Government of the District of Columbia

Department:	***Department of Health***
Administration:	***Health Emergency Preparedness and Response Administration***
Section:	***Emergency Medical Services***
Policy Name:	***Ambulance Interior Climate Standards***
Policy Number:	***2010-0010***
Effective Date:	***15 November 2010***
Approved By:	***Beverly Pritchett, Senior Deputy Director, HEPRA***
Applies To:	***All EMS Operational Agencies***
Purpose:	***Ambulance Interior Climate Standards***
Reference:	***EMS Act of 2008, Section 5***
Revision:	***Original***

Section 5 of the EMS Act places the authority for the inspection of ambulances within the Department of Health. All ambulances must meet the District requirements for medical equipment and supplies in order to be certified as an ambulance. This policy outlines the interior climate standards for a District certified ambulance.

Purpose

The purpose for interior climate standards is directly related to patient care. Patients who are treated in extreme temperature ranges may not respond to the treatments being delivered. Some critical patients (such as those with hyperthermia or hypothermia) may find their condition worsened due to an unusually cold or hot ambulance interior.

District of Columbia Ambulance Interior Climate Standard

The Department of Health has adopted the following interior climate standard for all ground based ambulances in the District of Columbia;

- Heating System
  - The heater in the driver's and patient compartment of the ambulance must be able to reach a minimum temperature of 65-degrees F within 30-minutes from an ambient temperature of 32° F.
- Cooling System
  - The cooling system in the driver's and patient compartment of the ambulance must be able to reach a minimum temperature of 80-degrees F within 30-minutes from an ambient temperature of 95° F.

- Temperature Operating Range
  - The patient compartment of the ambulance shall be above 50-degrees F, but not exceed 85-degrees F, while in a stand-by mode awaiting a response.
  - The environmental system in the driver's cab and the patient compartment of the ambulance must maintain an operating temperature between 65-degrees F and 80-degrees F at all times while the ambulance is in operation.
- Environmental Controls
  - There will be separate, functioning, adjustable environmental system operating controls in the driver's cab and patient compartment areas.
  - The blower motor in each compartment must have at least three speeds (not including "OFF") and function properly at all speeds.
  - The ventilation systems in both compartments must have adjustable louvers to direct air flow and be in good working order.

Enforcement of the Ambulance Interior Climate Standards

All ambulances must pass an inspection by the Department of Health prior to being certified to operate in the District of Columbia. Further, the Department of Health reserves the right to inspect any District certified ambulance at any time without prior notice. Any ambulance found out of compliance with these environmental standards is considered to have failed the inspection and will be removed from service immediately. Upon making the necessary corrections to the ambulance, the ambulance can be scheduled for a follow-up inspection. Until the ambulance passes the follow-up inspection the ambulance is to remain out of service and not utilized in a patient treatment or transport role.

Exceptions to the Ambulance Interior Climate Standards

The Department of Health recognizes that there may be extenuating circumstances where a temporary exemption to this standard may be warranted. When demands on the EMS system, availability of ambulances, or other conditions exist, the medical director of the organization can request a temporary exemption to this standard. The request should be directed to the Director of the Department of Health and submitted through the District EMS Officer. The request should outline the reasons why the exemption is necessary, how any ambulance granted an exemption will be used, and the length of time the exemption will be needed.

Upon review, the medical director will be notified of any exemption to be issued by the Director and the limitations of such an exemption.

Discussion

The standards adopted by the District are based on several national standards. The American Manufacturers Division Standard 102 covers HVAC standards for ambulances. The Federal KKK-A-1822F standard, Section 3, also addresses heat and air conditioning standards for ambulances. The United States Pharmacopoeia defines standards for the storage of medication in the National Formulary (USP-25/NF-20). These standards were consulted in developing the standards outlined above.

National Ambulance Interior Climate Standards

The American Manufacturers Division Standard 012 outlines the testing of ambulances for both heat and cooling. It states that;

> "The heater in each compartment shall raise the thermocouple temperatures to a minimum of 68° F within 30 minutes from an ambient temperature of 32° F. The air conditioner in each compartment shall lower the thermocouple temperatures to a maximum of 78° F within 30 minutes from an ambient temperature of 95° F."

The "Federal Specification for the Star-of-Life Ambulance KKK-A-1822F" states in 3.4.2.2 that;

> "The interior of the ambulance patient compartment must be maintained at a minimum temperature of 50°F when the ambulance is prepared for immediate response."

Further, Section 3.13 provides specifics on ambulance environmental systems. Section 3.13.1 states in part;

> "All ambulances will be equipped with a complete heating, ventilating, and air conditioning system(s) (HVAC) to supply and maintain clean air conditions and specified level of inside temperature in both driver and patient compartments. The system(s) may be separate or a combination system, which will permit independent control of the environment within the driver's cab and patient compartment. All ambulances will be equipped with HVAC that can be made to collectively operate using re-circulated air and outside ambient air and will be capable of maintaining a patient compartment temperature of 68°F to 78°F while patients are in the patient compartment."

Section 3.13.2 specifically references the heating criteria and states,

> "The heating system(s) will have sufficient capacity to maintain the temperature in the patient compartment at a minimum dry bulb temperature of 68°F."

Section 3.13.3 specifically references the air conditioning criteria and states;

> "The air conditioning system(s) will have sufficient capacity to maintain the temperature in the patient compartment at a maximum dry bulb temperature of 78°F."

Section 3.13.5 references the controlling system between the front cab and the patient compartment and states;

> "Adjustable, manual or thermostatically operative controls will permit heating and/or air conditioning and ventilation in either compartment without affecting the other compartment. Switches and controls will be located in "action area" panel and/or remote panel and identified for function and operating position. Blower or fan system will have at least three speeds (excluding "OFF")… Air systems will have adjustable louvers to direct the flow of air."

National Medication Storage Standards

Most of the medications commonly used by EMS are intended for storage at "controlled room temperature." The United States Pharmacopoeia (USP) has the following definition for controlled room temperature;

> "A temperature maintained thermostatically that encompasses the usual and customary working environment of 20°-25°C (68°-77°F); that results in a mean kinetic temperature calculated to be not more than 25°C; and that allows for excursions between 15°-30°C (59°-86°F) that are experienced in pharmacies, hospitals and warehouses. Provided the mean kinetic temperature remains in the allowed range, transient spikes up to 40°C are permitted, as long as they do not exceed 24 hours. Spikes above 40° may be permitted if the manufacturer so instructs. Articles may be labeled for storage at "controlled room temperature" or at "up to 25°C," or other wording based on the same mean kinetic temperature. The mean kinetic temperature is a calculated value that may be used as an isothermal storage temperature that simulates the nonisothermal effects of storage temperature variations. (See also Stability under Pharmaceutical Dosage Forms <1151>.) *U.S. Pharmacopeia: National Formulary (USP-25/NF-20). United States Pharmacopeia Convention, 2000.*

Common EMS Medications and Their Recommended Storage Temperatures

Medication	Recommended Storage Temp		Notes
	Centigrade	*Fahrenheit*	
Adenosine	15°-30°	59°-86°	Do not refrigerate
Albuterol sulfate	2°-25°	36°-77°	
Amiodarone	25°	77°	Controlled room temperature
Atropine	15°-30°	59°-86°	
Calcium chloride	15°-30°	59°-86°	
Diazepam	25°	77°	At or below
Diphenhydramine	15°-30°	59°-86°	Protect from freezing
Dopamine	15°-30°	59°-86°	Controlled room temperature
Epinephrine 1:1,000	15°-30°	59°-86°	

Epinephrine 1:10,000	15°-30°	59°-86°	
Furosemide	15°-30°	59°-86°	
Glucagon	20°-25°	68°-77°	Before reconstitution. Controlled room temperature
Lidocaine 2%	25°	77°	
Magnesium sulfate	15°-30°	59°-86°	Protect from freezing
Midazolam	15°-30°	59°-86°	
Morphine sulfate	15°-30°	59°-86°	Controlled room temperature. Do not freeze
Naloxone	15°-30°	59°-86°	Controlled room temperature
Sodium bicarbonate	15°-30°	59°-86°	

Summary of Recommended Practices from the USP-NF Chapter[1]

"Emergency Medical Services Vehicles and Ambulances-Storage of Preparations"

- Monitor and verify temperature profiles to compare with established limits, especially on hot summer and cold winter days.
- On-board cabinets must be insulated, and should use active heating and cooling if necessitated by the local climate.
- Consider using insulated portable carrying cases and, when they are not in use, keep them inside or in a climate-controlled cabinet to maintain controlled room temperature.
- Consider using portable cases exclusively, instead of on-board cabinets, to facilitate rotation. Time-temperature indicators can be used to monitor temperature exposures of the portable case's entire contents.
- Consider using time-temperature indicators to monitor individual medication packages, especially for environmentally sensitive and thermally sensitive preparations.
- All medications should be protected from excessive heat (40°C+). Some medications may need to be stored in a cold and/or dry place, and "environmentally sensitive" medications should not be stored on EMS vehicles unless the storage cabinet is temperature-controlled or individual time-temperature indicators are attached to each medication package.
- Consider stock rotation on a schedule based on local climate, perhaps every three days or so. The stock should be rotated into a climate-controlled environment. Stock rotation may be especially necessary for environmentally sensitive preparations.
- Consider temperature exposures when parking ambulances. Park in heated and air-conditioned garages if possible. When parking outside, attempt to park in the shade.

[1] Brown, Lawrence H. & Campagna, James D., "Medication Storage in the EMS Environment: Understanding the Science and Meeting the Standards." July 8, 2008, EMSResponder.com, http://www.emsresponder.com/article/article.jsp?id=1885&siteSection=18