# Ontario Emergency Medical Services
# Section 21 Sub Committee

## Emergency Medical Services Guidance Note #6

## Issue: Motor Vehicle Advanced Technology Hazards

PREAMBLE

Advanced vehicle technologies have provided for innovation in the automotive industry. Aimed at achieving higher fuel efficiencies, reduced vehicle emissions and improved occupant safety standards, vehicles with these advanced technologies have created health and safety hazards/concerns for emergency response workers tasked with dealing with vehicle emergency incidents.

For the purposes of this Guidance Note, advanced vehicle technologies include high voltage electric and hybrid powered vehicles, alternate fuel cell (hydrogen) powered vehicles, airbags, seatbelt pre-tensioners, and automatic roll-over protection systems in convertible vehicles. Crush injuries from sudden and unexpected vehicular movement, electrical shock, caustic burns and impact injuries may result if safety measures are not taken to protect paramedics from hazards involving advanced vehicle technologies.

There are no universally recognized badges/plates/decals to identify these advanced vehicle technologies among the different vehicle manufacturers and after-market conversion vendors. Paramedics may be unaware of the dangers posed by these advanced vehicle technologies and may rely on the expertise of other first responders and allied agencies for direction at the emergency scene. As a result, inter-agency dialogue regarding operational considerations at such emergency responses is recommended. Providing awareness training for paramedics regarding the hazards posed by advanced vehicle technologies is important to protect the health and safety of paramedics.

BACKGROUND

The National Fire Protection Association (NFPA) has identified these emerging vehicle hazards and has developed a Hybrid and Electric Vehicle Emergency Field Guide which can provide awareness to paramedics on the potential hazards regarding these types of vehicles. Areas identified where there are potential hazards are as follows:

| **Item** | **Potential Hazard** |
|---|---|
| Electric Drive, Hybrid Electric Drive, Plug-In Electric Hybrid Vehicles | High voltage shock, caustic burns, inhalation of toxic fumes, unexpected vehicular movement. |
| Fuel Cell Powered Vehicles | Same as above plus explosion risks from Hydrogen ($H_2$), which is highly flammable and burns without smoke or visible flame. |
| Alternate fueled vehicles (propane and natural gas) | Explosion/fire from damaged compressed gas cylinders or fuel supply lines. |
| Increasing number of airbags, locations of pyrotechnic detonation units and propellant cylinders | Blunt force injuries due to late unexpected deployment. Explosion risk if propellant cylinders are compressed during extrication. |
| Seatbelt pre-tensioners | Blunt force injuries and burns if units are compressed during extrication. |
| Roll-Over Protection (ROP) devices (pop-up roll bars) | Blunt force injuries with late deployment, especially when applying c-spine support to front seat patients. |
| Key Fob Ignition Actuator | No intrinsic hazard, but allows for vehicle start up by proximity alone, resulting in possible sudden vehicle movement. |

OCCUPATIONAL HEALTH AND SAFETY PRECAUTIONS AND CONTROL MEASURES

Hybrid and electric vehicles are regularly driven on Ontario roadways. Paramedics should receive training and instruction on the hazards posed by these vehicles at emergency scenes. It is recommended that training include early recognition strategies to identify these vehicles (various decals, badges and dashboard layouts exist) and the identification of safety zones in and around these vehicles. Inter-agency dialogue and training opportunities may prove to be beneficial as Fire Services routinely receive specialized training in this regard.

General Information:

- There are multi or dual stage air bag systems that utilize two (2) igniters. Paramedics should be aware that in minor accidents the second igniter (a pyrotechnic charged device) may remain active after the first one has inflated the airbag. This second igniter may still pose a danger to first responders if activated; however, re-inflation of the deployed air bag is very rare.

- In convertibles and hard-top convertibles, paramedics should stay clear of the deployment zone of any un-deployed Roll-Over Protection (ROPs) devices. These may be located directly behind each of the headrests (two inverted U shaped bars that deploy vertically) or may be along the rear dash of the vehicle (one wide bar that deploys from rear to front, arching upwards as it moves into place).

- Interrupting the power source can be accomplished by turning off the ignition (remove the traditional key) or moving the key fob at least nine (9) metres away from the vehicle. If this does not power down the vehicle, a more advanced circuit interruption procedure will have to be performed by fire service personnel.

- Be aware that all components of electric drive vehicles can remain functional up to ten (10) minutes after the power supply has been disconnected.

- Fire services may opt to provide a fine misting of water over the entire scene to reduce battery electrolytic (potassium hydroxide (KOH)) dust in the air and/or static spark generation (in hydrogen ($H_2$) powered electric vehicles).

- It should be noted that common ABC fire extinguishers may be used with electric drive vehicles, taking into account appropriate measures and precautions.

Safety measures and precautions may include, but are not limited to the following:

General Safety Measures at the Scene:

- Approach and park upwind and uphill from the collision site whenever possible. This will reduce the chance of inhalation of electrolytic dust/toxic smoke from battery fires and from being struck by a rolling vehicle.

- Approach vehicles from the side and block the wheels if first on scene, as electric vehicles can move without notice or noise.

- Identify the power supply of the vehicle as early as possible.

- Encourage vehicle occupants to open windows/doors prior to paramedics approaching, if possible. Ventilation of the vehicle is especially important where there is potential for battery-involved fires as toxic fumes can accumulate.

- If the battery compartment is smoking or on fire, direct the vehicle occupants out and away from the vehicle to an upwind location if possible.

- Do not make any attempt to sever cables or wires.

- Do not touch orange or blue-clad cables or wiring harnesses. Be aware that the high voltage (HV) orange-clad cables often run just under the chassis and passenger compartment of most vehicles.

- Stay 12.5 centimetres (5") away from side curtain airbags, 25 centimetres (10") away from drivers' side airbags and at least 50 centimetres (20") away from passenger side airbags, whenever possible.

- With all electric vehicles, if hissing type noises are emanating from the trunk area, exit the vehicle and move to an upwind location until the Fire Department is able to stabilize the scene. This noise may be from off-gassing batteries or, if it is a hydrogen powered fuel cell electric vehicle ($H_2$ EV), it may be the hydrogen tank's pressure relief valve venting highly combustible gases into the atmosphere.

- Exercise caution whenever extrication tools are in contact with door pillars, centre consoles, dash boards or steering wheels as they may come into contact with the Supplementary Restraint System (SRS) actuators and pressure canisters, resulting in rapid deployment of the system.

- Prior to starting the extrication process from a part of the vehicle, the paramedic should work with firefighters to ensure that the interior plastic trim has been removed; particularly if the paramedic is to remain in the vehicle with the patient(s) during the extrication process (this exposes the canisters so that accidental deployment can more easily be avoided).

<u>Policies and Procedures/Information and Instruction:</u>

- Develop policies and procedures for personal protective equipment (PPE) usage, donning and doffing procedures, respiratory protection, scene safety assessment and approach.

- Provide information, instruction and training programs aimed at educating the worker specifically in ways to protect themselves when dealing with advanced vehicle technologies.

- Arrange inter-agency workshops/training sessions on advanced vehicle technology hazards with Fire Department staff, where possible.

- Carry out regular review of the above information with all paramedics.

Personal Protective Equipment:

It is recommended that paramedics at vehicle emergency incidents wear personal protective equipment appropriate in the circumstances including:

- Helmet and eye protection.

- High visibility garments.

- Powder-free nitrile or latex-free gloves and leather work gloves.

- Foot protection appropriate in the circumstances.

SOME RELEVANT OCCUPATIONAL HEALTH AND SAFETY ACT REQUIREMENTS

Employers are required by the Occupational Health and Safety Act (OHSA) to:

- Take every precaution reasonable in the circumstances for the protection of a worker – OHSA Clause 25 (2)(h)

- Provide information, instruction and supervision to a worker to protect the health or safety of the worker – OHSA Clause 25 (2)(a)

- Acquaint a worker or a person in authority over a worker with any hazard in the work - OHSA clause 25 (2)(d).

REFERENCES AND RESOURCE MATERIALS

National Fire Protection Association (NFPA); *Emergency Field Guide, 2015 Edition*.

National Fire Protection Association (NFPA); *Alternative Fuel Vehicles Training Program for Emergency Responders Online Training* .

This document should be shared with the workplace Joint Health and Safety Committee or Health and Safety Representative, incorporated into the workplace occupational health and safety policy and program where appropriate, and posted on the Public Services Health & Safety Association website and the websites of other interested stakeholders.

**This Guidance Note has been prepared to assist the workplace parties in understanding some of their obligations under the Occupational Health and Safety Act (OHSA) and the regulations. It is not intended to replace the OHSA or the regulations and reference should always be made to the official version of the legislation.**

**It is the responsibility of the workplace parties to ensure compliance with the legislation. This Guidance note does not constitute legal advice. If you require assistance with respect to the interpretation of the legislation and its potential application in specific circumstances, please contact your legal counsel.**

**While this Guidance Note will also be available to Ministry of Labour inspectors, they will apply and enforce the OHSA and its regulations based on the facts as they may find them in the workplace. This Guidance Note does not affect their enforcement discretion in any way.**