All the Ways to Die on a Farm…Well Almost All

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Risk Taking Behaviors? Not Farmers! That's only for City Folks!

What Risks do you take?


BUTLER

What is Risky Behavior in Agriculture?

Same as everywhere else

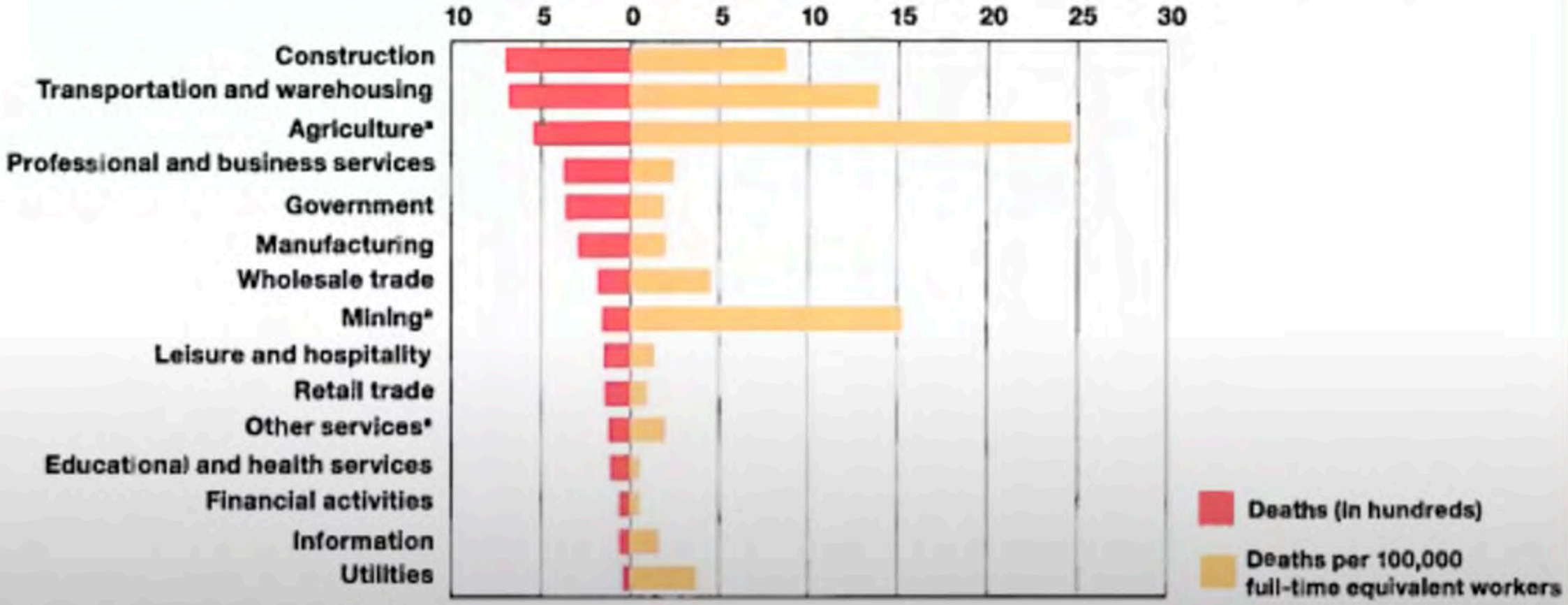
- Lack of judgement
- In too much of a hurry/not paying attention
- Not using safety equipment
- “It won’t happen to me”
- “I’ve always done it this way”
- Not thinking of the consequences

Risky?

Children

- About 115 children from 0 to 18 years of age have died on an annual basis recently in agricultural workplaces, but only 20 percent were actively working. The other 80 percent were bystanders or playing in agricultural settings.
- The current rate of child fatalities on farms is about half of what it was a generation ago. Grassroots efforts like farm safety day camps, Extension workshops and the Farm Safety For Just Kids organization are among the main contributors to the reduction in childhood fatalities.

Occupational unintentional-injury-related deaths and death rates by industry, United States, 2011



*Agriculture includes forestry, fishing, and hunting. Mining includes oil and gas extraction. "Other services" excludes public administration.

Table 1. Average annual non-fatal injuries and injury rates in agriculture production in the U.S., 2001 and 2004.

	20-54 Years Old		55+ Years Old		Age Unknown
	Number	Rate*	Number	Rate*	Number
Total	52,715	4.6	26,573	4.5	4,652
U.S. Regions	Number	Rate*	Number	Rate*	Number
Northeast	2,667	2.9	1,070	2.7	467
Midwest	18,678	5.3	9,516	4.3	1,119
South	20,220	5.7	11,766	5.5	874
West	11,152	3.2	4,222	3.8	2,192
Nature of Injury	Number	%	Number	%	Number
Fracture	9,222	17.5	5,449	20.5	87
Sprain/Strain	11,928	22.6	4,715	17.7	450
Multiple	4,980	9.5	4,556	17.2	195
Cut	8,220	15.6	4,277	16.1	286
Bruise	6,485	12.3	2,770	10.4	33
Other	11,880	22.5	4,806	18.1	3,601
Days of Restricted Work Activity	Number	%	Number	%	Number
None	6,529	12.4	3,722	14.0	184
<1 day	7,731	14.7	3,111	11.7	50
1 – 6 days	16,952	32.2	5,205	19.6	257
7 – 13 days	3,977	7.5	1,651	6.2	0
14 – 27 days	2,786	5.3	1,952	7.4	39
1 – 3 months	7,626	14.5	5,447	20.5	41
> 3 months	6,601	12.5	5,161	19.4	165
Unknown	513	1.0	323	1.2	3,916
Number of Days Hospitalized	Number	%	Number	%	Number
1 – 7 days	7,477	89.4	3,593	68.3	76
8 – 14 days	544	6.5	539	10.3	20
15 – 21 days	109	1.3	545	10.4	0
> 21 days	0	0	164	3.1	0
Unknown	230	2.8	416	7.9	70

* Rate per 100 workers

Source: NIOSH Occupational Injury Surveillance of Production Agriculture

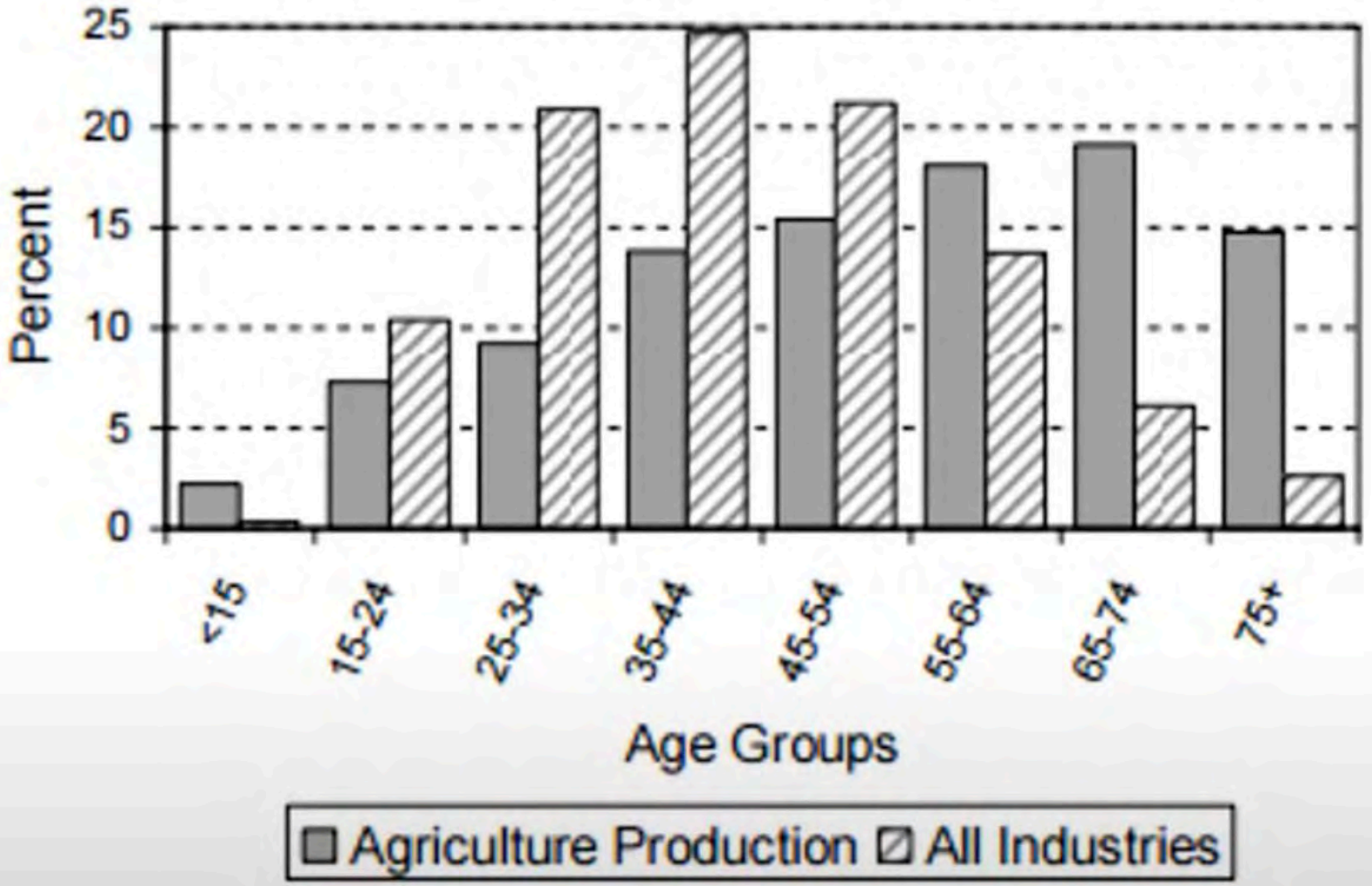
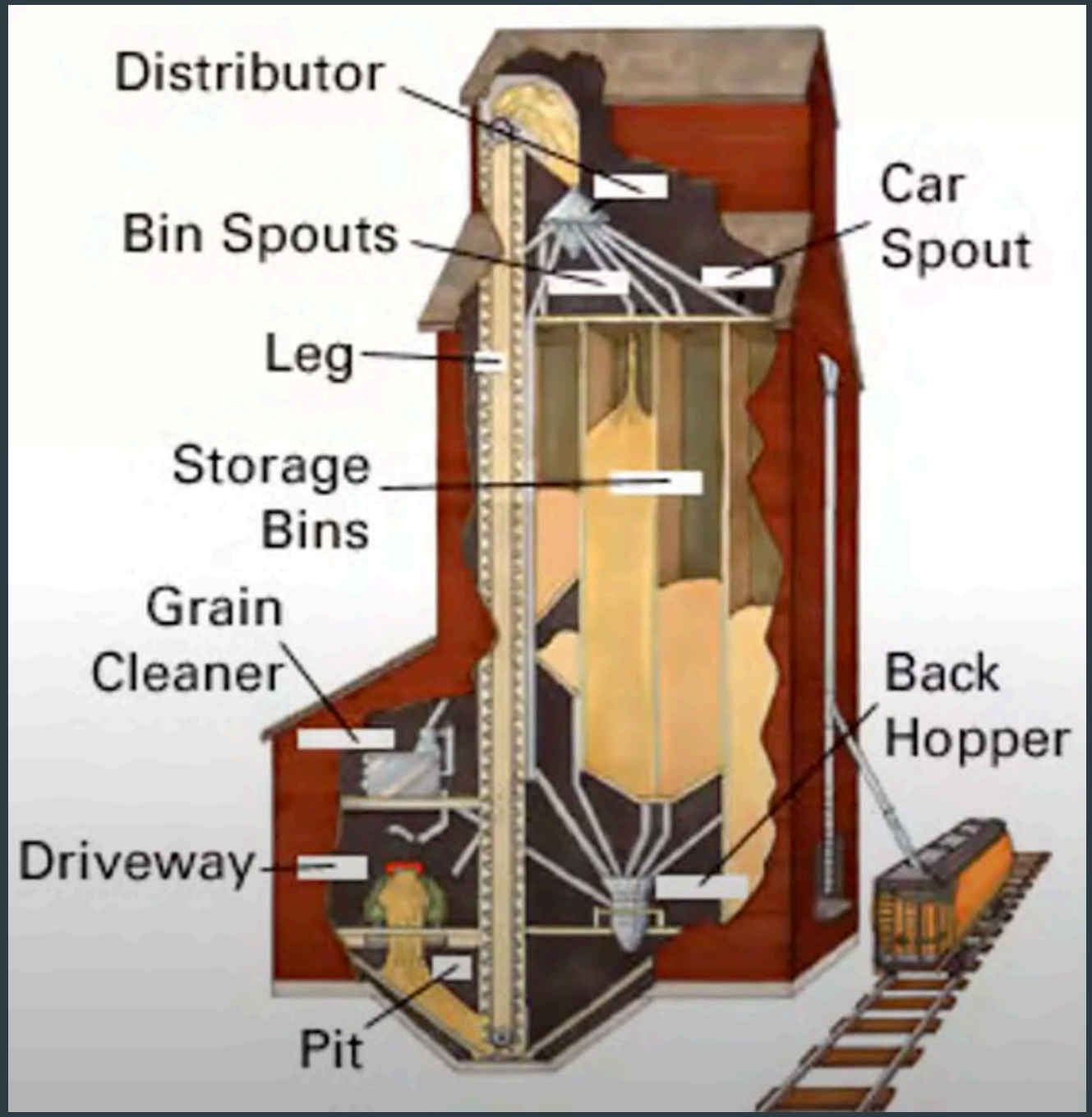


Figure 1. Occupational deaths by age group for agriculture production and all industries, U.S. 1992-2004.

Source: BLS Census of Fatal Occupational Injuries (data excludes N.Y. City)

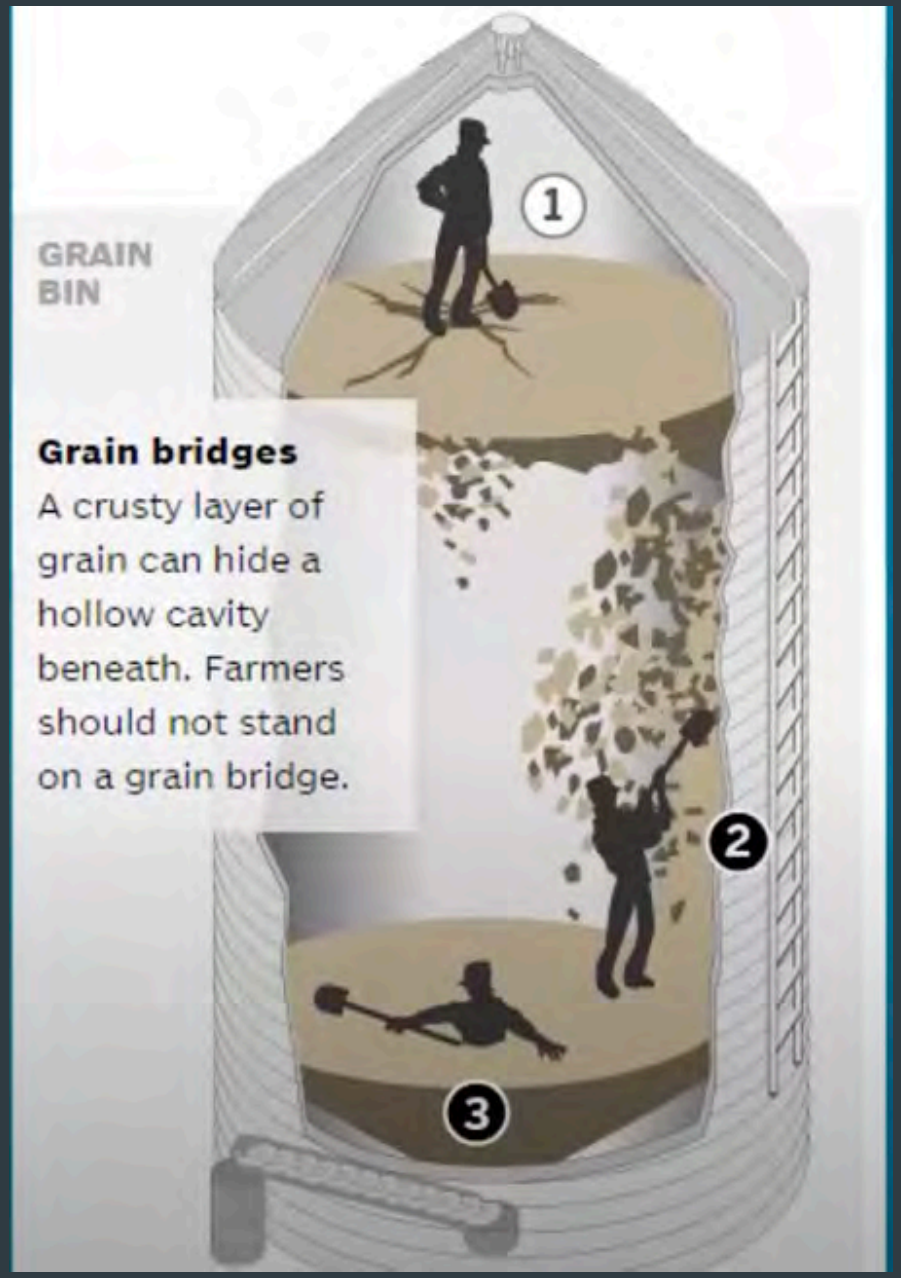
Grain Bin/Elevator Accidents


Distributor
Bin Spouts
Leg
Storage Bins
Grain Cleaner
Driveway
Pit
Car Spout
Back Hopper

Grain Bin/Elevator Accidents

US Department of Labor Statistics

- In past 50 years, more than 900 cases of grain engulfment have been reported
- Fatality rate of 62 percent
- In 2010, at least 62 US works were killing in grain engulfments
  - Highest number on record


GRAIN BIN
Grain bridges
A crusty layer of grain can hide a hollow cavity beneath. Farmers should not stand on a grain bridge.
1
2
3


SCUE

Grain Bin/Elevator Accidents

Key Points

- Know how long a patient has been entrapped
- Anticipate possible crush injuries
- Anticipate that the patient has inhaled significant grain dust or other particulate
- Understand that successful extrication takes specialized training and equipment

Grain Elevator Explosions

Grain Elevator Explosions

- Organic Dust
- Oxidant
- Source of Ignition

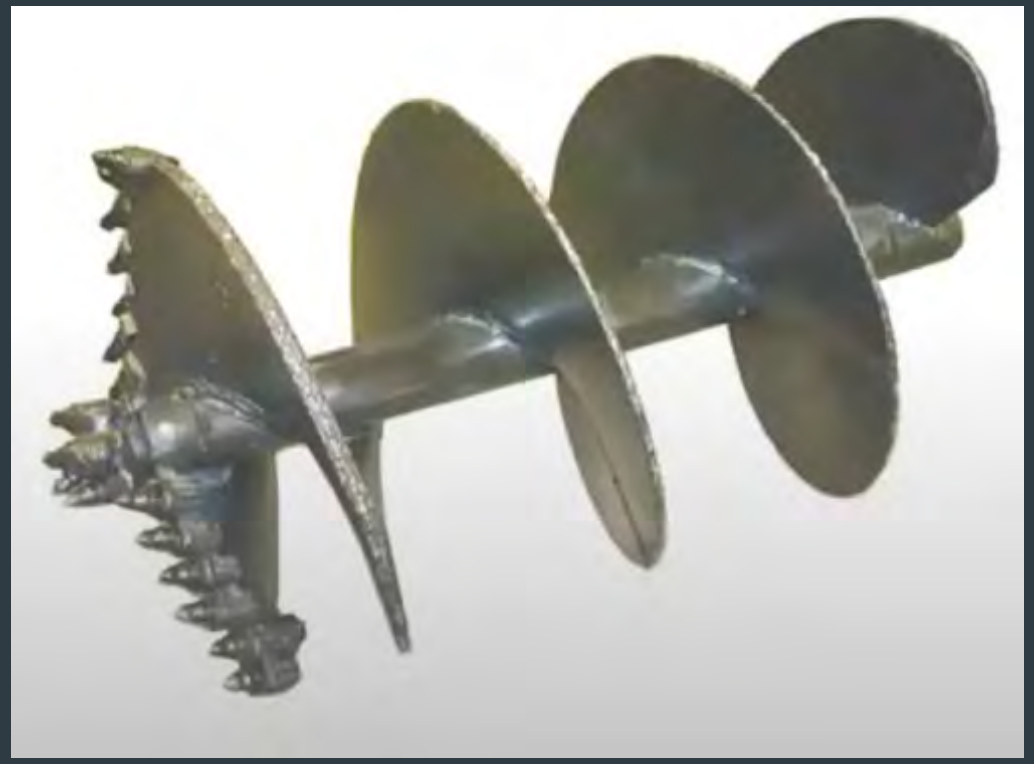
- Low Explosive Limit (low dust)
- Upper Explosive Limit (Low oxidant)

Grain Elevator Explosions

- Grain elevators with enough dust in the air may explode with a source of ignition (spark)
- When one portion of the elevator explodes, other explosions may also be triggered leading to more structural instability

Augers

- Amputations
- Lacerations or fractures
- Electrocutions
- Death



Augers

Key Points

- Augers cause significant injuries
- The extrication process for auger entrapments may result in significant scene times
- Tourniquets and junctional tourniquets should be used when appropriate

PTO’s (Power Take-Offs)

A

B

Figure 1 - Preoperative photographs of the degloved penile skin showing placement of a Foley catheter (A) and the degloved scrotum with no noticeable injury to the testicles or cord structures (B)

Key Points

- Never step over a PTO, especially when the cover is off
- Encourage your community to be proactive in keeping safety covers on equipment
- PTO injury patients are very likely to have head/neck/spinal injuries and may have been thrown a significant distance

Tractor Rollovers

“More than 1,700 U.S. farmworkers died in tractor accidents from 2003 to 2013 and the most common thing to go wrong was a rollover. Those accidents accounted for 40 percent of all tractor fatalities…”

Key Points

- Encourage the use of roll over protection systems (ROPS) in your community
- Anticipate crush injuries as well as head/neck injuries in tractor rollover patients

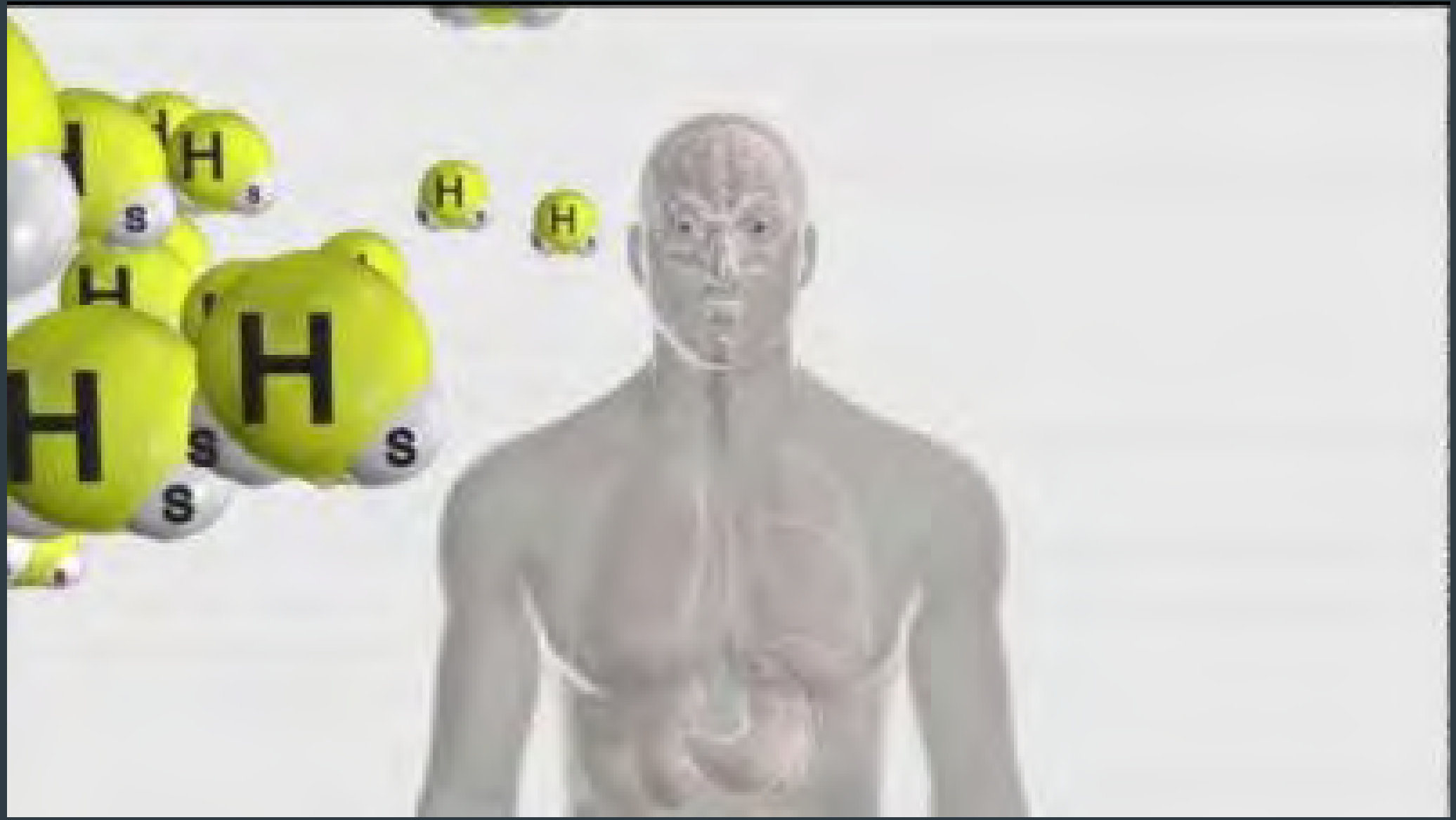
Front Loaders

Natural or Manmade Obstacles
How much does this weigh?

Key Points

- Anticipate crush injuries and head/neck/spinal injuries in frontloader accident patients

Sewage Slurry Pits

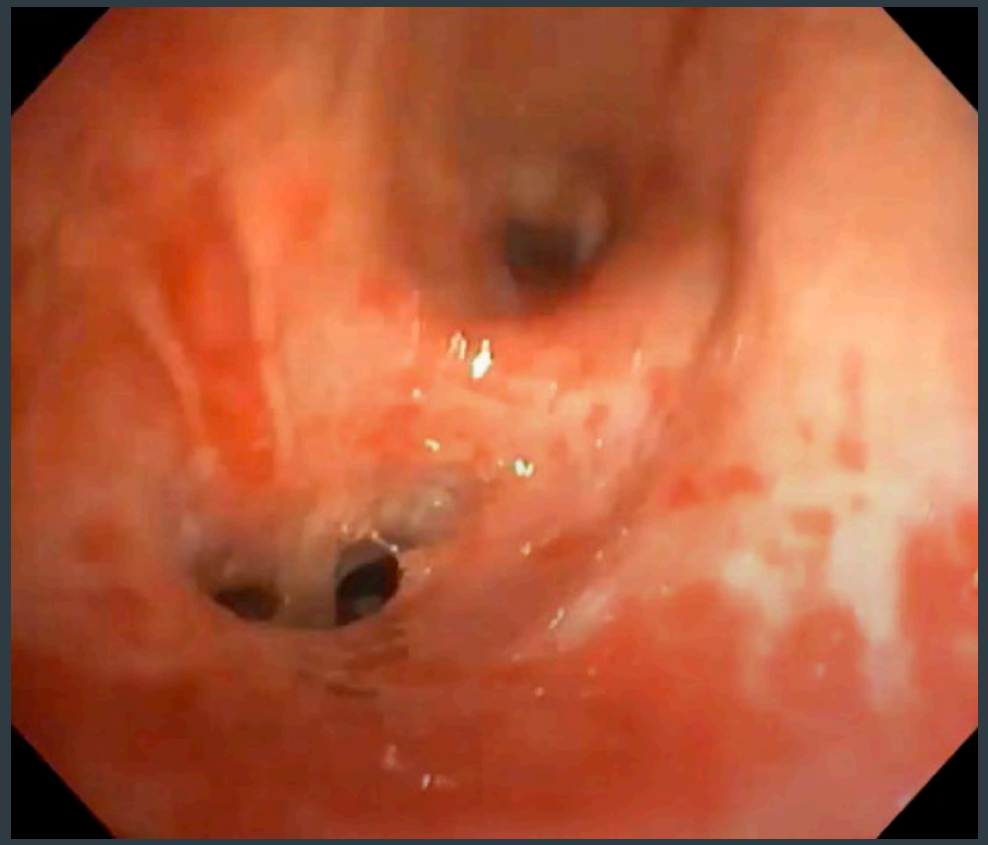

H
S

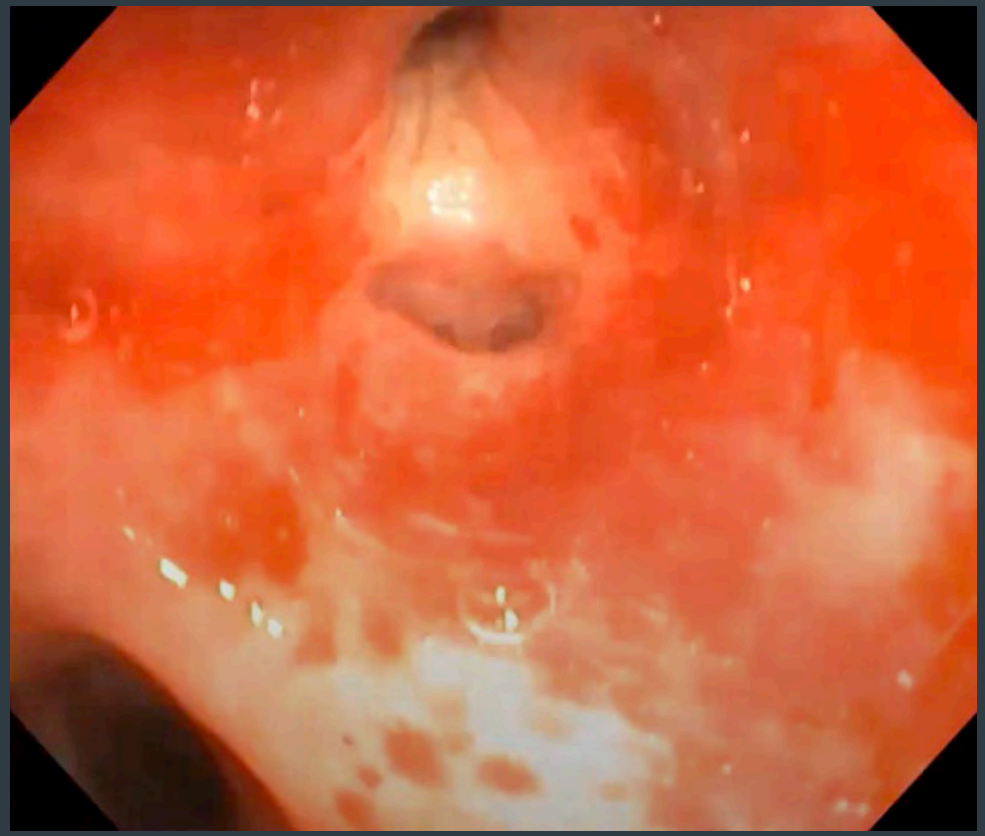
Key Points

- There are usually two victims before others become aware that there’s a risk of hydrogen sulfide poisoning
- Scene safety around sewage slurries on dairy or hog farms is imperative
- Educate your prehospital providers on these risks

Chemical Spills

Anhydrous Ammonia Pulmonary Toxicity

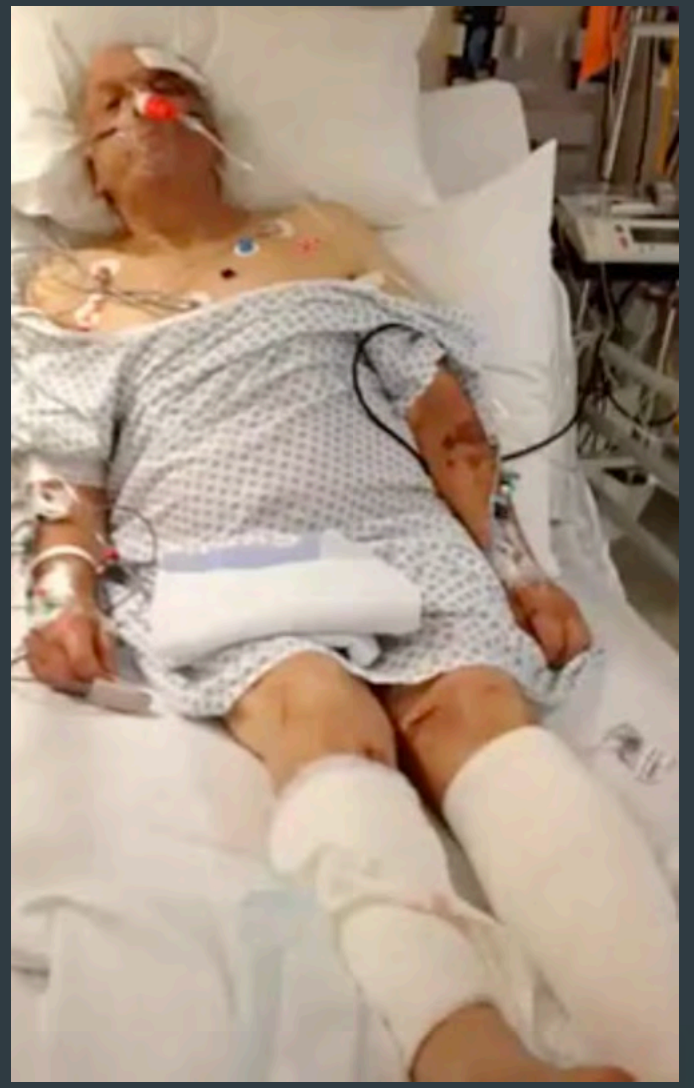




Key Points

- Early on there is mucus membrane irritation, coughing and bronchoconstriction
- Anhydrous ammonia pulmonary toxicity: sloughing of damaged lung tissue and occlusion of airways with respiratory failure 2-3 days post exposure
- Large ETT and early tracheostomy may help with clearing of sloughed mucosa

Livestock Attacks



Nice Pony

Case Study

- 69 year-old male presenting after being struck by a horse with associated facial laceration, nasal bone fracture, thoracic spine fracture, scattered subarachnoid hemorrhage, and right parietal subdural hematoma.

Upon Arrival

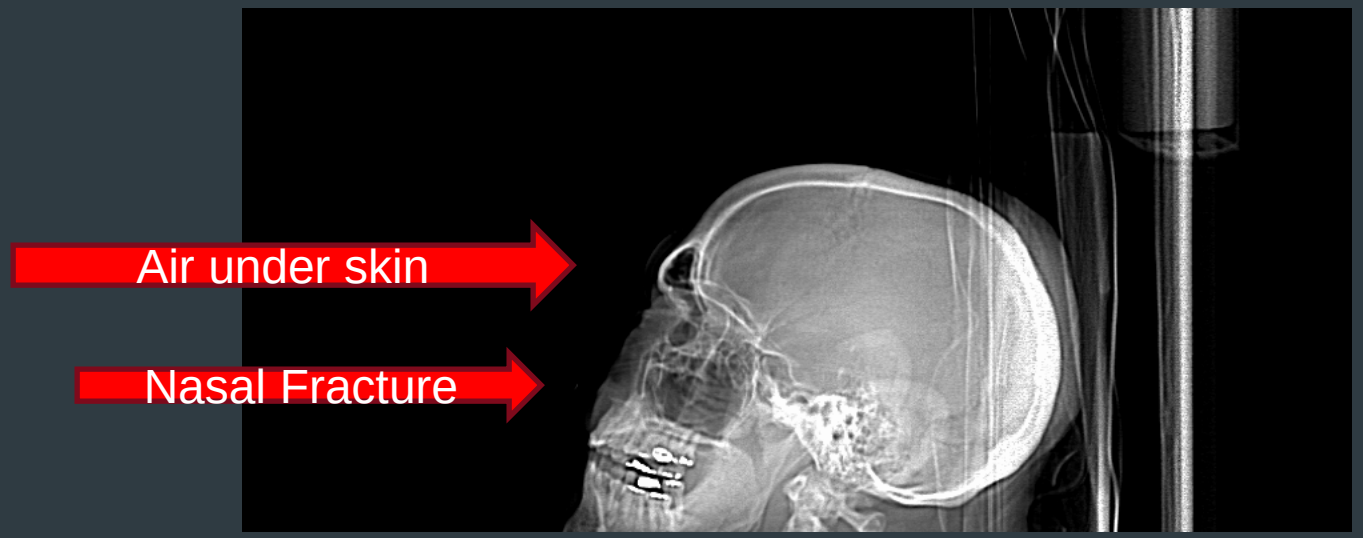
- 69 y.o. male who arrived by Lifenet presented to the emergency department for Head injury;
- Limited Trauma Activation, Lifenet from scene - kicked in the face by a horse earlier tonight with +LOC.
- Patient is unsure how long he lost consciousness for. He is currently complaining of pain in his right jaw/cheek and headache.
- Per EMS, he was complaining of abdominal pain upon their arrival, but now is not.
- He did vomit twice en route.
- He has a PMH of DM2 and HTN for which he takes medicines.
- Per EMS, GCS was 14 at the scene.

Consults

- **ENT surgery was consulted for the facial trauma, nasal bone fracture, and right cheek laceration.**
- **Neurosurgery was consulted for the head injuries and thoracic spine fracture**

Initial CT

Initial CT of Head



Diagnosis

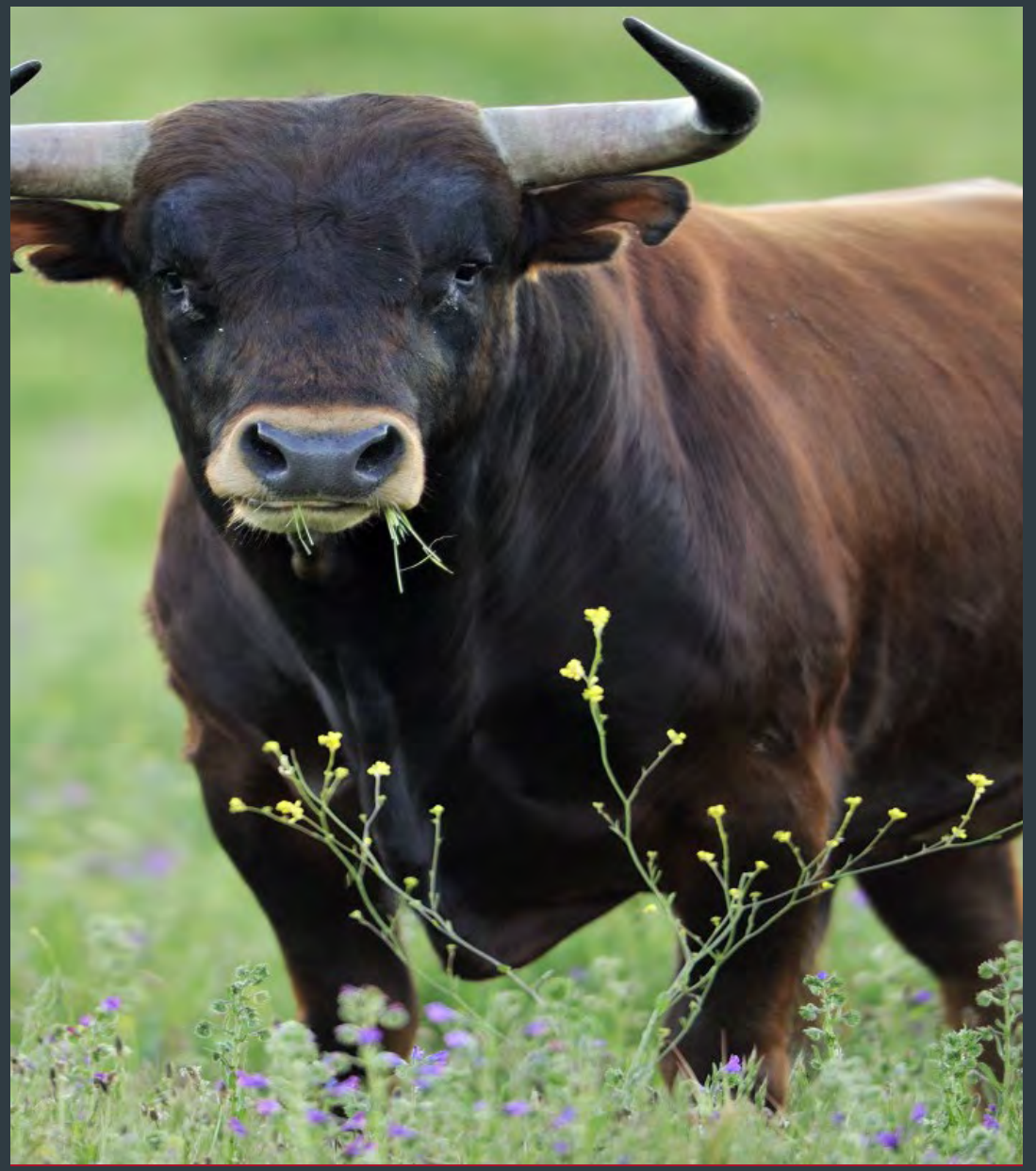
- Subdural Hematoma
- Contusion of brain with loss of consciousness
- Subarachnoid Hemorrhage
- Nasal Fracture
- Thoracic Spine Fracture Laceration of Head

Follow-Up

- **Still having Headaches**
- **Continues to wear back brace for T6-7 Fractures**
- **Also suffered traumatic subarachnoid hemorrhage, has had no progressive neurologic symptoms. Incidentally found likely 5 mm anterior communicating artery aneurysm per head CT, will further evaluate with CTA head and neck when here for next appointment.**

It's No Bull!

Oh yes it is!



Case Study

- 61 y.o. female who arrived by flight program presented to the emergency department for Trauma transfer from North Platte, patient was attacked a bull with multiple injuries.
- Patient was resuscitated with bilateral chest tubes, intubation and fluid resuscitation.
- CT head, CT chest abdomen and pelvis revealed subarachnoid hemorrhage, bilateral pneumothoraxes, multiple rib fractures, liver laceration, possible kidney injury.
- Patient was transferred by flight to UMMC for further evaluation.
- Patient did become mildly hypotensive enroute and TXA given.
- Unknown past medical history. Patient not on blood thinners per report

Primary Survey

- Airway intact, trachea midline - ET tube in place.
- Breath sounds clear bilaterally, no respiratory distress
- Circulation: Normal tensive, regular rate and rhythm, no cyanosis
- Disability: Moves all 4 extremities spontaneously, GCS 3 T
- Exposure: Patient disrobed entirely for exam

Secondary Survey

- Head: No scalp injury, skull palpated without crepitance or step off
- HEENT: No hemotympanum, scleral icterus or nasal septal hematoma. No midface instability on palpation. Pupils 3 mm and mildly reactive.
- Neck: No crepitus or step-off in cervical collar before and after exam
- Chest: Bilateral chest tubes in place. Draining bloody fluid. no crepitance, no respiratory distress,
- Cardiac: regular rate, no murmur, normal heart tones
- Abdomen: no rebound or guarding, ecchymosis around right flank
- Pelvis: stable, non-tender, no ecchymosis noted
- Back: Patient rolled with C-spine protection, no vertebral tenderness palpated, no ecchymosis noted
- Extremities: No obvious deformities, Full range of passive motion
- Skin: Normal color, no diaphoresis or cyanosis
- Neuro: GCS 3t

Radiology

XR chest PA or AP only (Final result)
Final result by Interface, External
Impression:
IMPRESSION:
1. Bilateral thoracostomy tubes without pneumothorax.
2. Low lung volumes with unchanged mild central and basilar atelectasis

DISCUSSION: ET tube 6 cm above carina. Bilateral thoracostomy tubes, unchanged in position. No right or left pneumothorax. Heart size normal. Low lung volumes. Mild central and basilar opacities most consistent with atelectasis. Enteric tube tip gastric fundus. Multiple delayed bilateral rib fractures.
Narrative:
Chest XR PA or AP Only
INDICATION: ct and intubated
XR chest PA or AP only (Final result)
Final result by Interface, External Ris In

Impression:
1. Bilateral thoracostomy tubes, unchanged. No definite pneumothorax.
2. Multiple displaced bilateral rib fractures, unchanged.
3. Stable endotracheal tube and enteric tube with tip projecting over the region of the gastric body.
4. Bilateral urinary opacities, slightly decreased. May represent pulmonary contusions, consolidation or atelectasis.

- Summary?
- Multiple broken ribs
- 2 Chest tubes
- Intubated
- Pulmonary Contusions

Radiology

XR shoulder complete minimum 2 views left (Edited Result - FINAL) Result time:

Edited Result - FINAL by Interface, External

Impression:

Impression:

1. Nondisplaced transverse fracture of the acromion process.
2. Nondisplaced fracture, base of the coracoid process.
3. Multiple left-sided rib fractures and left-sided pneumothorax,
better evaluated on recent chest radiograph.
4. Diffuse left lung opacities, may relate to pulmonary contusions.
5. Left-sided thoracostomy tube and enteric tube, partially imaged.

Indication: Evaluate coracoid fracture, AP, axillary and scapular Y

Discussion:

Nondisplaced transverse fracture of the base of the coracoid process.

Nondisplaced transverse fracture of the acromion process.

Acromioclavicular and glenohumeral alignment maintained. Multiple
known left-sided rib fractures and left-sided pneumothorax, better
evaluated on recent chest radiograph. Diffuse left lung opacities may

- Summary?
- Fracture of shoulder
- Multiple left sided rib fractures

CT thorax w & wo contrast (Edited Result - FINAL)

1. No evidence of vascular injury within the chest, abdomen or pelvis on this noncontrast CT. Contrast is noted within the renal collecting systems and urinary bladder. Recommend correlation with outside imaging.
2. Small bilateral pneumothoraces. Bilateral thoracostomy tubes. Notably, the right thoracostomy tube courses along the right lower lobe, probably extending through the diaphragm with tip abutting the
distal esophagus/gastroesophageal junction.
3. Bibasilar predominant pulmonary opacities, likely representing combination of atelectasis and developing pulmonary contusions.
4. Small right hemothorax. Prominent soft tissue swelling along the right flank.
5. 3.4 x 2.6 cm hyperdense right adrenal mass, presumably representing adrenal hemorrhage, although follow-up is recommended.
6. Possible ill-defined area of heterogeneous attenuation within the superior aspect of the right hepatic lobe, segment VII, suspicious for underlying liver laceration, although poorly characterized on this noncontrast CT. No perihepatic hematoma is identified. Dedicated
CT with contrast could further evaluate, as clinically warranted.
7. Subcutaneous emphysema noted along the right lateral chest extending along the patient's right lower back.
8. Small amount gallbladder sludge or gallstones.
9. Endotracheal intubation.
10. Enteric tube, tip curled in the gastric fundus.
11. Acute, displaced left scapular fracture with displacement of the coronoid process.
12. Acute, displaced segmental right fifth, right lateral sixth, right lateral seventh, segmental eighth, ninth, 10th and 11th and right posterior 12th rib fractures. Notably, the right 11th rib extends into the right retroperitoneum.
13. Acute, displaced segmental left third, fourth, fifth, sixth, seventh, eighth, ninth, and 10th rib fractures. Left posterior 11th rib fracture.
14. Acute mildly displaced right T9 and T10 transverse process fractures.
15. Nondisplaced right L1 transverse process fracture. Possible nondisplaced right L4 transverse process fracture.

Summary?

Bilateral pneumothoraces

Atelectasis and pulmonary contusions

Small right Hemothorax

Small Liver laceration

Subcutaneous emphysema right lateral chest extending to the right lower back

Acute displaced left scapular fracture with displacement

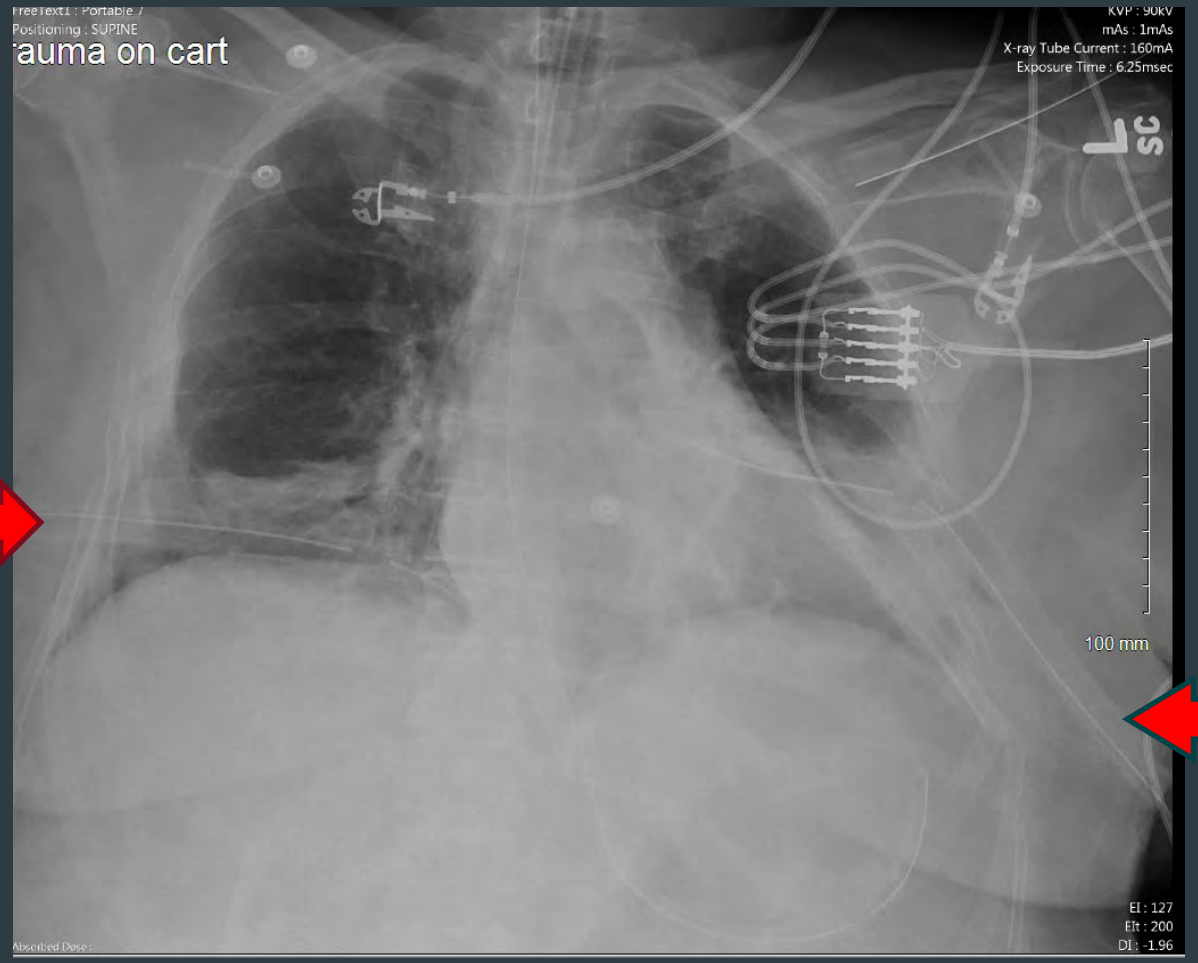
Rib fractures- right 5, 6, 7, 8, 9, 10, 11 and 12. Left 3, 4, 5, 6, 7, 8, 9, 10, 11

Right T9-T10 transfer process fractures

L1 nondisplaced fracture

Right adrenal hemorrhage.

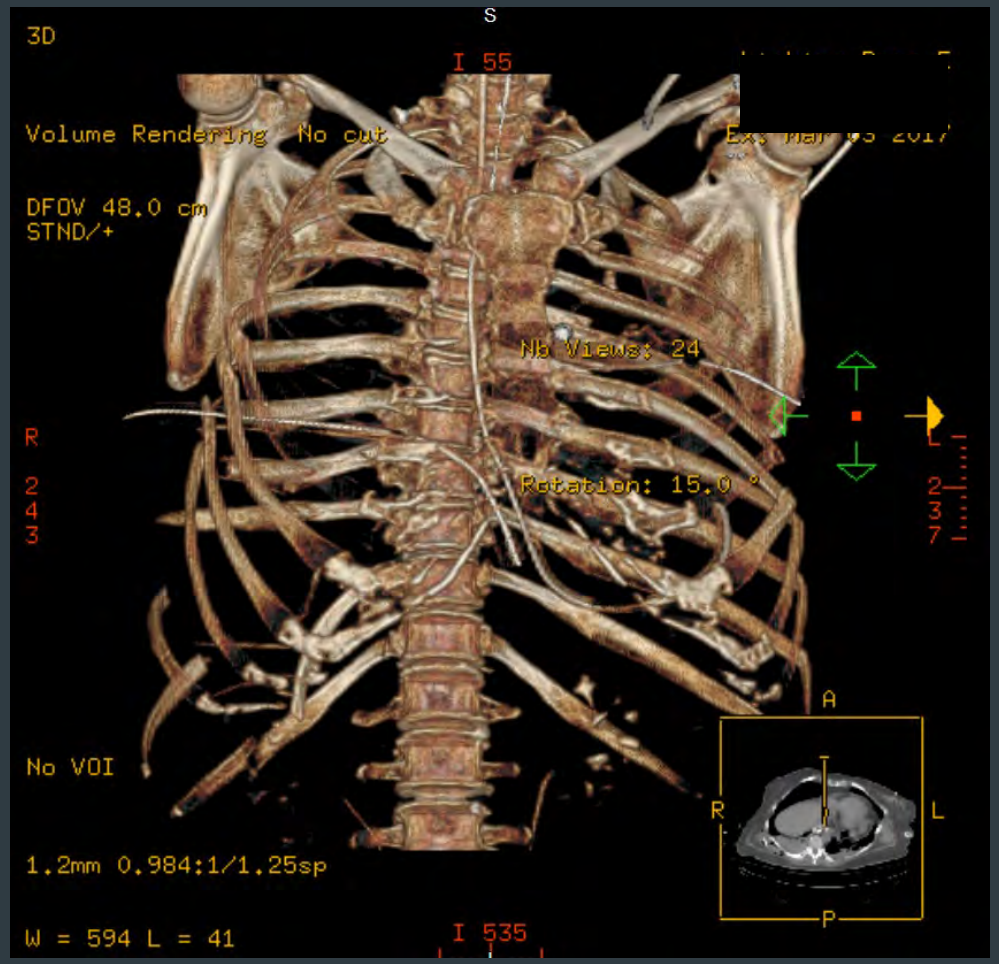
Initial Chest X-Ray



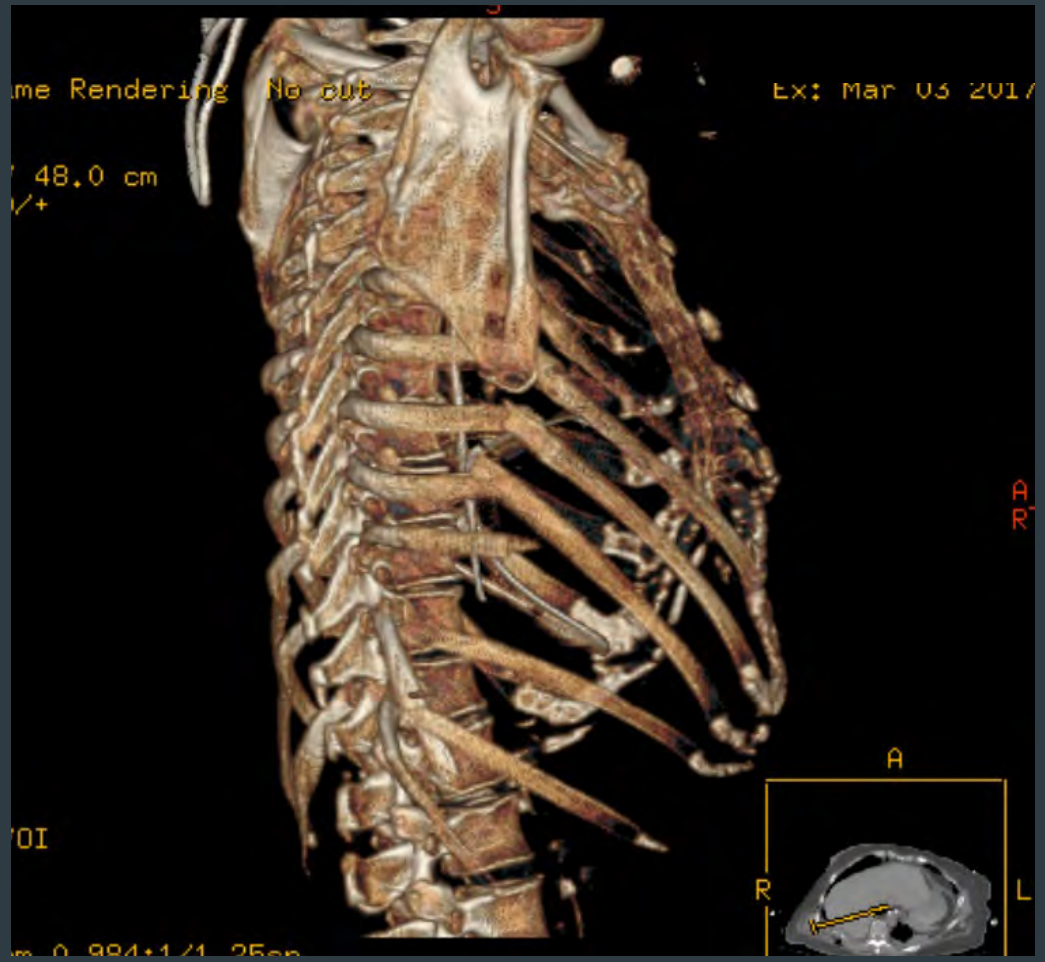
Chest Tube

Chest Tube

Chest X-ray Recon View



Rotation of X-Ray

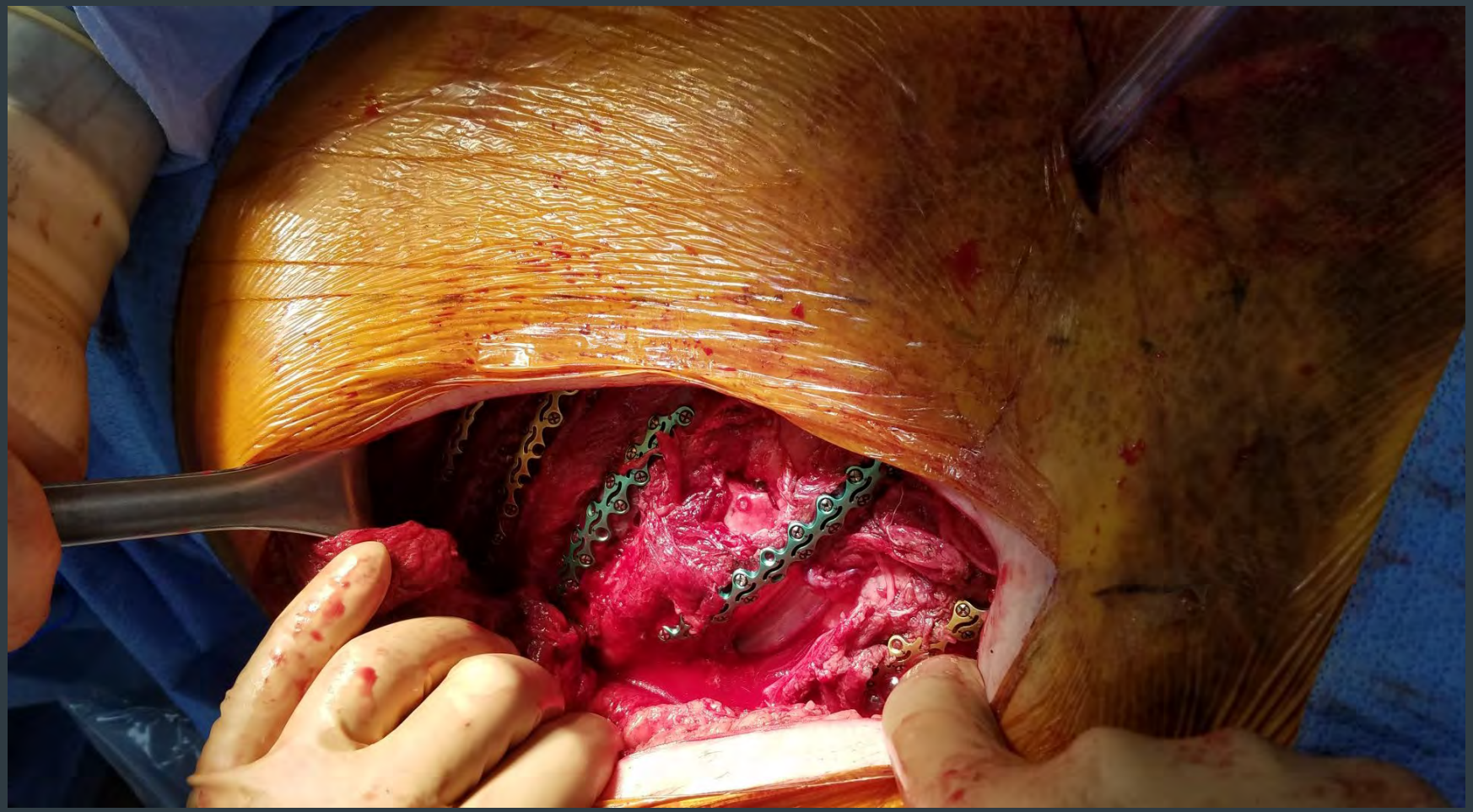


How are rib fractures fixed?

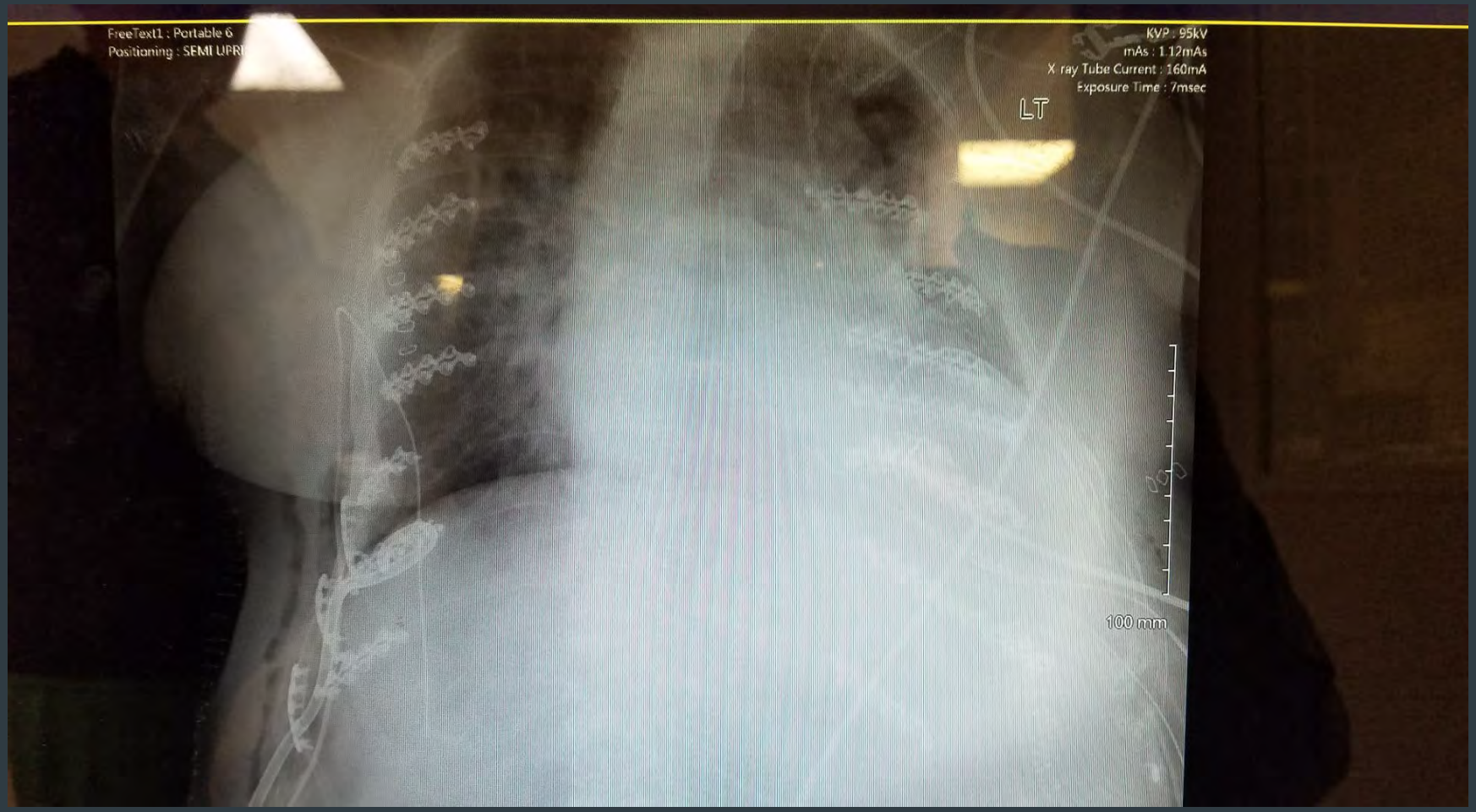
- Some are left to heal naturally especially those that are non-displaced.
- When fractures case much pain or problems breathing, rib plating can be done.

- Don’t look at the next slide if you don’t like blood or the OR.

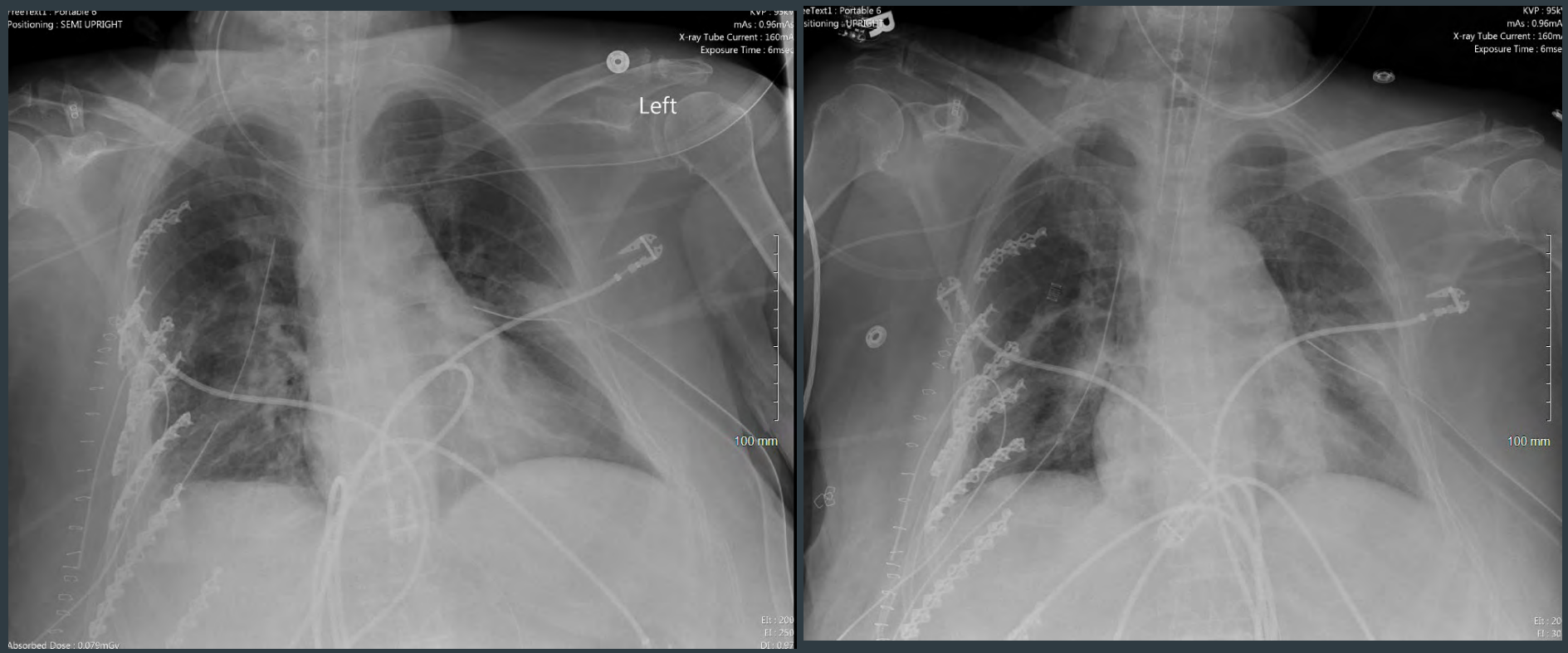
Rib Plating during OR



After Bilateral Rib Plating



Post Rib Plating



Care Continues

- 3/21
  - Antibiotics stopped today for UTI. Will go to acute Rehab but not ready yet. Failed swallow study. Dobhoff tube continues for feedings.
- 3/24
  - Still has PICC line. Will go to closer to home for Rehab on 3/27

Final Follow-up Report

Patient presents to clinic in follow up s/p hospitalization 3/3-3/24 after she was struck by a bull sustaining multiple injuries including tSAH, cervical spine posterior ligamentous injury, left coracoid process fracture, T9, T10, L1, L2, L4 TP fx, liver laceration, significant chest trauma with multiple bilateral rib fractures, bilateral pneumothoraces and pulmonary contusions. Patient underwent ORIF of multiple ribs on 2 separate occasions. She was discharged to acute rehab in Kearney and has been home since 4/12.

Patient reports pain to be controlled with oxycodone every 8-12 hours. She denies shortness of breath unless she "does too much." She is tolerating a diet and having bowel movements every 3 days. She is using milk of magnesia to help with her bowels. She denies fevers but has occasional chills. She continues to note a mild tremor to her right hand. Patient has one non-healing wound to the left upper back which she is performing wound cares every 3 days: cleansing with saline and covering with mepilex dressing. She is currently on a course of bactrim per her PCP for possible wound infection.

Update: She is back home helping to brand the cattle again.

CDC Fatalities Caused by Cattle

- Four states 2003-2008
- Deaths occurring in the production of crops and animals in the United States totaled 2,334; of these, 108 (5%) involved cattle as either the primary or secondary cause

Key Points

- Livestock are frequently faster and stronger than we realize
- Livestock should always be contained away from an injured patient for scene safety
- Remember that livestock bites are also potential rabies risks

ATVs

ATV’s

- Here at Nebraska Medicine Trauma Services, we evaluated 71 individuals between 2019 and June of 2020 for incidents related to ATV’s. Our age range was 8 years old to 62 years old. Two individuals needed rehabilitation upon discharge. Only two individuals were using helmets. Helmets save lives and injuries!

Consumer Product Safety Commission 2013 Annual Report of ATV related deaths and injuries

- In 2013, there were an estimated 99,600 ATV–related, emergency department-treated injuries in the United States
- Estimated 25 percent of these involved children younger than 16 years of age
- As of December 31, 2013, CPSC staff received reports of 13,043 ATV-related fatalities occurring between 1982 and 2013

Key Points

- ATVs should be of an appropriate size for the rider
- Children should be supervised when riding the
- Safety training and helmet wearing makes a difference

Rural ED Trauma Transfers

- Limited resources
- Physician specialty board certification varies
- Procedural competency varies
- Specialist availability may be limited
- Transport times are increased

Questions?