

*Raising farm safety awareness
through personal stories*

<https://tellingthestoryproject.org/>



Agricultural Safety & Health Research Lab

We are dedicated to reducing risks and improving safety in farming through research, innovation, and education.



<https://go.illinois.edu/ISSA-lab>

Grain entrapment is a frequently fatal agricultural hazard that occurs when workers enter silos to clear blockages, a problem that has recently seen a disproportionately high number of cases in Illinois. To combat this issue, the program is researching high-pressure air extraction methods, developing machine learning models to predict entrapments, and offering specialized safety training.

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