



N O R T H E R N A R I Z O N A H E A L T H C A R E

Trauma Injury

Prevention

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N O R T H E R N A R I Z O N A H E A L T H C A R E

What is Injury Prevention and Why does it matter?



Regulatory stuff

Definition and Requirements

All trauma centers must have an injury prevention program that:

- Has a designated injury prevention professional
- Prioritizes injury prevention work based on trends identified in the trauma registry and local epidemiological data
- Implements at least two activities over the course of the verification cycle with specific objectives and deliverables that address separate major causes of injury in the community
- Demonstrates evidence of partnerships with community organizations to support their injury prevention efforts

In Level I trauma centers, the injury prevention professional must be someone other than the TPM or PI personnel.

Measures of Compliance

- Job description for relevant staff
- Graphs/tables highlighting recent injury mechanism trends from registry
- Report of injury prevention activities including the following:
 - Activity name
 - Activity date
 - Participation data
 - Evaluation of outcomes (where feasible)
- Program objectives and deliverables for each injury prevention activity
- Any materials (including posters, flyers, press releases, etc.) relevant to the injury prevention initiatives



Regulatory stuff - National

Additional Information

While there are no specific certification requirements for an injury prevention professional, this individual would have the skills to lead trauma center efforts to develop and maintain an organized, interdisciplinary, public health approach to injury prevention. Examples of injury prevention areas of focus include:

- Motor vehicle occupant safety
 - Child passenger safety seat education
 - Distracted driving
- Motorcycle and bicycle safety/helmet initiatives
- Pedestrian safety
- Fall prevention
- Firearm injury prevention programs
- Violence intervention and screening programs
- STOP THE BLEED® program as a community engagement strategy

Specific objectives and deliverables for each of the prevention initiatives should be documented in advance of implementation so that centers can describe their successes relative to their stated goals.

- **Utilize available data:** Identify high rates of injury and the populations in which these injuries occur. Analyze data to determine the mechanisms of injury, injury severity, and contributing factors. Utilize multiple injury and death data sources to reflect the true burden of injury.
- **Target at-risk populations:** Identify, understand, and target efforts toward at-risk populations while being sensitive to generational differences, as well as cultural, religious, and other established customs. Engage target population as a key stakeholder in development, implementation, and evaluation of the intervention.¹
- **Leverage partnerships:** Make use of other trauma centers, prehospital organizations, public health and violence prevention organizations, law enforcement agencies, schools, churches, and others interested and involved in community injury prevention efforts.
- **Choose effective or well-informed intervention strategies:** New intervention program development, assessment, and implementation are complex and time-consuming. Not all proven interventions work in every population. Evidence-informed interventions may still require adaptation for demographic and risk factor differences.²⁻⁶
- **Develop a plan:** Logic models are a best-practice method to plan intervention strategies and should be utilized to outline the intervention effort, including delineating risk and protective factors.⁷
- **Evaluate:** Develop surveillance and monitoring tools to assess not only the available performance indicators of the trauma center's prevention efforts but also the prevention effectiveness. Evaluation efforts should start at program inception with a feasibility assessment and include intermediate and long-term outcomes.
- **Communicate:** Partner with local print and broadcast media, and be prepared for many opportunities for trauma center leaders to serve as a reliable source of injury prevention information. Understand your stakeholders and the at-risk populations, and articulate your prevention message based upon their vantage point.⁷
- **Advocate:** Elected and appointed leaders can help implement prevention efforts if the trauma center understands their goals and ways to work with them to create effective laws promoting prevention.



Regulatory stuff - STATE

36-2225. Statewide emergency medical services and trauma system; definitions

- A. The department shall develop and administer a statewide emergency medical services and trauma system to implement the Arizona emergency medical services and trauma system plan. The department shall adopt rules to establish standards for the following:
 - 1. **Injury prevention** activities to decrease the incidence of trauma and decrease the societal cost of preventable mortality and morbidity.
 - 2. If not included in the documentation in subsection (D)(1):
 - a. Any information or documents required in subsection (C);
 - b. For an application for initial designation, a description of the health care institution's plans for:
 - i. **Injury prevention** activities, required in R9-25-1308(G)(5)(a); and
 - ii. Educational outreach activities, required in R9-25-1308(G)(5)(b); and
 - c. For an application for renewal of designation, a description of the **injury prevention** activities educational outreach activities conducted during the term of the designation;
 - e. **Injury Prevention** Council;
- 3. Participates in **injury prevention** programs specific to the trauma center's patient population at the national, regional, state, or local levels;
- 5. If required for the trauma center according to Table 13.1, establishes and maintains:
 - a. An **injury prevention** program:
 - i. Independently or in collaboration with other health care institutions, health advocacy groups, or the Department; and
 - ii. That includes:
 - (1) Designating a prevention coordinator who serves as the trauma center's representative for **injury prevention** and injury control activities;
 - (2) Carrying out **injury prevention** and injury control activities, including activities specific to the patient population;
 - (3) Conducting injury control studies;
 - (4) Monitoring the progress and effect of the **injury prevention** program; and
 - (5) Providing **injury prevention** and injury control information resources for the public; and
 - b. An educational outreach program:
 - i. Independently or in collaboration with other health care institutions, health advocacy groups, or the Department;
 - ii. That includes providing education to physicians, trauma center personnel members, EMCTs, and the general public; and
 - iii. That may include education about:
 - (1) **Injury prevention**,



Injury Data

Gleaned from several sources:

- Primarily from our own Trauma Registry
- State and Regional Data (statewide Trauma Registry data)
- Death data
- Crash data
- Fatality reviews



Education:

Increases Perceived risk, least effective

Engineering:

Decrease perceived barriers, most effective

Enforcement/enactment:

Increases perceived risk, enact laws and enforce compliance



MVC as an example

Education:

drivers ed, doctor, public information campaigns, insurance companies, health department, trauma centers, public service/EMS/Fire

Engineering:

adjustable seatbelts, adjustable seat heights, water barrels on side of road for crash, child passenger seats/booster seats, guard rails, rumble strips, lights, how roads are graded

Enforcement/enactment:

laws/policies work, but only if enforced-> main corridors enforced (and more people compliant) but the more remote.... less and less enforced so less and less compliant



4 Steps of Injury Prevention:

Define Problem

Risk & Protective Factors

Develop & test strategies

Measure Improvement

Refine Strategies

Assure Widespread Adoption



Define Problem

Sledding: almost 200 sledding injuries in a season, but very little had location data- and these were all found by hand abstraction from the ED log :(

- Had to survey staff, ED, EMS (Wing Mountain, NAU practice field – behind Kinsey elementary).
- Manually collected data on all the charts and kept on spreadsheet
- IN the meantime we worked on IT solutions for documentation and automated reports
- Data = **POV and Most were not from Flagstaff**

Season	Back Injuries	Admits	Sledding Injuries
2007-2008	16	20	172
2008-2009	19	29	190
2009-2010	8	21	134



Risk & Protective Factors

Risk Factors:

- Position on sled
- Multiple people on sled
- No helmet
- Hazards, obstacles, or moguls
- Location – safe area
- Improper clothing
- No clear area to walk back up

Protective Factors:

- Position on sled (laying down vs seated)
- Helmet
- No obstacles, hazards, or moguls
- Long run out
- Proper clothing
- Location (ie. not the median of I-40...)



Develop & test strategies

Education – local? Would it be effective?

Engineering Interventions? What could we do?

Enforcement?



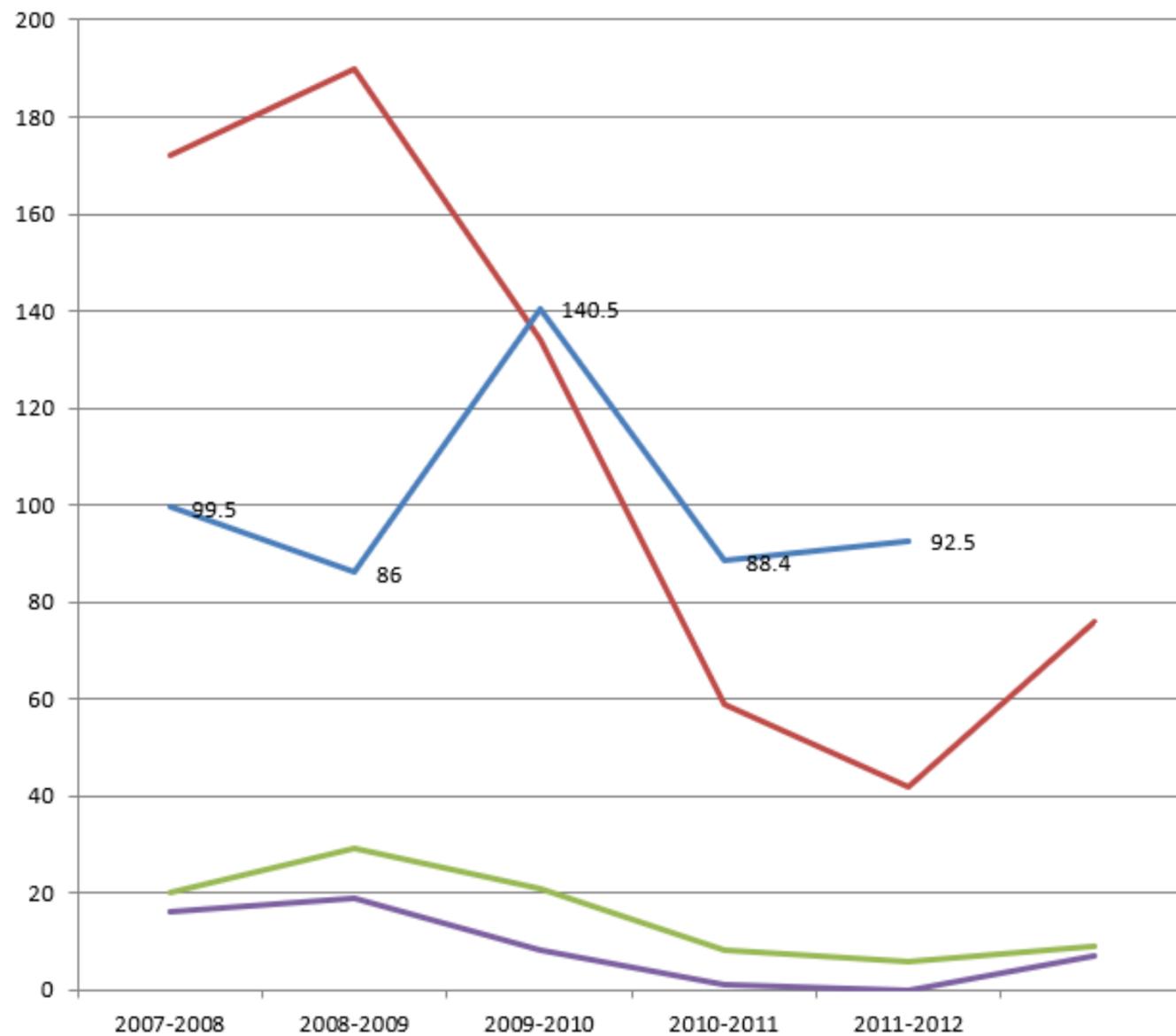
Outcomes - Is it working?

Season	Back Injuries	Admits	Sledding Injuries
2007-2008	16	20	172
2008-2009	19	29	190
2009-2010	8	21	134
2010-2011	1	8	59
2011-2012	0	6	42
2012-2013	7	9	76

Results: We reduced the injuries by roughly 150%



How do we know the reduction wasn't related to less snowfall?



Season	Back Injuries	Admits	Sledding Injuries	Seasonal Snowfall
2007-2008	16	20	172	99.5
2008-2009	19	29	190	86
2009-2010	8	21	134	140.5
2010-2011	1	8	59	88.4
2011-2012	0	6	42	92.5
2012-2013	7	9	76	

- Sledding Injuries
- Season Snowfall
- Admits
- Back Injury



Assure Widespread Adoption

Wing Mountain and NAU did this.

However, the problem is beginning to creep back up as people find unique non-centralized locations to sled.



So – What are the current causes of injury?

What are the risk and protective factors?

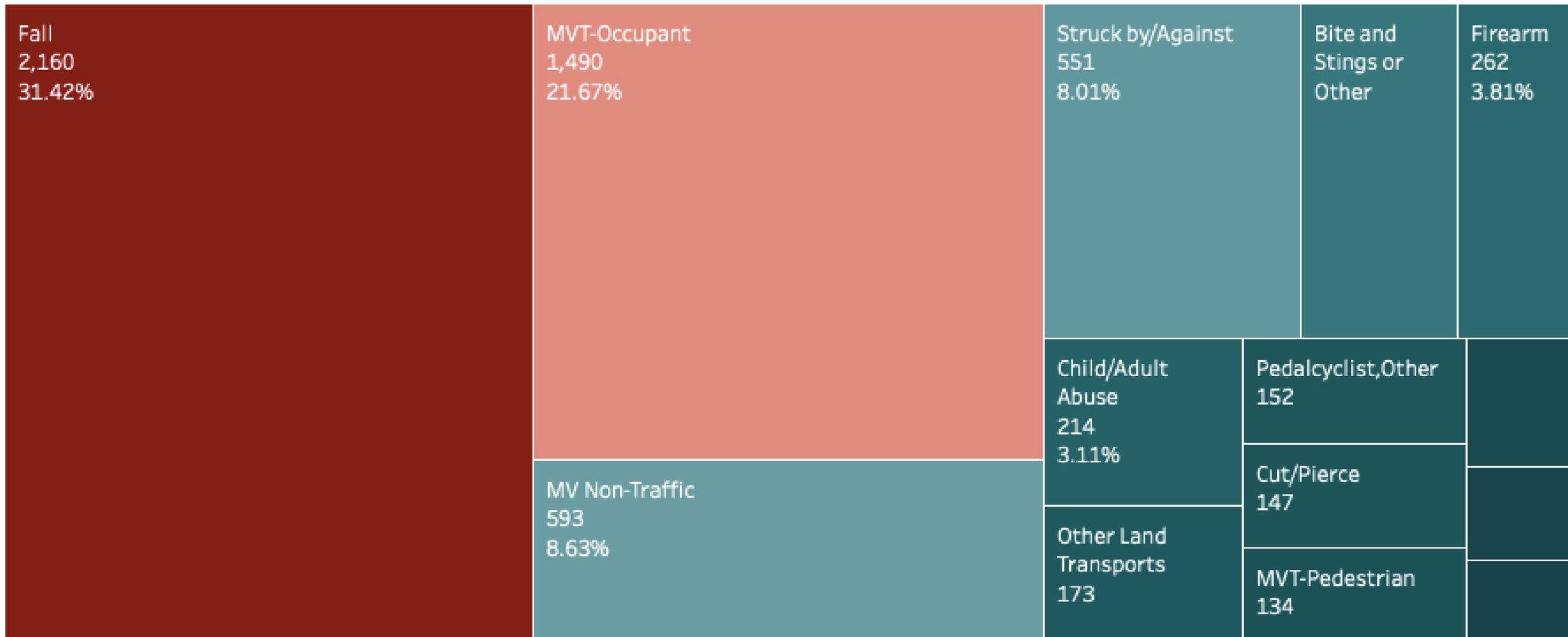
What are the planned interventions? Can we measure outcomes?

How do we get people to adopt them widely?



Falls

#1 MOI for all ages *and* for ages 0-17 in AZ.



(ADHS Bureau of EMS and Trauma System [BEMSTS], 2023)



Falls – kids

Risk factors:

- Large head size
- Lack of Coordination
- Unaware of danger/situation
- Inadequate supervision
- Placed in unstable seats on high surfaces (infants)
- 2nd story windows not secure (Toddler)
- Playgrounds with hard surfaces and high equipment
- Standing in shopping carts (toddler)

Protective factors:

- Restraints (seats, high chairs)
- Car seats and bouncy seats on floors
- Guards on windows
- Soft playground surfaces
- Cribs and beds with sides (Mesh or slats)
- Gates on stairs
- No climbing on furniture or counters or standing in shopping carts
- <https://parachute.ca/en/injury-topic/fall-prevention-for-children/>



Pediatric fall prevention – what are we doing?

Frankly – not a lot

Such an array of causes of these falls. It's difficult to pinpoint what to do to intervene.

Working with Pediatricians and County HD to provide education to parents

Creating infographics to put on screens in all NAH clinics and ED's

Working with stores to offer discounts on baby gates and play pens

Working with stores to place signs noting the dangers of standing in shopping carts



Falls

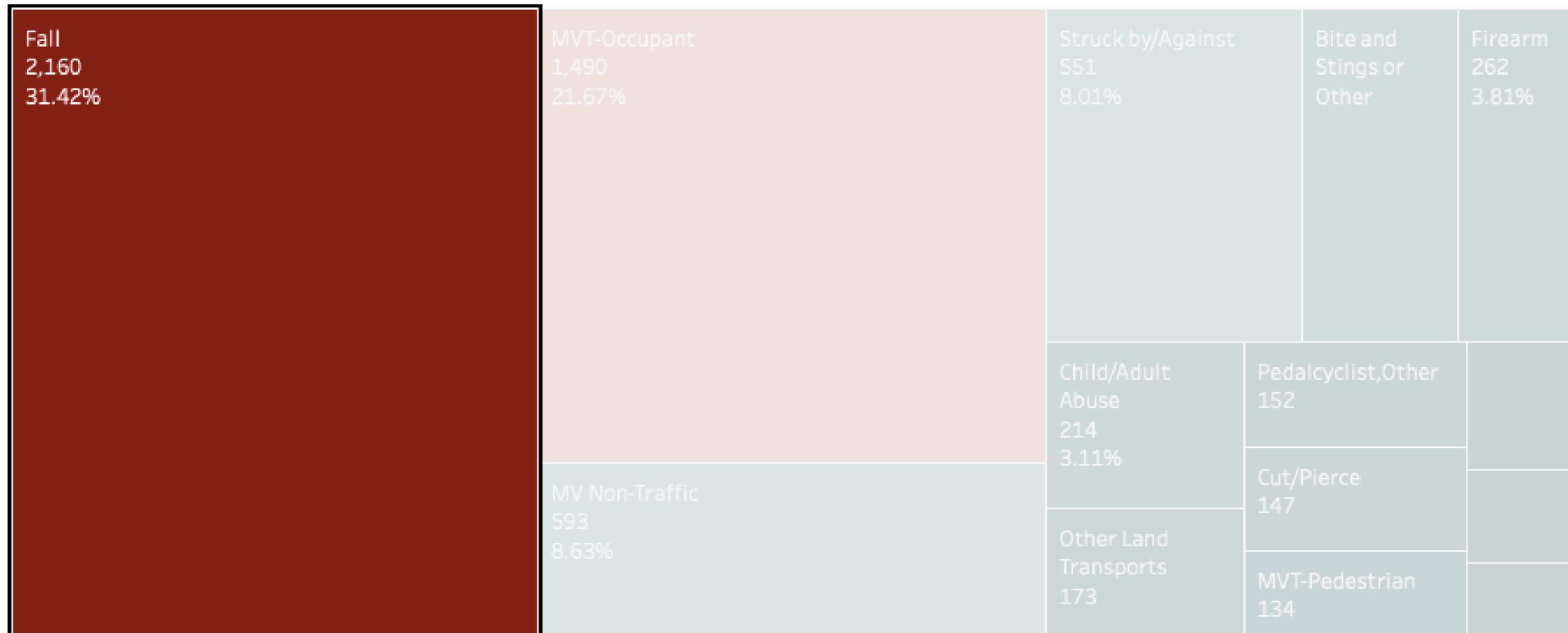
Where can we collaborate?

Ideas?



So what do we address now? – Injuries or deaths?

Trauma mechanisms (Select mechanism to see the pattern)



Deaths
1
0.0%

Hospital Charges
Total: \$53M
Median: \$19,501

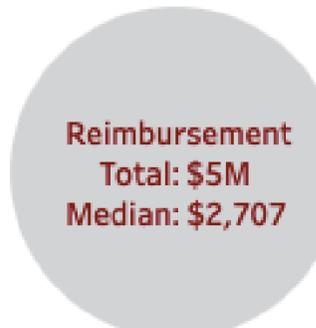
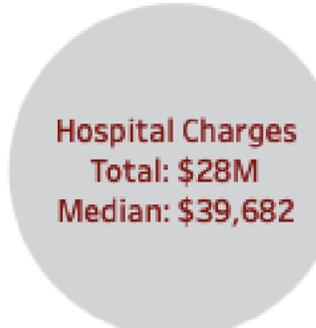
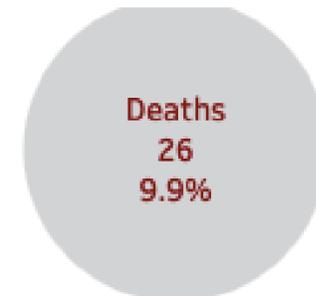
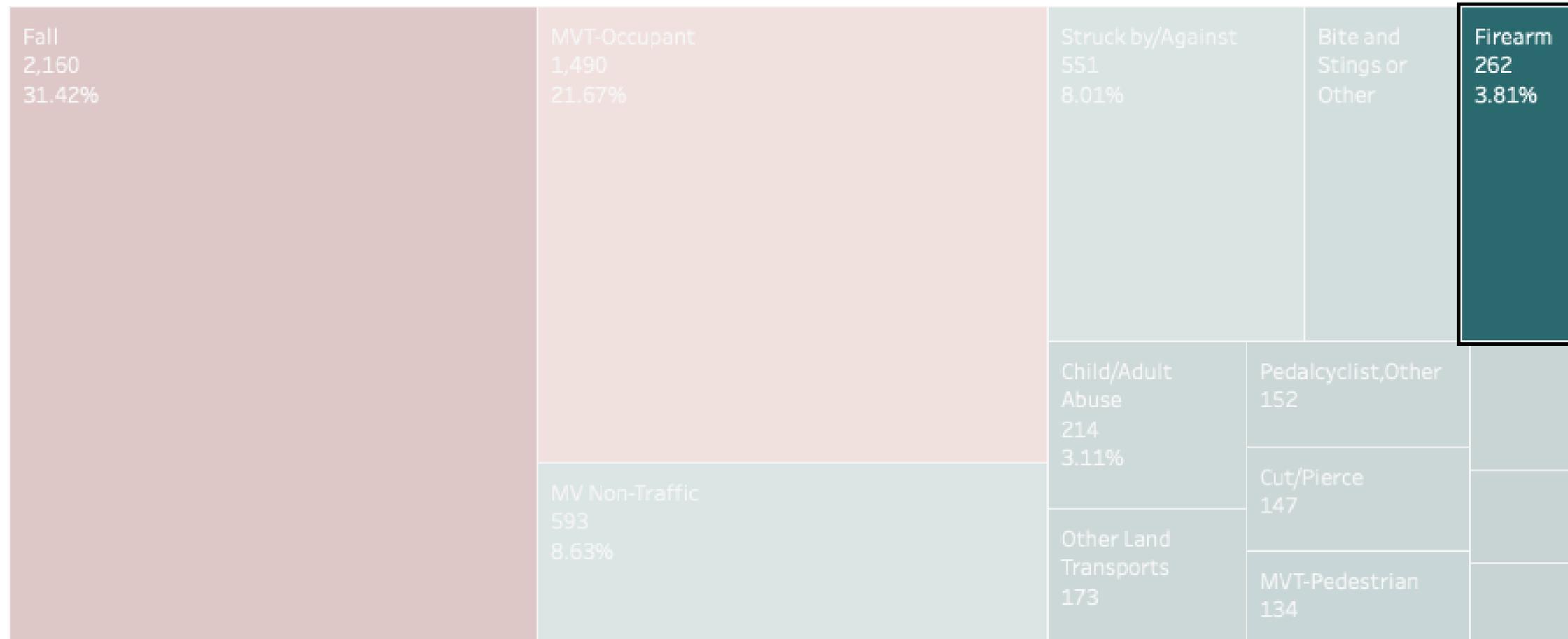
Reimbursement
Total: \$12M
Median: \$1,721

(ADHS Bureau of EMS and Trauma System [BEMSTS], 2023)



So what do we address now? – Injuries or deaths?

Trauma mechanisms (Select mechanism to see the pattern)

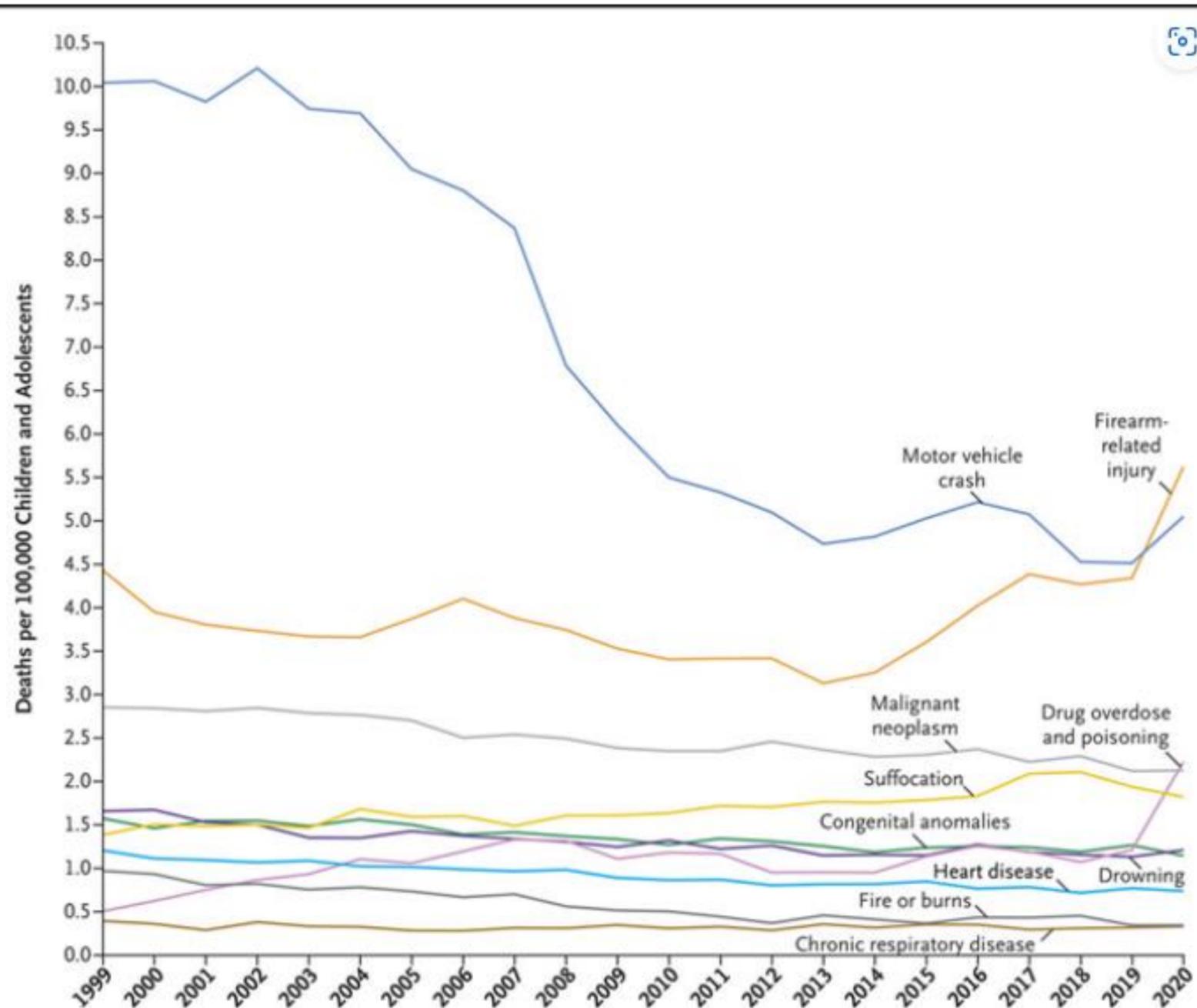


(ADHS Bureau of EMS and Trauma System [BEMSTS], 2023)

Firearms killed more children in AZ than all four of the top mechanisms of injury combined.



Firearms are #1 killer of children now - Used to be MVC



Pediatric deaths from 1999 to 2020 in the United States. (Piazza, 2022)

Piazza, A. (2022) Univ. Michigan News, [Firearms now top cause of death among children, adolescents, U-M analysis shows | University of Michigan News \(umich.edu\)](#)



MVC or Firearms

Injuries – MVC is low hanging fruit

Lots of interventions already exist

Not too political

Deaths from firearms – hard to address #2 – Political hot potato. Many folks are afraid to even raise the issue.

But, there are things that do work, and **common ground can be found.**



Safe Gun Storage

Two thirds of accidental child gun deaths could have been prevented if guns had been stored locked and unloaded.

The safest way to store a gun in your home is **unloaded** and securely **locked**, with the bullets locked in a separate container.

Safe gun storage will make it difficult for children, teens, and other family members to accidentally hurt themselves with a gun. Only people who will safely use a gun should have access to it.

You should also ask about gun safety and storage when your children are visiting other homes that may have guns.

Easy ways to store a gun safely include:

- Gun cases or safes
- Lock boxes
- Gun cabinets
- Trigger and cable locks

Many states have laws regarding gun storage. To find updated firearm safe storage laws in your state, visit statefirearmlaws.org.



Cable lock



Lock box

To learn more, visit: facs.org/quality-programs/trauma/ipc



Storage at a Safe, Remote Location

As long as a gun is properly stored, a gun does not legally need to be kept in the owner's home. For instance, if a gun is mostly used for hunting, it could be stored in another location when not being used for that purpose.

Cars are NOT safe places to keep guns.

Children can easily access guns left in cars, and cars are often targets for gun theft.

To learn more, visit:

facs.org/trauma

Storing Ammunition (Bullets) away from Guns

What to Do When a Friend or Family Member Is at Risk and Has Access to a Gun

Talk to your friend or family member about safe storage or removing their gun from the home.

If you are worried about a friend or family member hurting themselves or someone else, seek help immediately from:

- A mental health provider
- A substance abuse treatment center
- A primary care provider
- A hospital emergency department
- The National Suicide Prevention Lifeline at 1-800-273-8255

If you are concerned that someone you know should not have a gun because he or she is violent, suicidal, or at risk of accidental injury, alert the local police or call 911.

(American College of Surgeons, n.d.)



NORTHERN ARIZONA HEALTHCARE

If we can't prevent the injury, we may be able to prevent the death!



(Kessler, 2024)



SAVE A LIFE



(Department of Defense [DOD] & American College of Surgeons, n.d.)



(Kessler, 2024)



Now let's talk about #2 cause of injury and Pediatric death

Risk and Protective Factors -

Interventions – are we doing all we can to keep our kids safe?



(buckleupnc, n.d.)

What does good seat belt fit look like?

GOOD seat belt fit

The seat belt fits properly when:

- ✓ Shoulder belt lays on middle of the chest and shoulder.
- ✓ Lap belt lays on upper thighs, not the stomach.

Always properly buckle children aged 12 and under in the back seat!

(Centers for Disease Control and Prevention [CDC], 2023)

Do you know the four stages of car seat safety?

Rear Facing	Forward Facing	Booster	Seat Belt
Rear facing provides the best protection for a young child's developing spine: rear face to a minimum of age 2, ideally age 4.	When a child has outgrown their rear facing convertible seat and is at least 2 years old, move to a forward facing seat with a five point harness.	When a child has outgrown their five point harness, is at least 5 years old, and is mature enough to sit properly, move to a belt positioning booster.	When a child is at least 10 years old and can pass the five step test, move to a seat belt alone.

(Leonard, 2016)



(Bennett, 2016)



(leszekglasner & Adobe, n.d.)



Passenger Restraints and Motor Vehicle Crashes- STAB Report

29.92% of motor vehicle occupants NOT wearing passenger restraint at time of accident.



No Seatbelt	Seatbelt
4.0%	1.2%
of occupants died	of occupants died



No Helmet	Helmet
6.7%	3.8%
of motorcyclist died	of motorcyclist died



MVT-Occupant accounted for **over 1/4** of Pediatric Deaths

What should we be doing?

What are we doing?

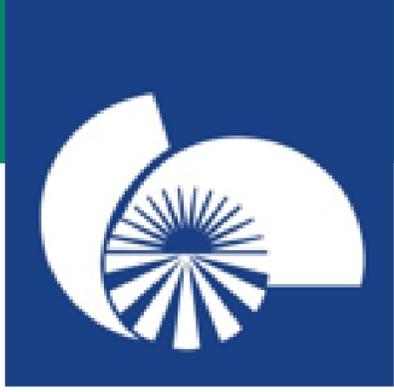
Where can we collaborate?



What are we doing?

- School Driver's Education
- Graduated Driver License
- County health department car seat checks, installations, education, and classes
- Safe Kids Coalition
- Buckle Up Education on the Reservation with Tuba City and Hopi Injury Prevention committees





What else *should* we be doing?

Enacting and enforcing a PRIMARY ENFORCEMENT SEATBELT LAW.

States with primary seat belt laws see an avg 9% improvement in SB usage.

High visibility enforcement = increase of 20+ percentage points in seat belt usage (NHTSA, 2022)

More Car Seat check up events – 46% are installed incorrectly (NHTSA, 2020)

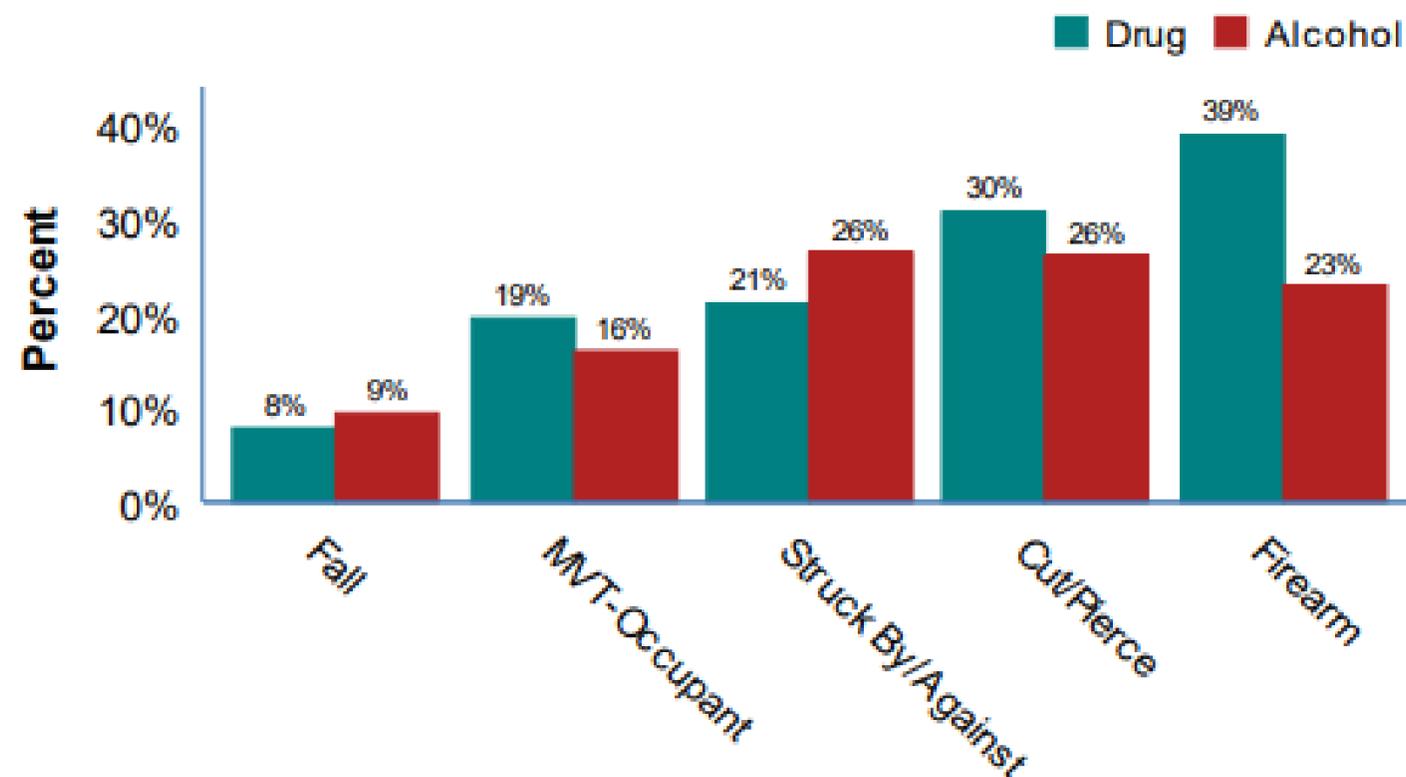
Educate about distracted driving and drunk/drugged driving. *Opportunity to collaborate ?*

Engineer fixes ex. Ignition interlock devices



Drinking, Drugging, and Driving:

Figure 20: Mechanism-specific trauma proportion by alcohol and drug use



Data source: Arizona State Trauma Registry 2021

What are we doing?

- Hope Coconino
- Drug Court
- Casa Challenge
 - Multidisciplinary: law enforcement, EMS/ED, victim or victim's family member, insurance agent, judge or prosecutor



4 Steps of Injury Prevention:

Define Problem

Risk & Protective Factors

Develop & test strategies

Measure Improvement

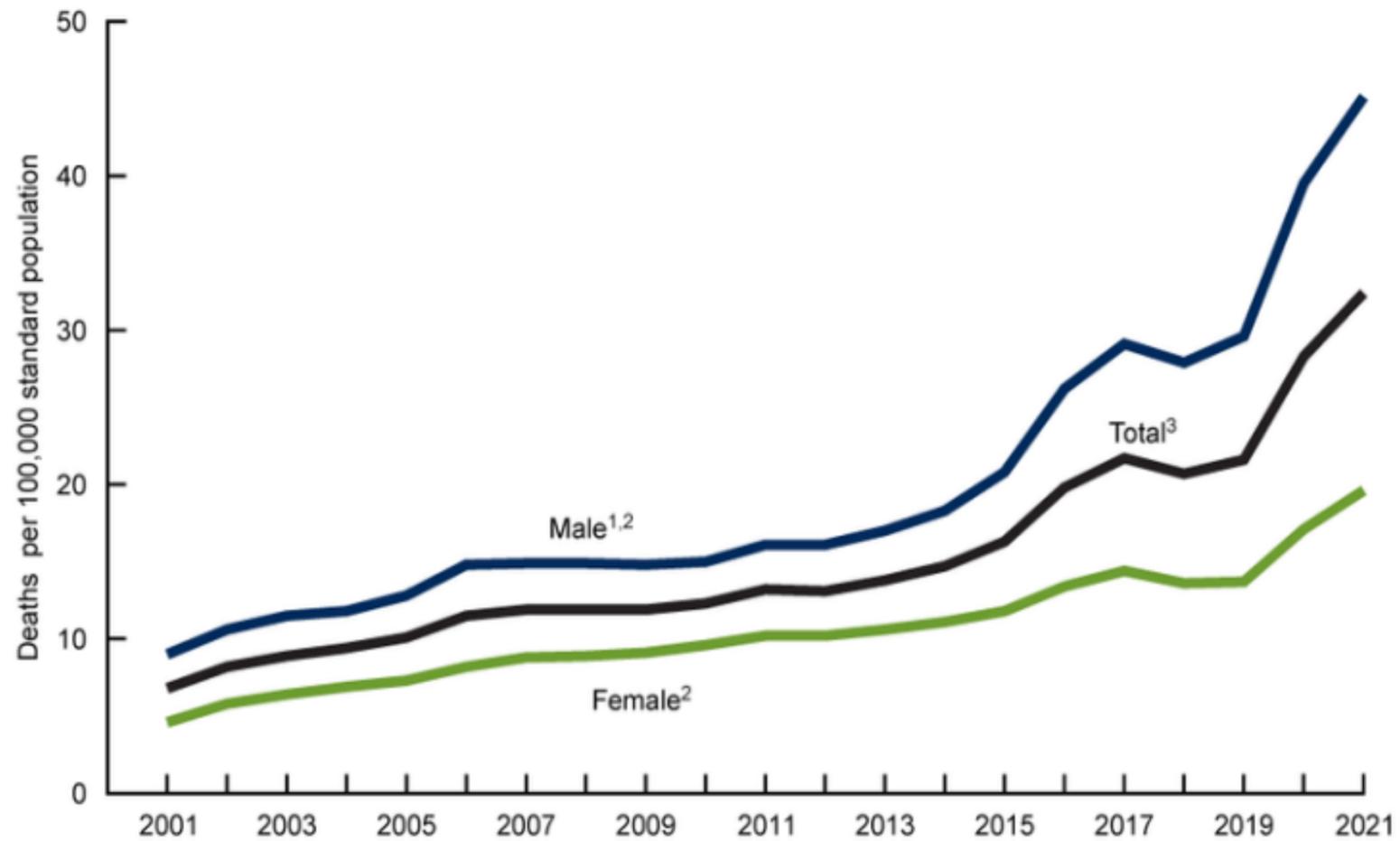
Refine Strategies

Assure Widespread Adoption

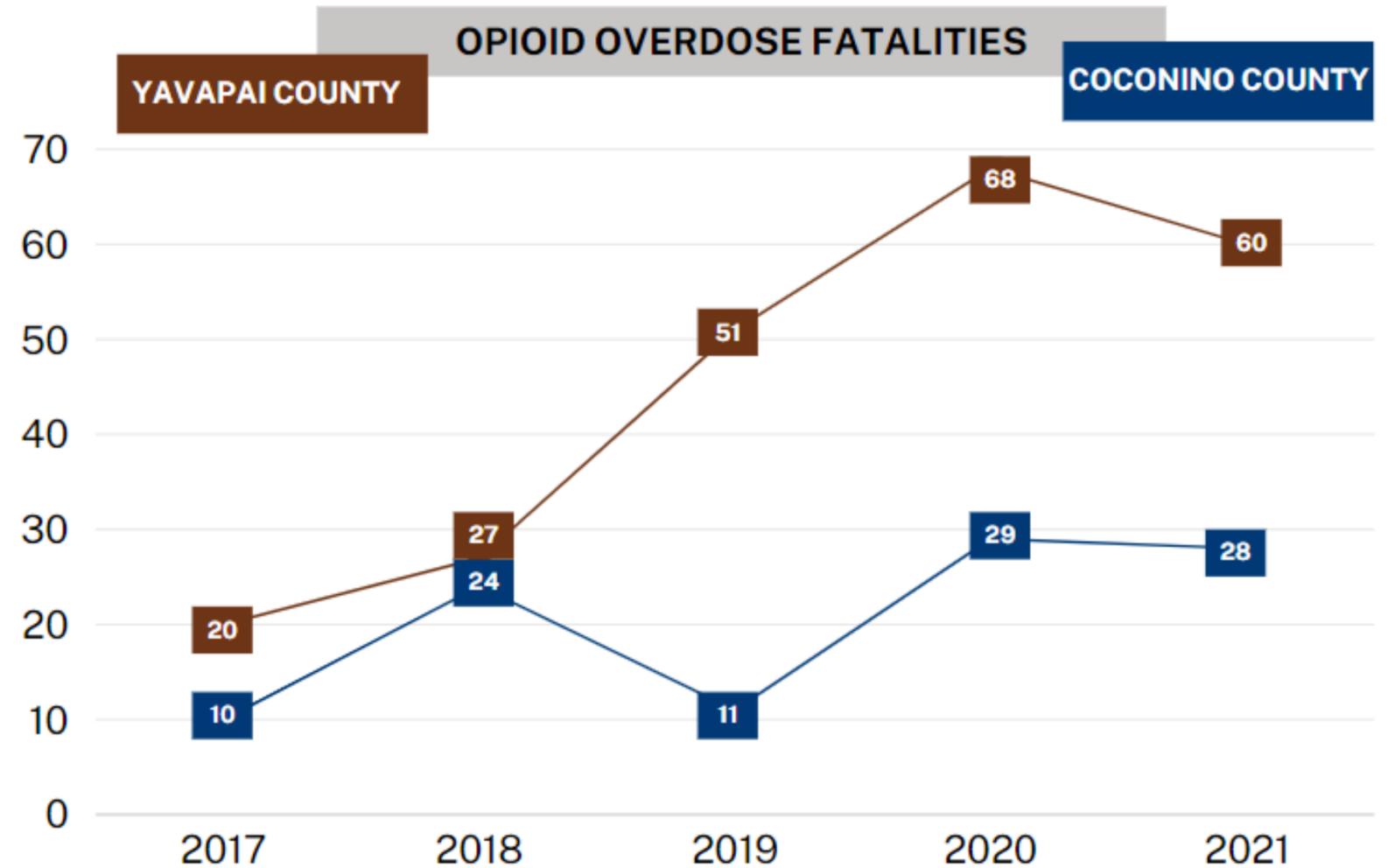


The Opioid Epidemic

Age-Adjusted rate of Overdose Deaths, 2001-2021



Age-adjusted rates of drug overdose deaths have risen over 500% over the past 20 years.



In Coconino County we have seen a 180% increase in opioid deaths between 2017-2021, while Yavapai saw a 200% increase in the same period.



Risk Factors: Drugs and Alcohol

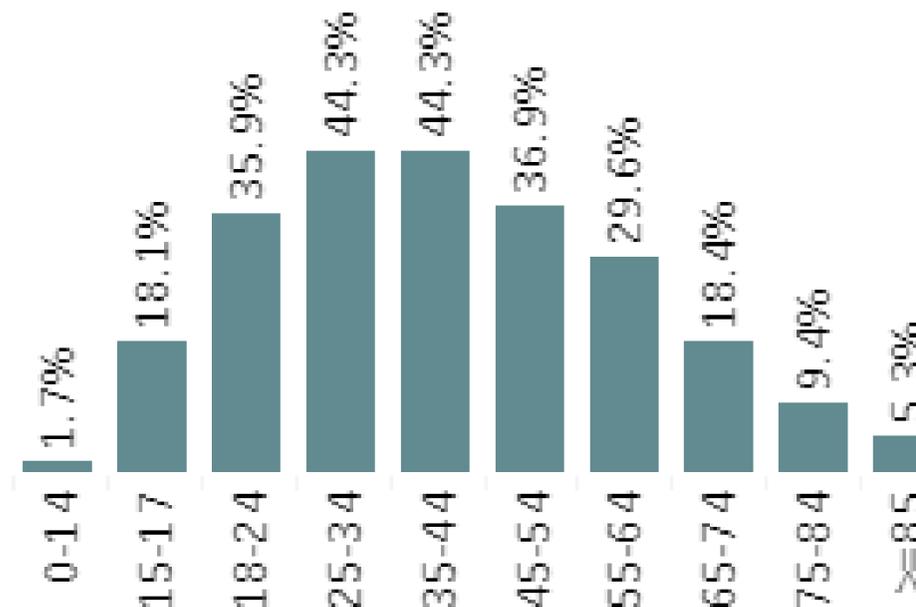
The most significant risk factor associated with traumatic injuries is drug and alcohol use.

23.80% of AZ trauma patients were suspected or confirmed as under the influence of alcohol or drugs.



23.80%
of trauma patients were suspected or confirmed of being under the influence of drugs or alcohol

Trauma Incidents with suspected or confirmed drug or alcohol



(ADHS Bureau of EMS and Trauma System [BEMSTS], 2024)



Narcan and Substance Use

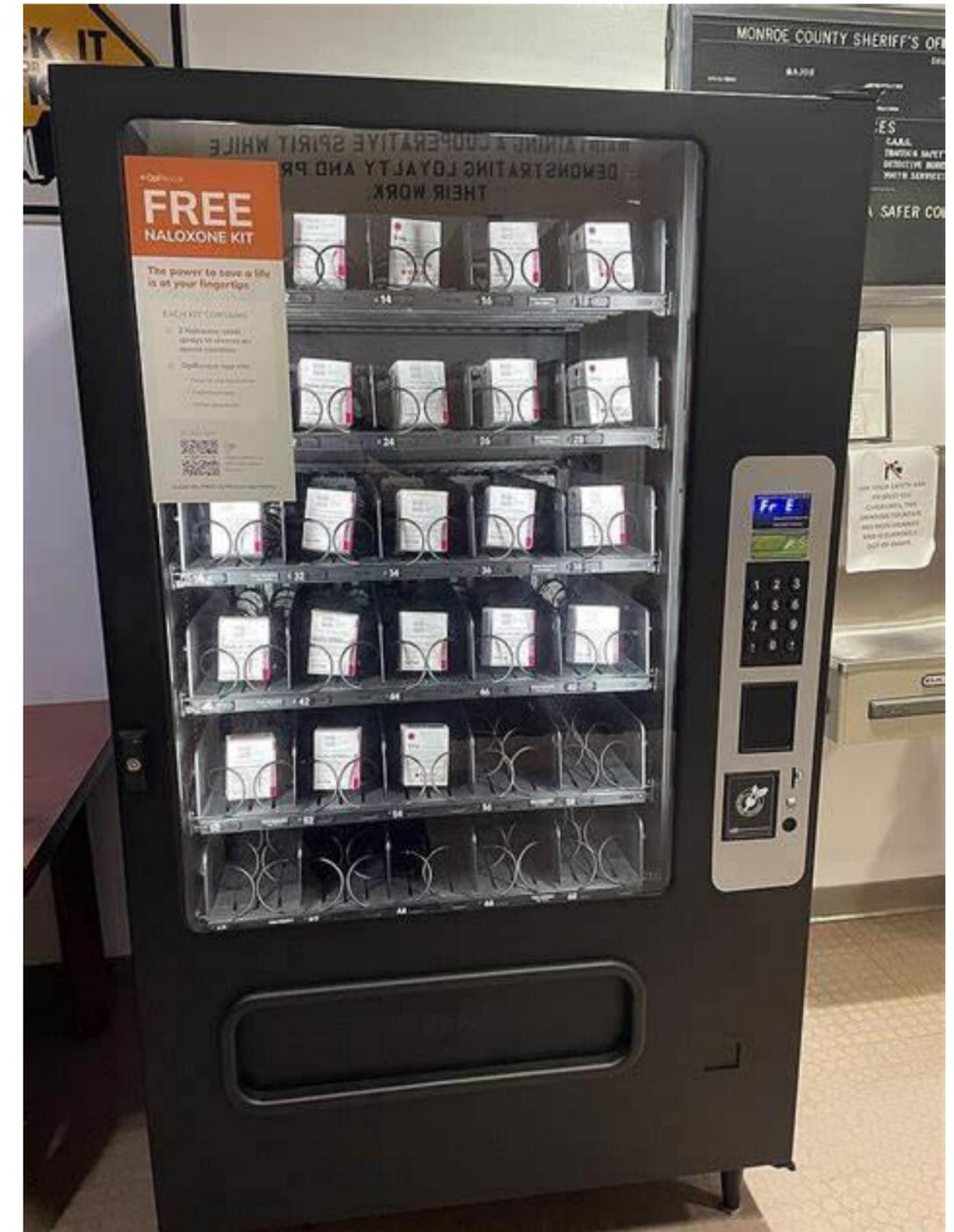
What are we doing?

- Screening and Referral to Treatment
- Harm Reduction Vending Machines
- Naloxone Distribution Program
- Opioid Committee
- Hope Coconino

What is the state doing?

- Funding for County-level harm reduction programs
- Incentivizing hospitals to dispense Naloxone through EDs
- Funding for EMS Narcan/naloxone leave behind programs

Community problems require community solutions...



(Wayne State University, 2021)

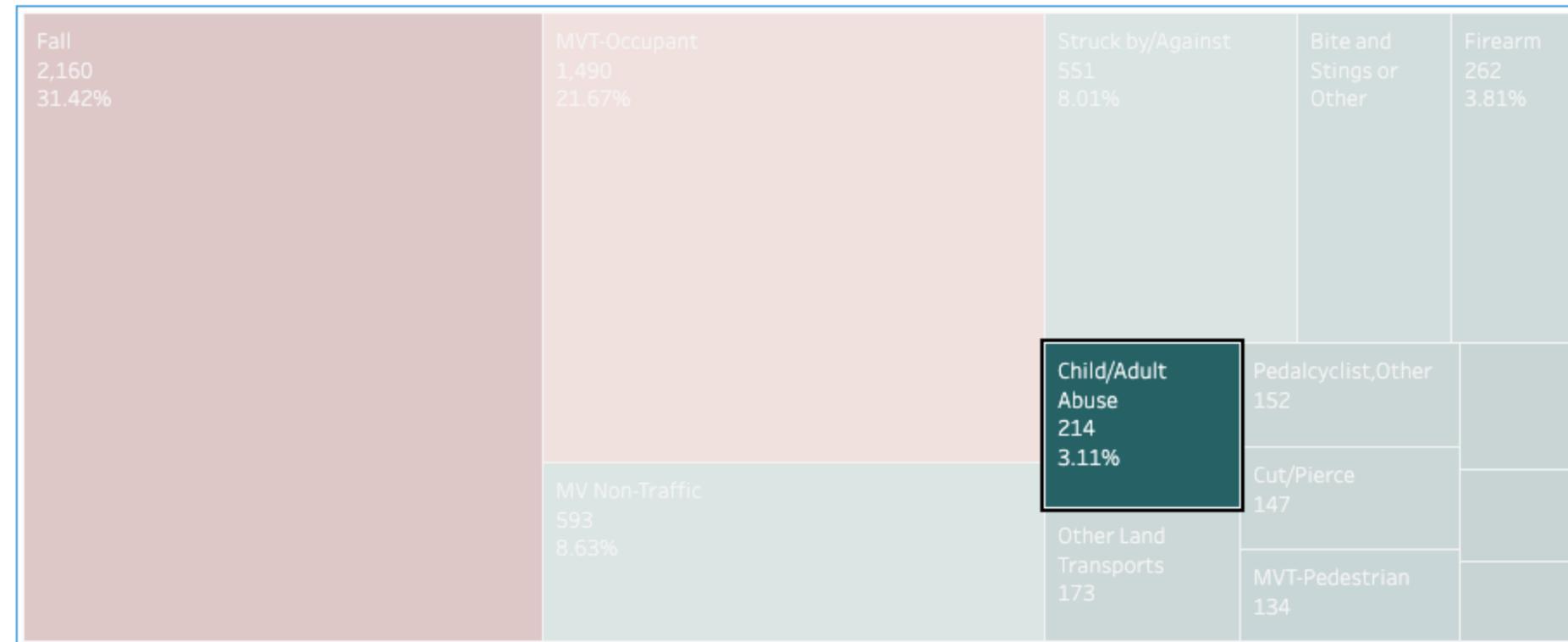


Child Abuse

Risk factors:

- Crosses all races and genders
- All economic statuses
- Youngest are most vulnerable
- Girls have slightly higher rate than boys
- 77% are abused by parents
- Healthcare workers want to believe the parents – which is why it is often missed.
- Correlation with DV up to 60%

(ADHS Bureau of EMS and Trauma System [BEMSTS], 2023)



(ADHS Bureau of EMS and Trauma System [BEMSTS], 2023)

Deaths
7
3.3%

Hospital Charges
Total: \$13M
Median: \$30,921

Reimbursement
Total: \$2M
Median: \$1,834



Child Abuse

What are we doing?

- Child Maltreatment screening in ED and peds/PICU.
- Now rolling out to NAH primary care clinics
- Monthly - Multi Disciplinary child abuse review meetings
- Educating Law Enforcement, prosecutors, DCS
- Close coordination with our Child Advocacy Center
- DV screening and referral in our ED and inpatient (soon to be in clinics).

(ADHS Bureau of EMS and Trauma System [BEMSTS], 2023)



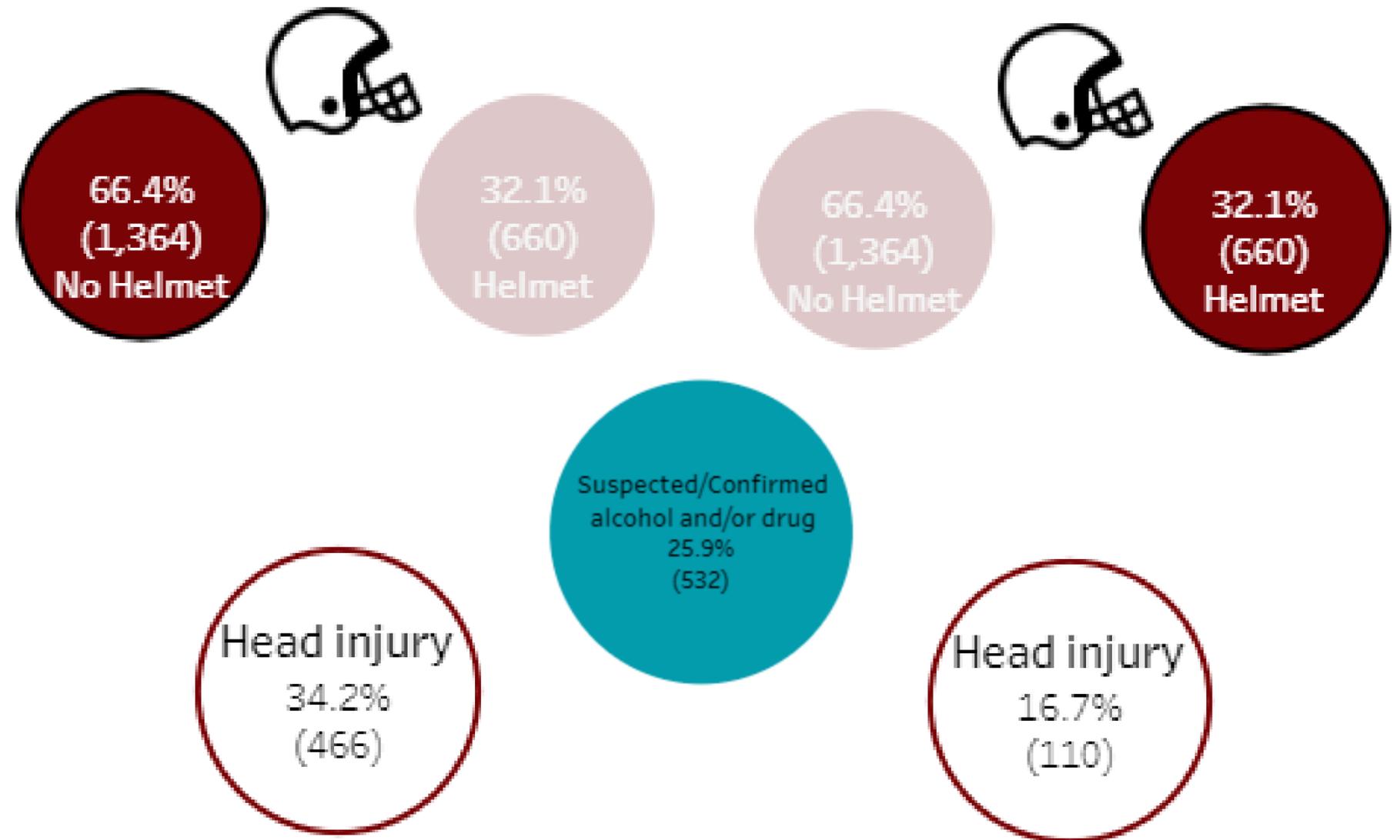
ATV/OHV Safety

Risk factors:

- Lack of safety gear
- **No helmet**
- **Alcohol or drug use**
- Passengers on single-rider ATVs
- Improper ATV fit (too big)
- No training
- Improper riding environment

(ADHS Bureau of EMS and Trauma System [BEMSTS], 2023)

Head injury percentage: NO Helmet VS Helmet



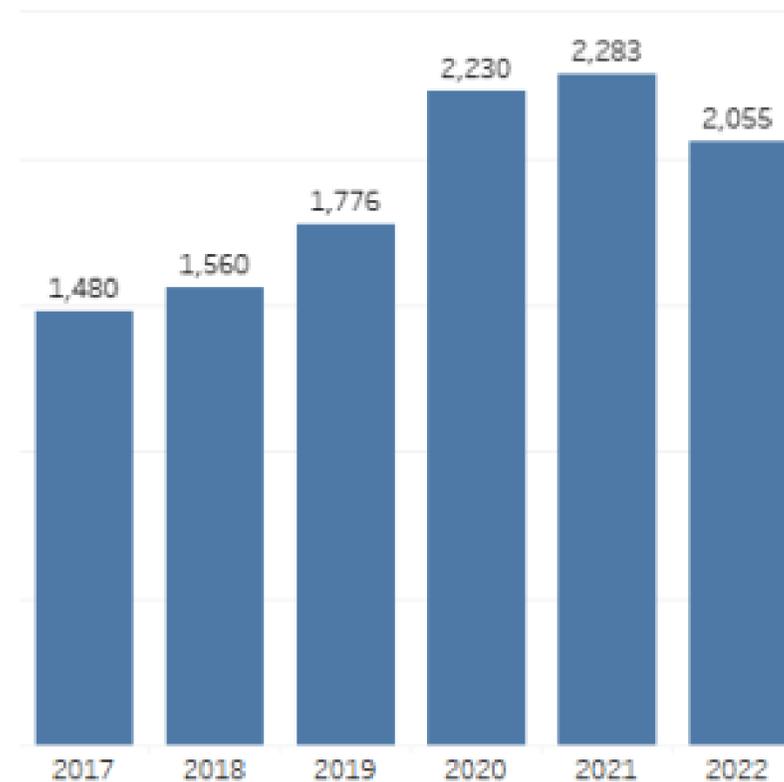
(Arizona Department of Health Services [ADHS], 2024)



Quail Kids

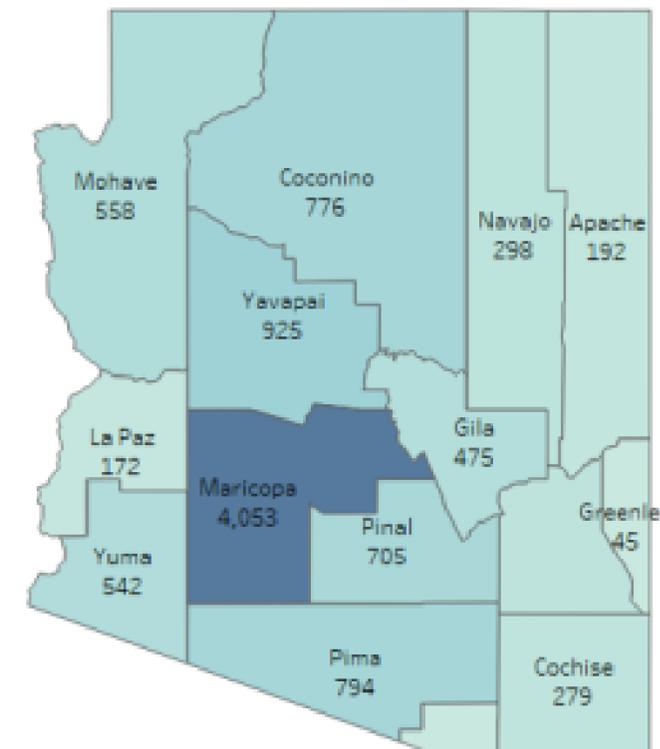
Due to the rise in Off-highway Vehicle (OHV) related injuries, the Arizona Bureau of EMS and Trauma has partnered with participating trauma centers and the Arizona Department of Game and Fish to implement an OHV outreach program- Quail Kids.

Off-highway vehicle related trauma by year



(Arizona Department of Health Services [ADHS], 2024)

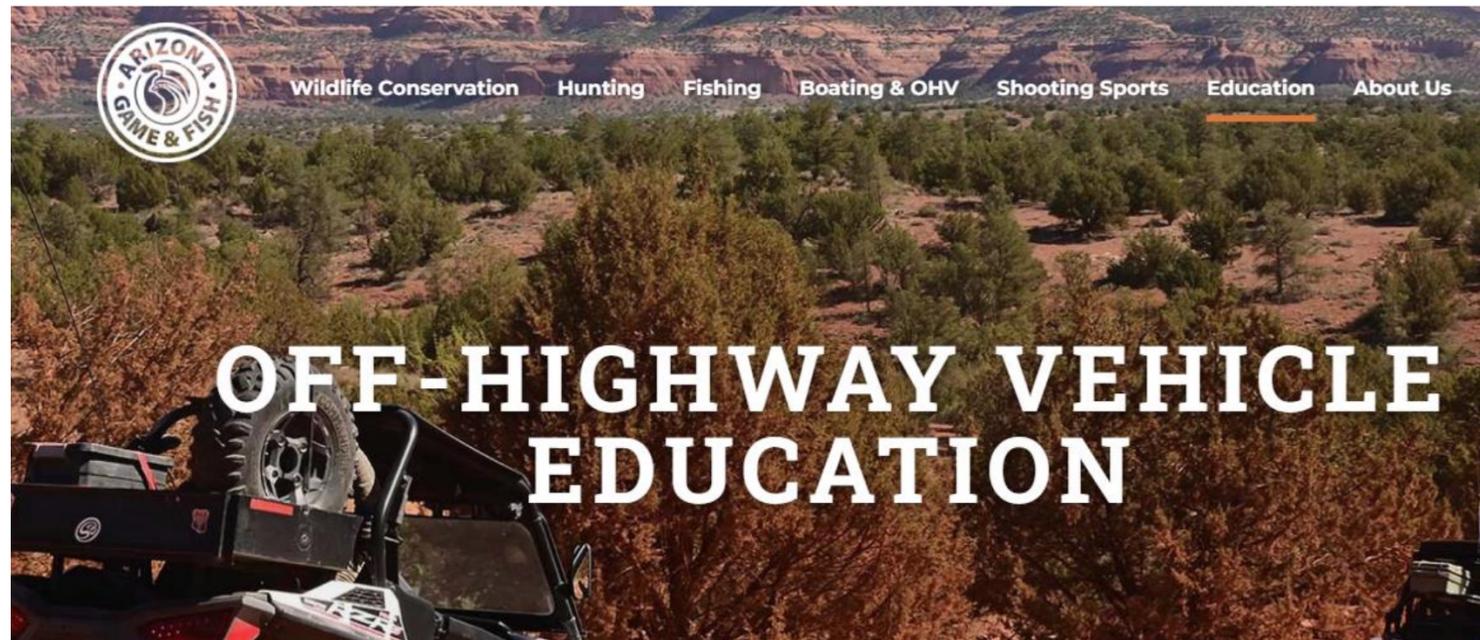
Off-highway vehicle related trauma count by injury county: 2017-2022





Quail Kids

Great opportunity for EMS to partner with us! To bring Quail Kids to all AZ communities



(Off Highway Vehicle Education - Arizona Game & Fish Department, 2024)

School OHV Safety Education Program

Quail Kids is an interactive learning experience designed to teach young riders the importance of off-highway vehicle safety. The course topics include protective riding equipment requirements, matching rider abilities to the machine size and ethical riding.



OHV Education information

ATV SAFETY CHECKLIST

- ✓ Wear a helmet, eye protection, and protective clothing.
- ✓ No passengers on single-rider ATVs. EVER.
- ✓ Ride off-road, not on paved or loose gravel roads.
- ✓ Never operate an ATV while under the influence.
- ✓ Ensure the right size and fit of your ATV.
- ✓ Take an ATV safety course!

Riding an ATV will always have risks, especially for children under 16. If you, your family, or your friends choose to ride an ATV we hope you choose to do so safely.

If you would like to take FREE online ATV safety course, please scan the below QR code:



ATVsafety.org/atv-ecourse/

The American Academy of Pediatrics (AAP) strongly recommends that children under the age of 16 not ride ATVs.

ATV SAFETY



Don't just say yes.

LEARN THE RISKS BEFORE YOU ALLOW YOUR CHILD TO RIDE



Help us get the word out!

THE RIGHT FIT

To check for a good ATV fit...

Stand on the footrest—there should be four to six inches between your bottom and the seat

Sit with feet placed on the pegs, ensure knees bend at least 45 degrees

Make sure you can easily reach and use the throttle and brake while fully seated and while turning

Make sure your elbows are bent and you can maintain a firm grip on the handlebars while turning

90% of ATV-related youth deaths and injuries occur on adult-size ATVs

Choosing the right ATV keeps your child safe. Follow this helpful size chart when in doubt

ATV Youth Label		Typical Engine Size
6-9	Y-6+	70cc or smaller
10-11	Y-10+	90cc or smaller
12-13	Y-12+	110cc or smaller
14+	T	110cc or larger

ATVs are off-road vehicles, they are never meant to be driven on public roadways

Every ATV rider should wear the proper safety gear

- Helmet
- Goggles
- Long sleeves
- Long pants
- Gloves
- Over the ankle boots

THE RIGHT GEAR

Helmets reduce the chance of head and neck injuries by 50%

ATVs are designed for ONE rider at a time, never take a passenger on a single-rider ATV

ATV SAFETY AND YOUR CHILD

4 children are seen in the ER due to ATV-related injuries every hour

- 1. Always wear a Helmet**
Helmets reduce the likelihood of ATV-related fatal head injuries by **40%** and nonfatal brain injury by **60%**
- 2. Ensure Proper ATV size**
80% of deaths and injuries among ATV riders younger than 16 years of age have occurred when they were on adult-size vehicles
- 3. No Passengers on Single-Rider ATVs**
46% of all pediatric (under 18) ATV-related deaths were passengers or operators with passengers
- 4. Avoid Driving on Public Roadways**
72% of ATV-related deaths of children aged 18-17 occur on public roadways

Hospitalizations due to ATV-related injuries are 30% higher in youth than in adults



N O R T H E R N A R I Z O N A H E A L T H C A R E

There are SO MANY ways we can work together to prevent these tragic injuries.

Quail kids and Child Passenger Restraints are perfect programs for collaboration!

Thank you!

Questions?



References

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Questions?

Mission:

Improving health, healing people.

Vision:

Always better care.

Every person, every time...**together.**

Values:

