Injury Prevention for Farmers

February 16, 2021

Charlotte Harris, MD, Orthopedic Surgeon
Amy Johnson, NP-C, Nurse Practitioner
Hannah Harris, OTD, Occupational Therapist

Technical Logistics

Zoom Webinar

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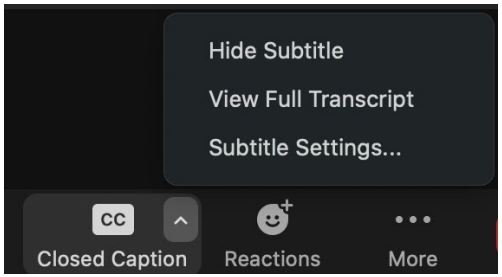
Tech Support

- Contact Katie Trozzo in the chat or via email for support ketrozzo@vt.edu

Live Captioning

- Enable Captions by clicking the CC button then “View Full Transcript”
- Check out the Verb It link in the chat for a customized caption viewing experience



Recording

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Zoom Tools

Q & A

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Chat

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AgrAbility Farm Injury Prevention

Dr. Amy Johnson, DNP, FNP-C

February 16, 2021

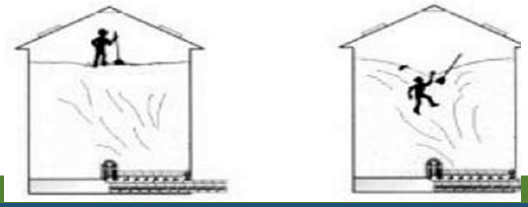
The Picture of Agriculture

- Average age = 58-59 years old
- VA - 36% > 65 yo
- 3rd most dangerous job
- 150,000 disabling injuries
- 10-40% risk of injuries
- 5% permanent injury
- Chronic health conditions
- Medications

http://agsafety.tamu.edu/files/2011/06/US-AGRICULTURE-FATALITY-STATISTICS1.pdf
https://www.osha.gov/dsg/topics/agriculturaloperations/

Traumatic Injuries

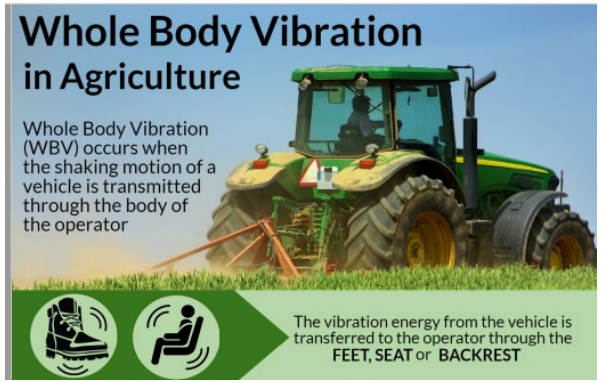
- Tractors
  - 50% of all fatalities
  - Rollovers, run-overs, roadway collisions
  - ROPS – 38 -> 99% improved outcome
    - 2014 – 62% equipped
- Machinery
  - Amputations
    - 1:10 Lifetime risk
    - Upper limb 65%
  - PTO Shaft
    - 540 rpm – 9/sec
- Livestock
  - Non-fatal injury
  - Human interaction
- Grain Bins/Entrapment
  - Submersion beyond knees prevent self rescue
  - Full submerged in < 20 sec
  - Full engulfment > 2000 pressure
  - Gasses, Limited Oxygen



Slips, Trips, Falls, Creaks and Cracks

- Uneven terrain
- Wet surfaces
- Heights
- Machinery

- Cumulative Trauma
  - Vibration
    - Tractors
    - Machinery
    - Climbing
    - Positioning



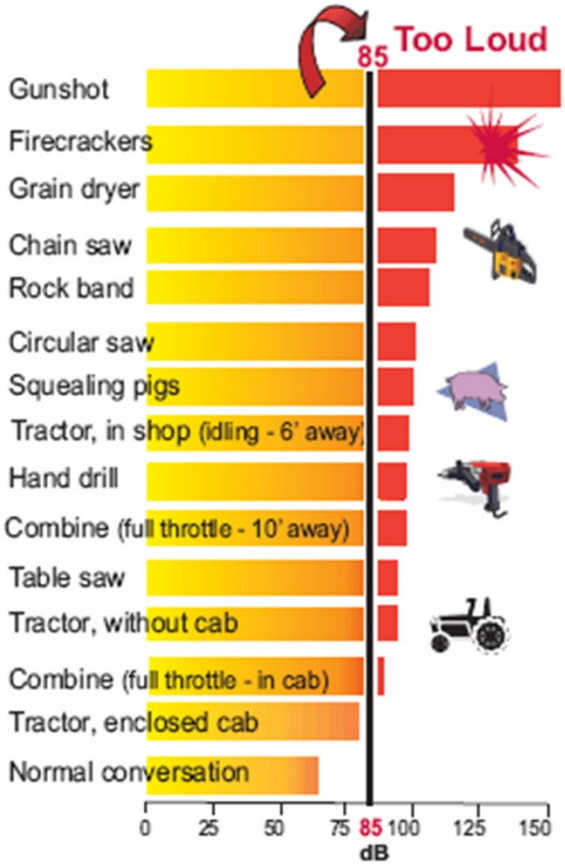
Eye Safety

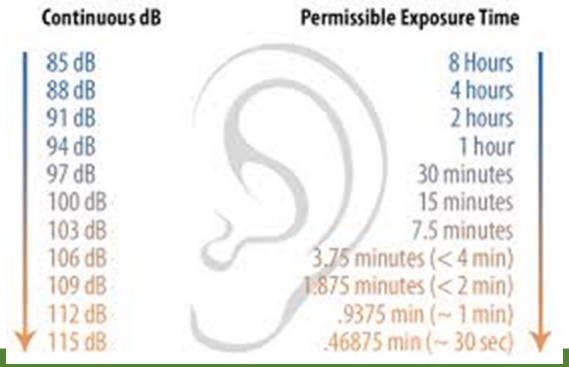
- Flying debris
- Dust
- Chemicals
- Sun Damage
- Light Damage

- Safety glasses
- Sun glasses
- Welding helmets

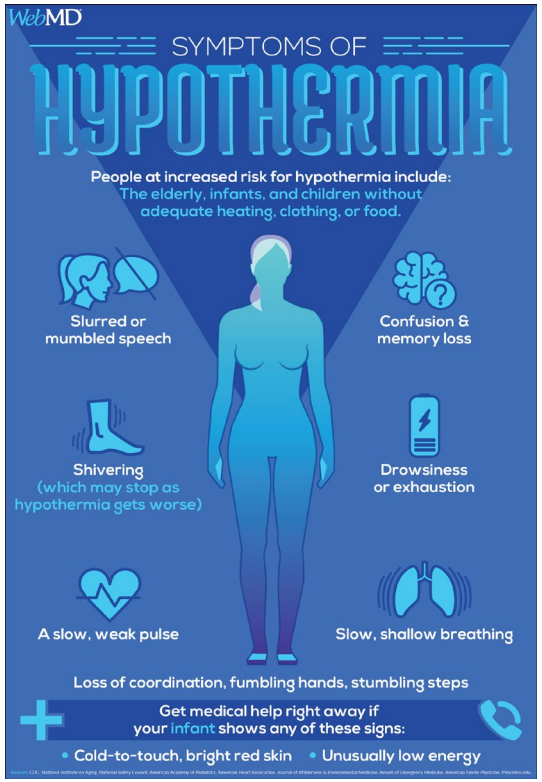
Hearing Protection

- Majority of farmers have some degree of hearing loss
- Intensity of sound and length of exposure
- “Stopped up” or ringing in ears





The Elements



Prevention is Key

- Equipment Maintenance
  - SMV
  - PTO Shields
  - Rollover Protection
  - Lighting
  - Fire Extinguishers
- Safety Checks
  - Storage
  - Clutter
  - Security
  - First Aid Kit
- Emergency Plan
  - Contact numbers
  - Field locations, GPS Coordinates
  - Access points
  - Daily schedule
  - Expected time of return
- Stop and Think!


CAUTION
HAZARDOUS
MATERIAL
STORAGE AREA


Mtn
Dew

Interesting fact…

- Stepping over a PTO shaft will save you 3 seconds
- 100 times = 5 mins
- A farmer watched completing a task
- His answer: None
- Reality: 10 times he put his life on the line!

Thank You!

Dr. Amy Johnson, DNP, FNP-C

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Dr. Charlotte Harris, MD

Topics of Discussion

- Preventing tractor roll over injuries
- Proper tractor driving on hilly land and on roads
- Safe use of augers and machinery
- Cumulative trauma—minor injuries that turn into major injuries

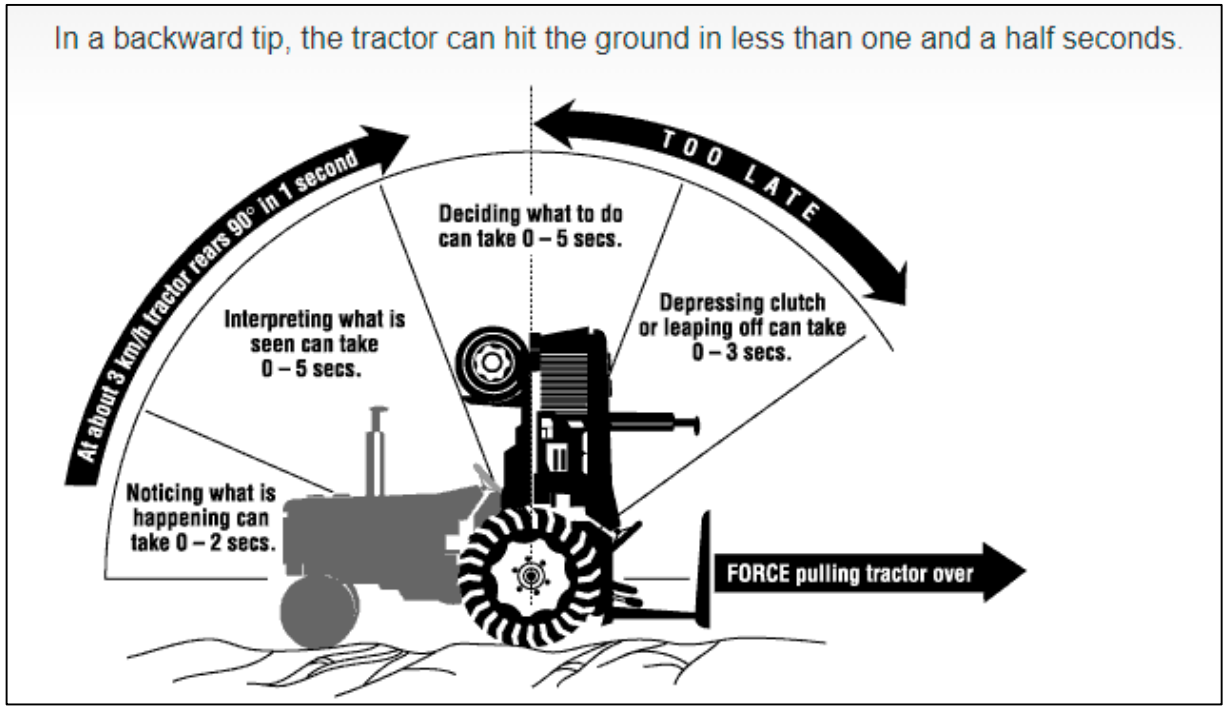
Tractor Safety

- 50% of tractor roll-overs end in death
- Crush injuries to chest and pelvis are common
- Paralysis from spine fracture can occur

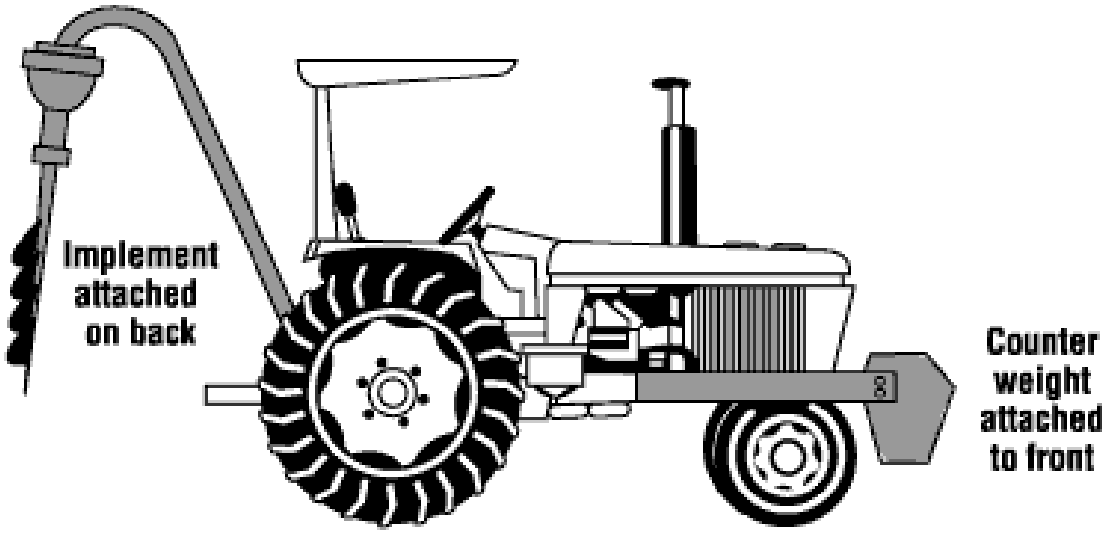
This is very important!!

- Rollover cages and seatbelts save lives.
- Proper driving on hillsides and highways save lives.

Preventing Tractor Rollover & Injury



Preventing Tractor Rollover & Injury



Preventing Tractor Rollover & Injury

- Turn downhill, not uphill, if stability becomes uncertain on slopes or ramps.
- Keep loads, implements, or loader buckets close to the ground during transport or when turning.
- Keep side-mounted implements on the uphill side.
- Driving the tractor with a loaded front-end loader in the raised position increases risk of rollover by raising the center of gravity.

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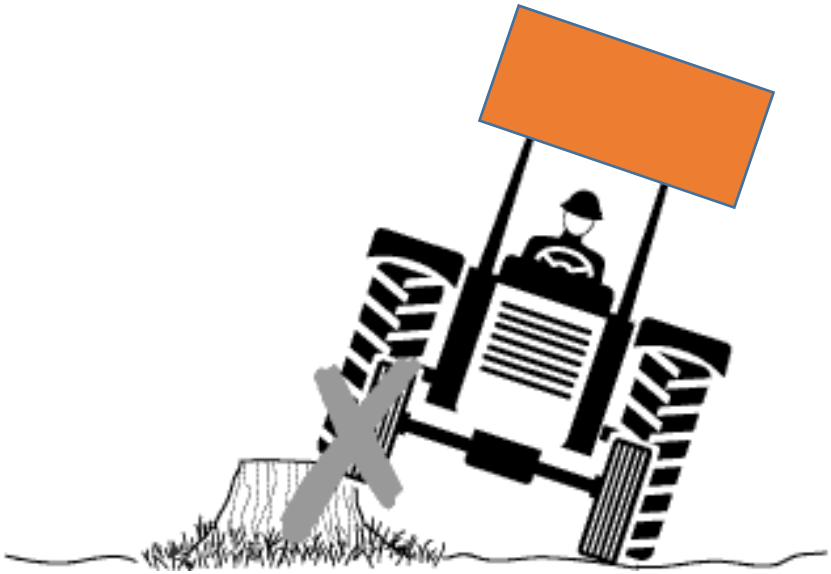

Preventing Tractor Rollover & Injury

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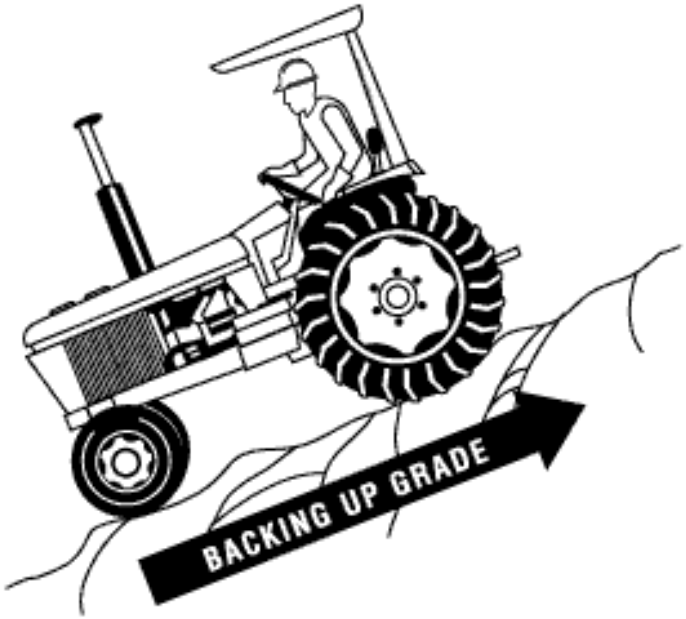
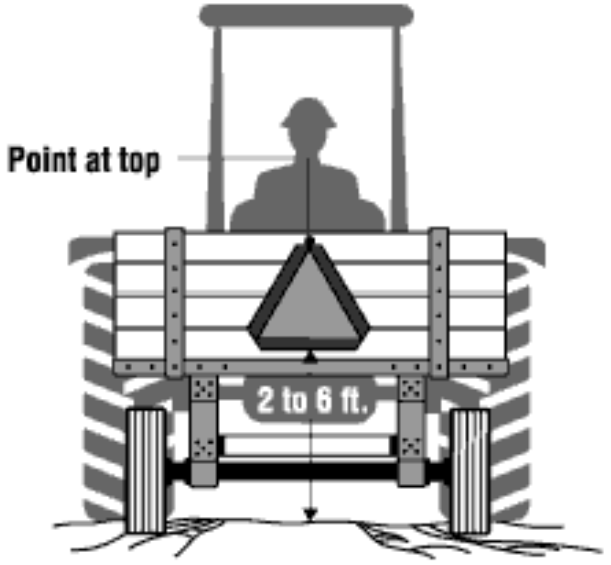
Preventing Tractor Rollover & Injury

- Match speed to conditions and loads.
- Slow down when pulling rear-mounted equipment.
- Drive forward down steep slopes and back up them.
- Never engage clutch while driving downhill.
- Use low gears to prevent free wheeling.



Tractor Safety on the Road

- Use escort vehicles if you must travel busy routes.
- Lock break peddles together for even operation
- Use throttle rather than break to slow down if towing machinery to avoid jack-knifing equipment.
- Descend a hill in the same gear you would use to ascend when carrying a load.



Positioning of Slow-Moving Vehicle Sign

Auger Injuries

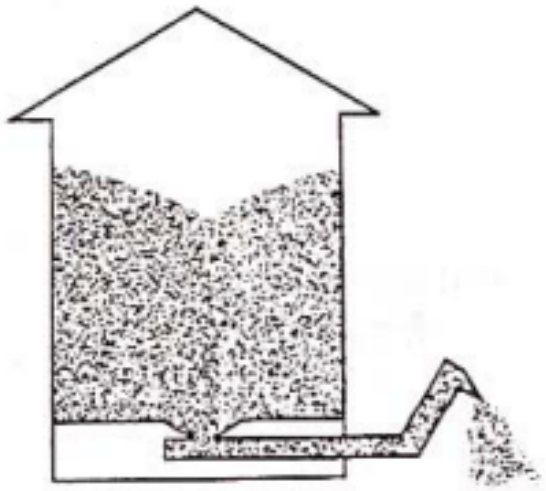
Cuts, fractures, loss of limbs, or death

- Entanglement in the exposed intake screw, drive belt, or PTO
- Being struck by an uncontrolled spinning crank used to raise or lower the auger
- Leave all safety guards in place and replace when worn or broken

Electrocution from overhead wires

➢ Injuries more common among inexperienced youth and should never be operated by any one under 18 years of age.

Example: 16-year-old in the grain bin



Machinery, Belts, & Hitches

- Understand your equipment and read the operating manual
- Don’t remove any protective guards or shields and replace those that are worn or broken
- Don’t bypass safety mechanisms or take risks (farming is already risky!)
- Younger people may not understand how machinery operates nor the devastating injuries that can happen
- Older people may take more short cuts due to fatigue and arthritis

Cumulative Soft Tissue Trauma

The Itis Brothers

1. Tendonitis
2. Bursitis
3. Arthritis

Back Problems

- Proper lifting of reasonable loads
- Age, weight, and smoking

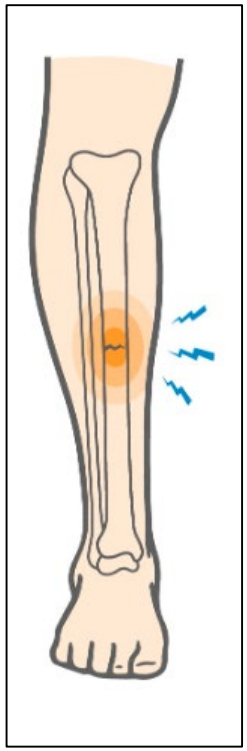
Cumulative Bone Trauma

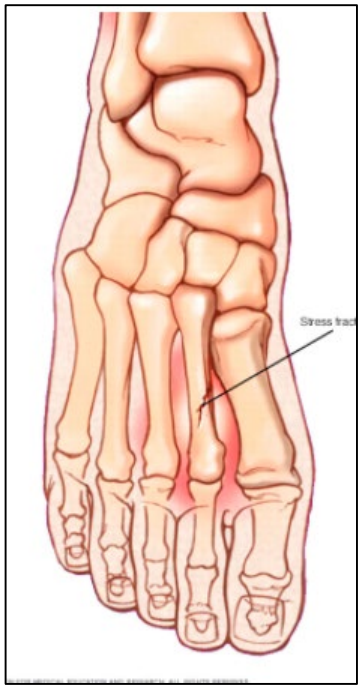
Stress/Incomplete Fractures

- Pain is a protective mechanism
- Will heal with proper rest
- Will break through with continued loading

- Common scenarios: Repetitive jumping off tractors/wagons, hitting hitches, a direct blow

- Example: Sledge hammer & the pool
- Example: Liza & the tiller





https://upswinghealth.com/conditions/stress-fracture-of-the-tibia/#/
https://www.mayoclinic.org/diseases-conditions/stress-fractures/symptoms-causes/syc-20354057#dialogId17503980

Summary

- Don’t rush!
- Wear a seatbelt and use a roll cage with tractors
- When you’re tired, take a rest and drink water
- Never bypass safety mechanisms
- Replace broken safety guards and screens

References

- https://www.ccohs.ca/oshanswers/safety_haz/tractors/road.html
- https://www.uaex.edu/publications/pdf/FSA-1079.pdf
- https://www.mayoclinic.org/diseases-conditions/stress-fractures/symptoms-causes/syc-20354057

Agriculture Injuries By the Numbers

Table AI-13. National estimates of agricultural work-related injuries to adults (20 years and older) on US farms by source of injury

Injury Source	2001	2004	2009	2012	2014
Machinery	7,506	7,951	3,557	3,399	5,287
Persons/plants/animals/minerals	32,753	26,955	10,889	25,367	25,323
Structures/surfaces	6,295	6,818	5,384	10,450	2,890
Tools/instruments/equipment	9,899	9,226	2,857	4,398	6,229
Vehicles	9,154	11,122	5,178	8,758	5,345
Other sources (1)	21,897	18,257	19,468	8,685	13,310
Total (2)	87,503	80,329	47,332	61,057	58,385

1 Includes chemicals/chemical products, containers/furniture/fixtures, parts/materials, and other/unknown sources

2 Estimates may not sum due to rounding

Source: Occupational Injury Surveillance of Production Agriculture Survey, 2001, 2004, 2009, 2012 and 2014.

(CDC, 2018)

Agriculture Injuries By the Numbers

Table AI-9. National estimates of agricultural work-related injuries to adults (20 years and older) on US farms by body part

Body Part	2001	2004	2009	2012	2014
Head/skull/face/neck	9,582	7,931	4,878	6,829	5,212
Shoulder/chest/back/abdomen/pelvic region	16,754	18,484	9,169	10,699	14,959
Arm	3,609	4,687	2,214	4,623	1,677
Hand/wrist/fingers	19,099	16,713	10,246	10,325	10,315
Leg	11,747	10,498	6,124	8,002	7,253
Foot/ankle/toes	9,979	7,722	6,473	6,008	5,088
Multiple body parts	7,868	9,652	3,119	3,991	3,503
Other body parts (1)	8,864	4,643	5,109	10,580	10,378
Total (2)	87,503	80,329	47,332	61,057	58,385

1 Includes internal injuries and other/unknown body parts

2 Estimates may not sum due to rounding

Source: Occupational Injury Surveillance of Production Agriculture Survey, 2001, 2004, 2009, 2012 and 2014.

(CDC, 2018)

Agriculture Injuries By the Numbers

Table AI-7. National estimates of agricultural work-related injuries to adults (20 years and older) on US farms by nature of injury

Nature of Injury	2001	2004	2009	2012	2014
Bruise	8,856	9,720	4,744	5,307	5,059
Sprain/strain/torn ligament	16,638	17,548	10,114	8,720	13,247
Fracture	17,340	12,175	7,500	11,416	9,063
Cut	14,791	10,775	6,963	6,842	11,119
Multiple injury	9,623	9,839	5,548	3,747	3,229
Other injuries (1)	20,253	20,272	12,464	25,025	16,668
Total (2)	87,503	80,329	47,332	61,057	58,385

1 Includes scrape/abrasion, dislocation, puncture/stab/jab, traumatic rupture, crush/mangle, amputation, nerve injury, burn/blister/scald, traumatic brain injury, and other/unknown injuries
2 Estimates may not sum due to rounding

Source: Occupational Injury Surveillance of Production Agriculture Survey, 2001, 2004, 2009, 2012 and 2014.

(CDC, 2018)

Agriculture Injuries By the Numbers

Table AI-15. National estimates of agricultural work-related injuries to adults (20 years and older) on US farms by injury event and sex

Injury Event	Sex	2001	2004	2009	2012	2014
Violence and other injuries by persons or animals	Male	9,879	8,560	1,922	5,770	5,089
	Female	4,311	2,683	2,633	7,578	2,605
	Unknown	25	53	0	0	0
Falls, slips, trips	Male	11,633	12,020	4,146	6,666	7,063
	Female	4,378	3,195	1,962	2,373	3,569
	Unknown	0	0	0	0	0
Contact with objects/equipment	Male	27,731	19,834	10,060	10,829	13,127
	Female	3,634	1,796	2,770	3,038	2,887
	Unknown	101	119	0	0	0
Other events (1)	Male	16,774	21,871	15,984	18,907	14,404
	Female	5,361	6,735	7,486	5,119	4,397
	Unknown	3,676	3,464	368	778	5,242†
Total (2)	Male	66,017	62,284	32,112	42,171	39,684
	Female	17,683	14,409	14,851	18,108	13,459
	Unknown	3,802	3,636	368	778	5,242†

† This estimate is considered unstable due to a high standard error

1 Includes transportation incidents, fires/explosions, exposure to harmful substances/environments, overexertion/bodily reaction, and other/unknown events

2 Estimates may not sum due to rounding

Source: Occupational Injury Surveillance of Production Agriculture Survey, 2001, 2004, 2009, 2012 and 2014.

(CDC, 2018)

Common Acute, Overuse, and Chronic Injuries/Diseases seen in OT Practice

- **Tendon lacerations, tears, and inflammation in shoulders, wrists, and hands associated with overuse**
- Head injuries resulting in loss of use of one, or more, limbs (may include impaired vision)
- Spinal cord injuries
- Amputations
- Neck pain and musculoskeletal injuries
- **Injuries to the lower back**
- **Arthritis pain and joint changes**

Overuse Injuries: Tendon Tears and Tendonitis

Name of Injury	Symptoms	Potential Ag Related Risk Factors or Causes	Impact on Ag Related Activities
Rotator Cuff Tear	Dull ache deep in the shoulder, weakness of the arm, and challenges reaching over head or behind the back	Repetitive overhead activity or heavy lifting over a long period of time	Inability to properly use ag tools and perform regular tasks Increased risk for injuries to the neck and lower arm May impact rest

Overuse Injuries: Tendon Tears and Tendonitis

Name of Injury	Symptoms	Potential Ag Related Risk Factors or Causes	Impact on Ag Related Activities
Lateral Epicondylitis (Tennis Elbow) 	Pain, burning, or ache on the outside of the elbow	Fatigue and injury to the shoulder can increase use of the elbow and wrist. Forceful gripping, lifting with the palms up or forceful wrist extension	Inability to use the arm and wrist to maintain desired grasp on tools and equipment May impact rest

Overuse Injuries: Tendon Tears and Tendonitis

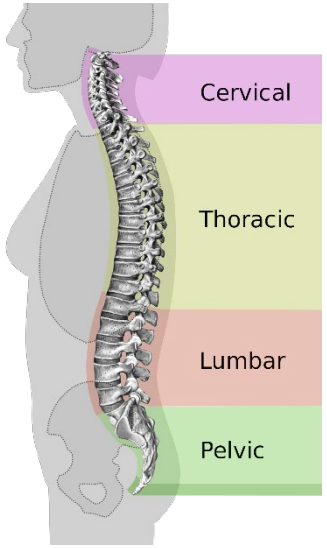
Name of Injury	Symptoms	Potential Ag Related Risk Factors or Causes	Impact on Ag Related Activities
Carpal Tunnel Syndrome (CTS) 	Tingling, numbness, severe pain in the wrist, and hand, primarily the thumb, index, and middle fingers. Pain often occurs at night	Repeated or prolonged bending, turning, and movement of your hands	Inability to make a fist, lack of strength in the hand resulting in inability to hold objects or perform manual tasks

Overuse Injuries: Tendon Tears and Tendonitis

Name of Injury	Symptoms	Potential Ag Related Risk Factors or Causes	Impact on Ag Related Activities
Hand and Wrist Tendonitis and Bursitis 	Pain when moving the hand or fingers, swelling, small lump or swelling that may be warm or tender to the touch	Repeated movement and strain of the wrist and hands	Reduced grasp on necessary tools and equipment Permanent changes to the joint

Injuries to the Lower Back

- Common causes
  - **Lifting objects <25lbs**
  - **Repeatedly lifting lighter objects**
  - **Repetitive twisting when moving objects**
  - **Awkward posture while working**
  - Prolonged driving on farm equipment causing vibration
  - Slips, falls, and other traumatic injuries working in adverse conditions



Mild and short length of time

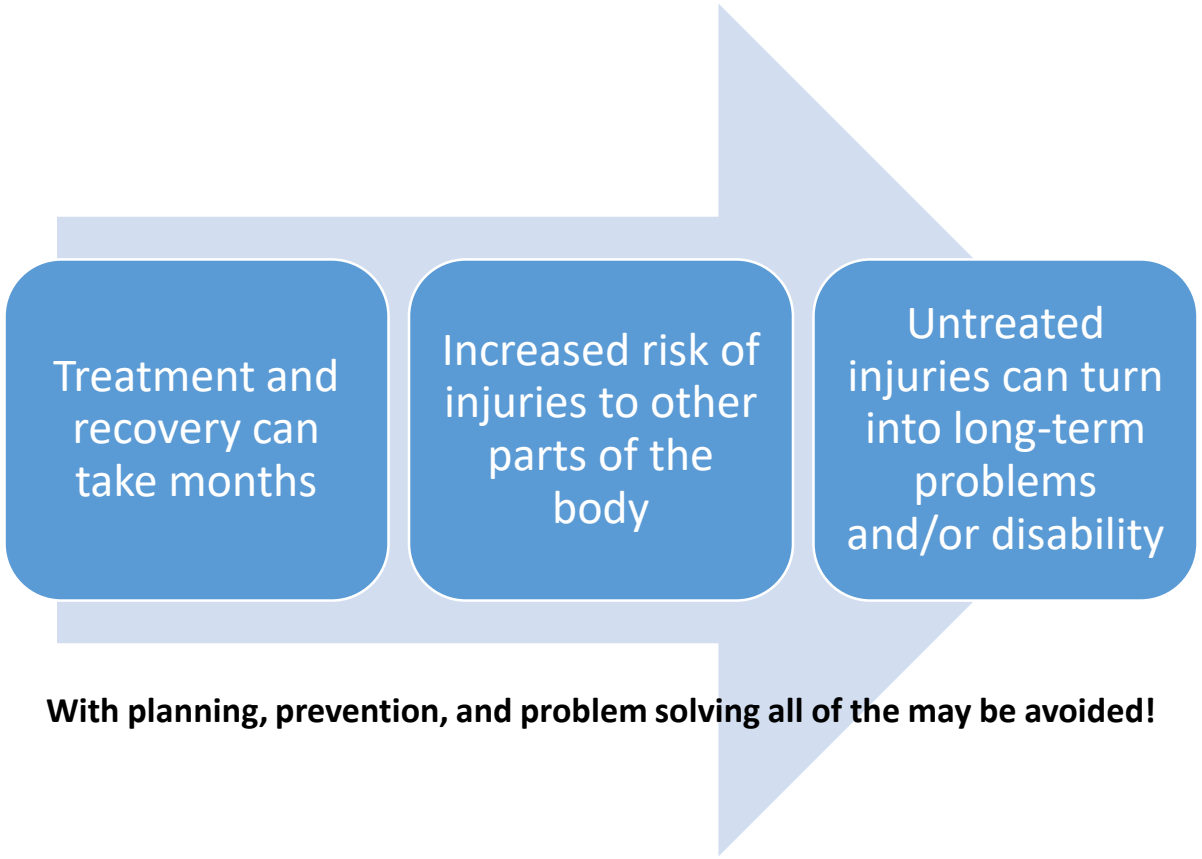
Severity of symptoms

Incapacitating, potentially leading to permanent disability

Arthritis

- Swelling and tenderness of one, or more, of your joints
- Most common symptoms
  - Pain
  - Stiffness
- Risk factors we can control:
  - Weight
  - Infection
  - **Joint injuries from overuse**
  - **Occupations that involve repetitive bending, squatting, and twisting**
  - Smoking

Take Home Points

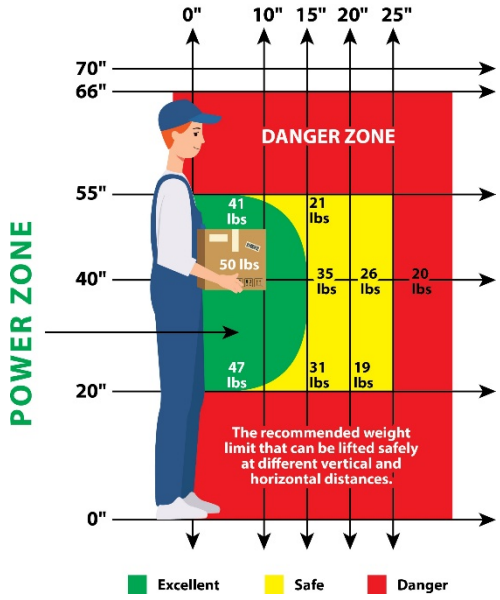


With planning, prevention, and problem solving all of the may be avoided!

Strategies and Techniques to Reduce the Risk of Injury

- **Identify high risk activities**
- **Modify, or change, the task or the work environment**
- **Use adaptive and ergonomic tools or equipment that promote optimal posture**
- **Use proper lifting techniques**
- **Complete stretching routines as prescribed/recommended by a healthcare professional**

Strategies and Techniques



- **Use ladders and lifts for tasks that may require overhead work**
- **Build work surfaces that are elbow height and allow space for forearms to rest on top**
- **Store tools and frequently used items between knee and shoulder height**
- **Keep frequently used items or tools within 17” of your body**
- **For continuous tasks, build in rest breaks approximately every 20 minutes**

Strategies and Techniques

- Use long handled tools or adapt existing ones to reduce stooped posture or repeated bending

(Image 1: Ergonomic handled added to shovel)

(Image 2: Ergonomic handle for push broom)

Strategies and Techniques

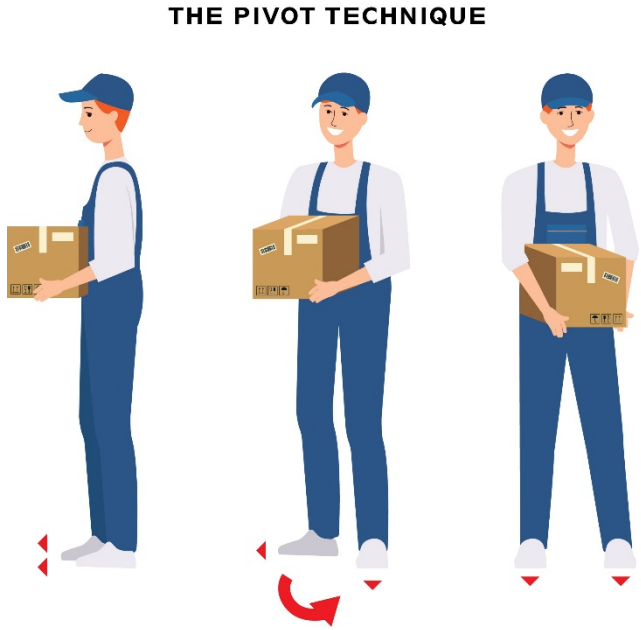
- Use containers with handles
- Redesign the load so they can be carried close to the body
- Use dollies, pallet trucks, utility carts, or roller conveyors when transporting loads more than a few feet or repeatedly

(Image 3: Use of dolly and long handles for moving heavier loads)

Strategies and Techniques: Proper Lifting

- Move close to your work area to reduce the need to lean/bend forward
- Keep lifts between just above knee level and shoulder level when possible
- Keep the load close to your body and lift with legs instead of back

Strategies and Techniques: Proper Lifting



Strategies and Techniques

- Look for ergonomically-designed tractor seats
- Use proper mounts and dismounts
- Use wide angle mirrors and swivel seats to avoid twisting of the spine

Strategies and Techniques

Hand Tools Requiring Force

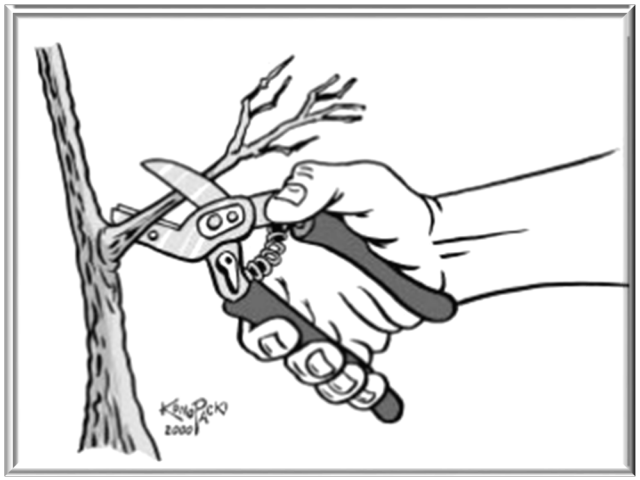
- Handle size should allow the hand to grip all the way around so that thumb and forefinger overlap by 3/8”
- Handle diameter should range from 1 3/8” for small hands and 2 1/8” for larger hands
- Cover handles with smooth, slip-resistant material (plastic or rubber)

(Image 4: Proper grip for hand tools)

Strategies and Techniques

Dual Handled Tools

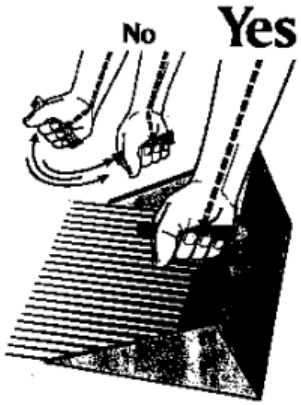
- Handles should be at least 4” in length
- Tools should have spring return to maintain open position
- Handles should be almost straight without finger grooves



(Image 5: Spring return for dual handled tools)

Strategies and Techniques

- Use tools that promote straight/neutral position of the wrist



(Image 6: Demonstrates neutral position of wrist when using a blueberry rake)

Examples

Challenge

Improvement

Examples

Challenge

Improvement

References

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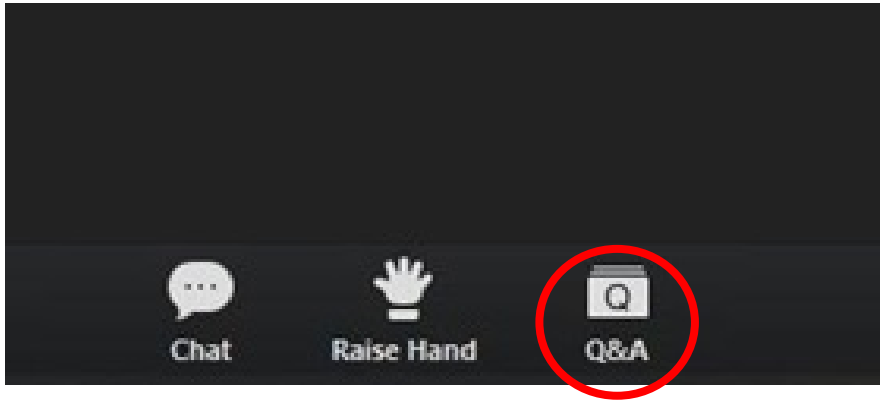
Images

- Image 1: http://www.agrability.org/wp-content/uploads/2016/04/Arthritis_Gardening_Web_sm.pdf
- Image 2: https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/442/442-085/BSE-316.pdf
- Images 3-6: https://www.cdc.gov/niosh/docs/2001-111/pdfs/2001-111.pdf
- All other images obtained via Creative Commons

Q & A Session

Please type your question using the Q & A feature noting if you want to address a specific panelist (Charlotte, Amy, Hannah)



Upcoming Events

February 18: Feeding the Soil with Pam Dawling

February 22: Yoga for Farmers

March 3: Building Soil Health to Sustain Virginia's Farms and Protect Water Quality: An Organic Approach

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Webinar Evaluation Link

https://tinyurl.com/17ie34av

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