How to Address Safety Issues for ATVs and Other Off-Road Vehicles

July 12, 2017
Presented by: Gerene Denning
Webinar Logistics

• Duration is 11:00 AM - 12:30 PM Mountain

• Webinar – recorded and archived on website. For quality of recording, phone will be muted during presentation

• If listening on the phone, please mute your computer

• To maximize the presentation on your screen click the 4 arrows in the top right of the presentation

• At the end of each section, there will be time for Q&A

• There is a handout pod at the bottom of the screen

• Please complete follow-up surveys; they are vital to assessing the webinar quality
Gerene Denning
University of Iowa
Goals of this Webinar

Once you have completed this webinar, you will be able to:

- Identify the major vehicle design factors that contribute to all-terrain vehicle (ATV) and recreational off-highway vehicle (ROV) roadway crashes.
- List one or more operator behaviors that increase risk on the road.
- Understand other types of harm and costs associated with ATV/ROV roadway riding.
- Join in a discussion of strategies for crash and injury prevention.
Learning Outcomes

To achieve the webinar goal, you will learn to:

Identify factors that contribute to ATV/ROV roadway deaths and injuries, including unique vehicle design features and common unsafe riding behaviors that are major contributors to roadway crashes.

Strategize using education, engineering, and enforcement approaches to increase roadway safety and prevent ATV/ROV crashes on the road.
Identify factors that contribute to ATV/ROV roadway deaths and injuries, including unique vehicle design features and common unsafe riding behaviors that are major contributors to roadway crashes.

Strategize using education, engineering, and enforcement approaches to increase roadway safety and prevent ATV/ROV crashes on the road.
Understanding Vehicle Terminology
Two Families of Off-Road Vehicles

- All-terrain vehicle (ATV)
  - Quad Bike or Quad
  - 3-Wheeler
  - 4-Wheeler

- Side-by-side (SxS)
  - Utility Task Vehicle (UTV)
  - Recreational Off-Highway Vehicle (ROV)
All-Terrain Vehicle (ATV)

- Straddle seat
- Handle bars (throttle & brake)
- Low pressure, deep-tread tires
- High clearance
- Narrow wheelbase

Sport ATV
Max speed
90-100 mph

Utility ATV
Max speeds
>60 mph
Side-by-Side (SxS)

- Bench or bucket seats for 2 or more occupants
- Steering wheel
- Foot pedals for acceleration and braking
- Low pressure, deep-tread tires
- High clearance
- Narrow wheelbase
Side-by-Side (SxS)

- Utility Task Vehicle (UTV)
  - Designed predominately for occupational use
  - Maximum speeds of 25 mph or less
  - Typically do not have ROPS and seat belts
Side-by-Side (SxS)

- Recreational Off-Highway Vehicles (ROVs)
  - Maximum speeds > 30 mph
  - Have ROPS and restraint system (seat belt or harness)

Sport ROV

Multipurpose ROV
ROVs are Increasing in Popularity

Source: CPSC analysis of data compiled by Power Products Marketing.

By 2013, ~1.2 million ROVs

Currently, over 13 million ATVs
Off-Road Vehicles
On The Road:
A Growing Roadway Safety Concern
Primary Data Sources

Consumer Product Safety Commission (CPSC):
- ATV Fatality Database (1982-2012)
- ROV Database of fatal and non-fatal crashes (2003-2011)

Iowa Off-Highway Vehicle Database
- Dept of Transportation (DOT)
- Dept. of Natural Resources (DNR)
- Iowa Trauma Registry
- (2002-2013)
Roadway Fatalities

Every year, in every state, more than half of all ATV fatalities occur on the road.

72% of ATV fatalities among 16-17 year olds are on the road.

56% of all ROV fatalities and injuries are from roadway crashes.
Injury Severity (Iowa)

On-road versus off-road ATV crashes had higher likelihood of:

- Head Injury
- Severe Head Injury
- Major Trauma (Injury Severity Score > 15)

29% of ATV crashes were on the road

Iowa ORV Crash and Injury Database
Major Crash Mechanism

Non-collision events (i.e. rollovers, falls, or ejections) are the most common crash mechanism on and off the road.
Was the Roadway Crash a Traffic Collision?

- **Fatal ATV (CPSC)**: 71% Yes, 29% No
- **ATV (Iowa)**: 87% Yes, 13% No
- **Farm Equipment (9 states)**: 85% Yes, 15% No

Source: Greenan et al., 2016, Inj Epidemiol 3:31
Was the Roadway Crash a Traffic Collision?

**ROV (CPSC)**
- 93% Yes
- 7% No

**Farm Equipment (9 states)**
- 85% Yes
- 15% No

Greenan et al., 2016, Inj Epidemiol 3:31
Traffic Collisions

Around one-third of ATV crashes on the road are a collision with another motor vehicle.

Paved Roads

- MV hit ATV: 48%
- ATV hit MV: 52%

Unpaved Roads

- MV hit ATV: 60%
- ATV hit MV: 40%

Fatal Crashes
There Is A Human Face To Roadway Deaths And Injuries

Pregnant mom killed, son hurt in ATV crash, Iowa patrol says

March, 2016: Lost control of ATV while turning …. her 3-year-old son were thrown from the vehicle …. victim landed on pavement …. she was carrying twins (a boy and girl) who also died

ORV CRASH: Montezuma Child Dies From Injuries

2015: ROV wheels dropped off the side of the road while turning …. the vehicle rolled over …. was thrown from the ROV and pinned by the rollover bar …. she was asphyxiated before the ambulance could arrive
Design Features That Contribute To Crash Risk
Manufacturers

Our vehicles are not designed to be used on the road.
High Center of Gravity

Narrow Wheelbase

+ 

High Clearance
Need For “Active Riding”

High center of gravity contributes to instability, including on inclines and in a turn.

Active riding means counteracting destabilizing forces:

- Shift body weight
- Grip on handlebars
- Footing
- Absorbing shocks
Off-Road Vehicle Tires

Roadway Tire

Designed to grip and release roadway surfaces in a predictable manner.

Off-Road Tire

Low pressure and knobby tread designed to grab off-road terrain for better traction.
Lack of Rear Differential

- Rear differential:
  - Outer wheels turn at higher rates than inner wheels.
  - All four wheels maintain contact with surface.

- No rear differential
  - Outer wheels can lose contact with surface tipping vehicle.
  - Lateral forces on high center of gravity increase risk of rollover.
YouTube Video of Roadway Crash
Lack of Other Safety Features

Commonly missing equipment:

- Lights
- Mirrors
- Turn signals
Fatal ATV Crashes

<table>
<thead>
<tr>
<th></th>
<th>Percent of Roadway Fatalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paved</td>
<td>58%</td>
</tr>
<tr>
<td>Unpaved</td>
<td>42%</td>
</tr>
</tbody>
</table>

- 100% Paved: 27 states
- 50%: 2 states
- 100% Unpaved: 21 states
Not Designed For Roads

High center of gravity increases risk of rollovers

Low pressure, knobby tread tires grab paved surfaces

Low pressure tires also increase shock severity when hit bumps and ruts

Needs wider turning radius and/or lower turning speeds
Other Contributors to Roadway Crashes and Injuries
Inexperience and Lack of Training

Inexperience is an independent risk factor for crashes

Less than 5% of riders get formal operator training
Males

ATV
- 89% of fatalities
- 80% of crash victims in Iowa database
- More likely to be operators than females

ROV
- 80% of all crash victims
- More likely to be operators than females

Higher propensity for risk-taking
Youth and ATVs

Being <16 years old is an independent risk factor for ATV crashes.

Over 90% of ATV-related deaths and injuries among youth occur on adult-size ATVs. True both on and off the road.
Youth and ROVs

Youth <16 years old

- 25% of all operator victims
- 35% of all passenger victims

But, 2 out of every 3 roadway crashes had a youth operator!
Passengers on ATVs

- Change the center of gravity and interfere with active riding:
  - Operator cannot shift weight appropriately on inclines and in a turn.
  - A passenger can distract the operator who must be continually aware of terrain features.
Passengers in ROVs

- Injured: 428 drivers, 461 passengers (CPSC)
- More passengers carried than can be restrained.
- Children may be too young to be restrained properly.
Multiple Victims in Roadway ROV Crashes

6 hurt after UTV crash in Mason County (ROV-ROV collision) July 5, 2017

1 Dead, 2 injured in Taylor County Crash (ROV-Truck Collision) June 13, 2017

UTV crash injures 7 children (ROV Rollover) May 31, 2017

UTV crash leaves two juveniles injured, one teen dead (ROV Rollover) June 12, 2017
Alcohol And Vehicle Operators

### Table 1

<table>
<thead>
<tr>
<th>Crash</th>
<th>Source</th>
<th>%Operators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatal ATV</td>
<td>CPSC</td>
<td>42%</td>
</tr>
<tr>
<td>Non-Fatal ATV</td>
<td>IA ORV Database</td>
<td>11%</td>
</tr>
<tr>
<td>All ROV</td>
<td>CPSC</td>
<td>50%</td>
</tr>
</tbody>
</table>

### Table 2

<table>
<thead>
<tr>
<th>Source</th>
<th>Roadway</th>
<th>Off-Road</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatal ATV (CPSC)</td>
<td>49%</td>
<td>32%</td>
</tr>
<tr>
<td>Non-fatal ATV (Iowa)</td>
<td>13%</td>
<td>8%</td>
</tr>
<tr>
<td>All ROV (CPSC)</td>
<td>52%</td>
<td>44%</td>
</tr>
</tbody>
</table>

### Alcohol Involved (%Operators)

<table>
<thead>
<tr>
<th>Operator Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;16</td>
</tr>
<tr>
<td>16-17</td>
</tr>
<tr>
<td>18-25</td>
</tr>
<tr>
<td>26-35</td>
</tr>
<tr>
<td>36-45</td>
</tr>
<tr>
<td>46-55</td>
</tr>
<tr>
<td>&gt;55</td>
</tr>
</tbody>
</table>

### Operator Age Fatal ATV Crashes (CPSC)
Speed Adds To Risk

- Speeds relatively safe for roadway vehicles are not safe for ATVs and ROVs.

- For example, 53% of ROV roadway crashes occurred at 20 mph or less.

- Speed further increases risk of crash and severity of injury.
Limited PPE Use (ATV)

Helmet use varies, but among non-racers is 25% or less.

Helmet use is lower:

- In fatal crashes
- Among adults
- Among passengers
- On the road
- In more rural communities
Limited PPE Use (ROV)

- Helmet No: 95%
- Helmet Yes: 5%

- Belted No: 73%
- Belted Yes: 27%
Remote Crash

“ATV passenger rollover. Trapped under ATV over 2 hours. Driver was dead at the scene.”
Remote Crashes

Golden Hour: The time following traumatic injury during which there is the highest likelihood that prompt medical treatment will prevent death.
Multiple Risk Factors

- Vehicle Design
- Riding on the road
- Inexperience and lack of training
- Being male
- Younger age
- Passengers
- Alcohol
- Speed
- Lack of helmet use
- Lack of seat belts
- Remote locations

More severe crashes tend to involve multiple unsafe behaviors
Directing Your Questions via the Chat

1. Chat pod is on left side of screen between attendees pod & closed caption pod

2. Type your question or comment here

3. Answers will appear here unless addressed verbally
Identify factors that contribute to ATV/ROV roadway deaths and injuries, including unique vehicle design features and common unsafe riding behaviors that are major contributors to roadway crashes.

Strategize using education, engineering, and enforcement approaches to increase roadway safety and prevent ATV/ROV crashes on the road.
More ATVs Allowed On Public Roads

35 states (70%) allow ATVs on public roads

Since 2002, 22 of the 35 states that allow ATVs on public roads have passed laws to expand use

In a number of states, including Iowa, counties and cities can expand access to roads and streets
Impacts on Communities

- Deaths and injuries
- Noise (in city limits)
- Trespassing
- Vandalism
- Damage to private and public lands
- Liability
Balancing User and Societal Needs

- States can have what is called an agricultural exemption but also applies to other occupational roadway use:
  - Utility workers
  - Rescue workers
  - Law enforcement
- Trails that include public roads.

Matt Ulberg, Director, Montana LTAP
Identifying the safest way for users to access forest roads.
The Three Es of Injury Prevention

All three together

Engineering

Powerful injury prevention tool

Education

Enforcement
Engineering
Crush Protection Devices

Australian Designs

Low Speeds <30 mph

Restrict Rollover to 90 degrees

Lifeguard

Quadbar
Helmets

Recreational

Occupational (Australia)
Education
ATV Safety Institute (ASI)

- Rigorously trained instructors
- Multi-day course
- Didactics
- Hands on training
- New ATV owner gets cost of training one person

- Limited number of instructors
- Most users don’t perceive a need to have formal training
National and State Programs

- National 4-H ATV Safety Program (Includes grants)
- State programs
  - Universities
  - Agricultural Health and Safety Centers
  - Departments of Public Health and Safety
  - Department of Natural Resources
Safety Tips for ATV Riders (STARs)

>15,000 Iowa students
Target = 12-15 years old
Fun, engaging didactics
Demonstration component

- 75% report having ridden on an ATV
- 92% report having ridden with passengers
- 81% report having ridden on public roads

ATV Safety Trainer Toolkit
Impact of Education and Training

Measures and Common Results:

- Short-term demonstration of skills (Good/Very Good)
- Short-term knowledge (Good/Very Good)
- Knowledge retention (Limited)
- Change in riding behaviors (Little or none)

Individual behavioral change and cultural change requires safety laws and enforcement
Enforcement
Challenges

- Laws vary from significantly state to state, including laws related to roadway riding
- Laws related to roadway access can vary within a state
- Laws can be challenging to interpret
- Most users do not know the ATV/ROV safety laws
- Many direct enforcement challenges
  - No vehicle license plate
  - Operators of ATVs can easily evade law enforcement
Economic Development Does Not Require Sacrificing Safety
Trail Systems

- Dedicated riding trails for off-road vehicles
- e.g. Hatfield-McCoy trail system
- Set rigorous rules, including helmet use
- Trail permits required
- Enforcement of a well-defined geographical area
Off-Highway Vehicle (OHV) Parks

### Design

### Training

<table>
<thead>
<tr>
<th>Riding Practice</th>
<th>Outside Park*</th>
<th>Inside Park**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Youth on Adult ATVs</td>
<td>95%</td>
<td>15%</td>
</tr>
<tr>
<td>Multiple Riders</td>
<td>15-25%</td>
<td>5%</td>
</tr>
<tr>
<td>Helmet Use</td>
<td>&lt;25%</td>
<td>95%</td>
</tr>
</tbody>
</table>

*Crash Studies

**Observational Study
Organized Riding Events

Parks, trails, and riding events have been shown to increase tourism.
Please Consider Sharing Thoughts on Injury Prevention Strategies
Directing Your Questions via the Chat

1. Chat pod is on left side of screen between attendees pod & closed caption pod

2. Type your question or comment here

3. Answers will appear here unless addressed verbally
In this webinar, you have learned to:

Identify factors that contribute to ATV/ROV roadway deaths and injuries, including unique vehicle design features and common unsafe riding behaviors that are major contributors to roadway crashes.

Strategize using education, engineering, and enforcement approaches to increase roadway safety and prevent ATV/ROV crashes on the road.
Upcoming 2017 Webinars

Collaborating with Law Enforcement to Reach Zero
Tues., August 1, 2017 9:00-10:30 AM Mountain

Archived Webinars

Access the webinar archives
Training Videos

• Introduction to Road Safety Audits on Tribal Lands
• Introduction to Road Safety Culture

Watch these videos
Contact Information

If you have any questions related to this webinar, please contact the instructors at:

Gerene Denning at gerene-denning@uiowa.edu

Or contact the National Center for Rural Road Safety Help Desk at:

(844) 330-2200 or info@ruralsafetycenter.org

http://ruralsafetycenter.org/

For more information about the STARs school-based safety program, email us at:

atvsafety@uiowa.edu