

Vehicle Rollovers - Lessons Learned from Past Incidents

Emergency vehicle rollovers are costly. There is a human cost (fatalities and serious injuries to occupants), and there is a financial cost (vehicle damage, loss of use of the vehicle, and the public perception of your organization). They are also largely preventable. All emergency vehicles are susceptible to rollovers, but tankers (tenders), pumper tankers, aerials, and ambulances are particularly vulnerable because of their high center of gravity.

Case Example

A volunteer fire fighter died in a tanker rollover while responding to a working structure fire. The volunteer fire fighter responded to a text message from his fire chief at 0646 hours requesting him to bring Tanker 1 to the scene of the structure fire. Visibility was limited due to extreme fog conditions, and the National Weather Service had issued a fog warning for the local area. While traveling south on a two-lane, paved county road, Tanker 1 ran off the right side of the road through a narrow soft shoulder into a ditch. The fire fighter steered Tanker 1 back onto the pavement. While attempting to maintain the direction of travel, Tanker 1 overturned to the left, rolled over one and one-half times, and came to rest upside down on the pavement. The fire fighter was ejected from the cab and sustained fatal injuries when the vehicle rolled onto him. At 0713 hours, a civilian motorist came upon the overturned tanker and called 911. The fire fighter was not wearing a seat belt. <https://www.cdc.gov/niosh/fire/reports/face201706.html>

Case Example

A 44-year-old paramedic was injured when the ambulance she was in rolled over. The patient she was caring for was transported by another agency following the accident. The driver of the ambulance was not injured. Contributing factors to the accident included vehicle speed, high winds and heavy rain as the ambulance crossed an overpass.

Case Example

A 34-year-old male volunteer/paid on-call fire fighter was fatally injured and another fire fighter was severely injured in a single vehicle rollover crash. The crash occurred when the fire truck was unable to stop while crossing an intersection, swerved to avoid traffic and overturned into a utility pole. The fire truck was responding code 3 (lights and siren) to a reported brush fire on a two-lane paved road with a posted speed limit of 55 mph. The driver and the passenger were not wearing seat belts and were found lying next to the cab on the passenger side. The passenger died from his injuries at the scene and the driver was transported to the hospital with serious injuries. <https://www.cdc.gov/niosh/fire/reports/face200908.html>

Consider the following four areas to help prevent rollovers: **the vehicle, the roads, the driver, and leadership.**

Vehicles

Fire and EMS vehicles are certainly not getting smaller. Requirements of updated standards and limitations on length and width in existing stations have led to many vehicles being taller. This raises the center of gravity making the vehicles more susceptible to rollover.

The width may also be increased. While an increased width helps with stability it also means that the vehicle will take up more of its lane of travel, leaving less room for error or drift before the vehicle may leave the road.

The design of newer vehicles incorporates more stability control technology. While this is a positive step, the new technology can provide a false sense of security. Unfortunately, not all of the vehicles used by emergency service organizations are new. Many agencies purchase used apparatus and make needed changes to accommodate their needs. These changes can change the center of gravity based on the location and weight of equipment and water carried. Agencies should also be concerned with dynamic loads (water sloshing, providers moving about the back of an ambulance, etc.) when looking at their vehicles.

Vehicle inspection and maintenance play a key role in rollover prevention. Tires, suspension and brakes are obvious concerns, but items like wipers and defrosters can play a pivotal role in maintaining visibility and allow the driver to aim high in steering to lessen the potential for sudden steering corrections.

Roads

Not all roads are created equal. Interstate highways often have wide lanes and paved shoulders that are level with the edge of the roadway. Rural roads may have a high crown to promote drainage and may have dirt shoulders that are lower than the road surface (or have no shoulder at all). A vehicle traveling on a road with a high crown will not only have a tendency to move the vehicle toward the shoulder, but will also tilt the vehicle (and move the center of gravity) toward the edge of the road.

Rural roads may have narrower lanes, meaning that a larger vehicle will have a smaller margin for error before wheels leave the pavement. Should it leave the pavement there is a good chance that it will be dropping onto a soft shoulder (or right into a drainage ditch).

Two other areas to keep in mind are the driver's familiarity with the road and the weather conditions. The less familiar a driver is with the road and the worse the weather, the slower the vehicle should be operated.

Drivers

The number one job of every driver is to get the vehicle (along with personnel and equipment it carries) to the scene and back safely. Keep in mind that excessive relative speed is a contributing factor in most rollover incidents. Said a different way, we can prevent the vast majority of vehicle rollovers by simply slowing down. Excessive speed (for conditions) greatly reduces the driver's ability to control the vehicle on a curve or when making evasive steering moves. Reducing speed will increase the driver's ability to keep the vehicle under control during a wider range of circumstances. Reducing speed decreases the likelihood that evasive steering will be needed, further reducing the likelihood that weight (especially water) will shift and helping the driver maintain control.

All emergency vehicle operators should successfully complete an operator-training program. [VFIS has two programs - **Emergency Vehicle Driver Training** and **EMS-Vehicle Operator** available on www.vfis.com that can be used for this purpose.] Persons operating vehicles that are vulnerable to rollovers should receive training on what to do if the right wheels leave the paved surface. This is critical, because the steps to correct the situation go against their natural reaction to pull the vehicle quickly back onto the road surface. Oversteering will often cause the weight of the vehicle to shift from one side to the other or can lead to the tires gripping the road at an excessive angle once brought back on the road. Either scenario could lead to a rollover.

To help regain control of a vehicle that drops off the road surface the driver should:

- Take their foot off the accelerator and allow the vehicle to slow down gradually.
- Use soft application of the brakes, natural deceleration and downshifting to bring the vehicle to a safe speed or complete stop.
- Under soft shoulder conditions, feather the accelerator as needed to help maintain control of the vehicle slowing.
- Once the vehicle has been stopped or been brought down to a safe speed, gently steer the vehicle back onto the road surface using a lower gear and/or feathered acceleration to assist in overcoming the surface drop off or soft shoulder.

If we have not trained them on how to react to this situation, what makes us think that they will react appropriately?

Drivers of emergency vehicles need to understand how adrenaline (going to an emergency, lights and sirens) can impact their judgement. Typically, the more experienced a driver is, the better they are at overcoming the effects of adrenaline. Officers (or the person in the right hand seat) should help assure that the driver is taking the appropriate precautions for a safe response.

One of the most important step emergency responders can take is to wear their seat belt. Crash survivability is much greater when the responder is secured within the vehicle than when they are thrown from a moving vehicle. A seat belt will also help keep the driver in the driving position in the event of a quick movement. The best driver can do nothing if they are no longer in contact with the steering wheel and other controls.

Leaders

A major role of leadership in emergency services is to make sure everyone gets to go home. That includes the need to develop, implement and enforce operating guidelines. With respect to rollovers those guidelines should include:

- Seat belt usage by everyone in the vehicle;
- Driver training for all operators and training specific to vehicles susceptible to rollovers; and
- Emergency response guidelines including a consideration of having vehicles that are susceptible to rollovers respond in a non-emergency mode. Is the risk worth the short time saved?

Most importantly, leaders in the organization must “walk the talk.” This means leading by example.

Summary:

When an emergency vehicle rolls over responding to a call or during a patient transport no one wins. It creates another emergency and does nothing to help address the initial call for assistance. Rollovers are preventable. Make sure rollover prevention is part of the design of new vehicles and placement of equipment. Make sure vehicles are properly maintained and inspected. Make sure that all persons in the vehicle are buckled up and that the vehicle is operated at safe speeds for the conditions.

If you are a leader, WALK THE TALK!