Equipment for Ambulances revision June 10, 2012

American College of Surgeons Committee on Trauma
American College of Emergency Physicians

National Association of EMS Physicians

Emergency Medical Services for Children

(EMSC)

American Academy of Pediatrics

National Association of EMS Officials

Four decades ago, the Committee on Trauma (COT) of the American College of Surgeons (ACS) developed a list of standardized equipment for ambulances. Beginning in 1988, the American College of Emergency Physicians (ACEP) published a similar list. The two organizations collaborated on a joint document published in 2000, and the National Association of EMS Physicians (NAEMSP) participated in the 2005 revision. The
2005 revision included resources needed on ambulances for appropriate homeland security. All three organizations adhere to the principle that Emergency Medical Services (EMS) providers at all levels must have the appropriate equipment and supplies to optimize pre-hospital delivery of care. The document was written to serve as a standard for the equipment needs of emergency ambulance services both in the United
States and Canada.

EMS providers care for patients of all ages, who have a wide variety of medical and traumatic conditions. The
2009 revision included updated pediatric recommendations developed by members of the federal Emergency Medical Services for Children (EMSC) Stakeholder Group and endorsed by the American Academy of Pediatrics (AAP). The EMSC Program has developed several performance measures for the Program's State Partnership grantees. One of the performance measures evaluates the availability of essential pediatric equipment and supplies for Basic Life Support and Advanced Life Support patient care units. This document is used as the standard for this performance measure.

For purposes of this document, the following definitions have been used: a neonate is 0-28 days old, an infant is 29 days to 1 year old, and a child is >1 year through 11 years old with delineation into the following developmental stages:

Toddlers (1-3 years old)
Preschoolers (3-5 years old)
Middle Childhood (6-11 years old) Adolescents (12-18 years old)

These standard definitions are age based. Length based systems have been developed to more accurately estimate the weight of children and predict appropriate equipment sizes, medication doses, and guidelines for fluid volume administration.

Principles of Prehospital Care

The goal of pre-hospital care is to minimize further systemic insult or injury and manage life-threatening conditions through a series of well-defined and appropriate interventions, and to embrace principles that ensure patient safety. High quality, consistent emergency care demands continuous quality improvement and is directly dependent on the effective monitoring, integration, and evaluation of all components of the patient's care.

Integral to this process is medical oversight of pre-hospital care by using preexisting patient care protocols (*indirect* medical oversight), which are evidence-based when possible, or by medical control via voice and/or video communication (*direct* medical oversight). The protocols that guide patient care should be established collaboratively by medical directors for ambulance services, adult and pediatric emergency medicine physicians, adult and pediatric trauma surgeons, and appropriately trained basic and advanced emergency medical personnel. Current Institute of Medicine (IOM) recommendations encourage each EMS Agency to have a pediatric coordinator to specifically coordinate the capability of the service to care for non-adult patients.

Equipment and Supplies

The guidelines list the supplies and equipment that should be stocked on ambulances to provide the accepted standards of patient care. Previous documents regarding ambulance equipment referred to essential or minimal equipment necessary to adequately equip an ambulance. Equipment requirements will vary, depending on the certification levels of the providers, population densities, geographic and economic conditions of the region, and other factors. Item expiration dates should be checked on a periodic basis with strict adherence.

THE FOLLOWING LIST IS DIVIDED INTO EQUIPMENT FOR BASIC LIFE SUPPORT (BLS) AND ADVANCED LIFE SUPPORT (ALS) AMBULANCES. ALS AMBULANCES MUST HAVE ALL OF THE EQUIPMENT ON THE REQUIRED BLS LIST AS WELL AS EQUIPMENT ON THE REQUIRED ALS LIST. THIS LIST REPRESENTS A CONSENSUS OF RECOMMENDATIONS FOR EQUIPMENT AND SUPPLIES THAT WILL FACILITATE PATIENT CARE IN THE OUT-OF-HOSPITAL SETTING.

Required Equipment: Basic Life Support (BLS) Ambulances

A. Ventilation and Airway Equipment

1. Portable and fixed suction apparatus with a regulator per Federal specifications or standard
   - Wide-bore tubing, rigid pharyngeal curved suction tip; tonsil and flexible suction catheters, 6F–16F are commercially available (have one between 6F and 10F and one between 12F and 16F)
2. Portable oxygen apparatus, capable of metered flow with adequate tubing
3. Portable and fixed oxygen supply equipment
   - Variable flow regulator
4. Oxygen administration equipment
   - Adequate length tubing; transparent mask (adult and child sizes), both non-rebreathing and valveless; nasal cannulas (adult, child)

5. Bag-valve mask (manual resuscitator)
   - Hand-operated, self-expanding bag; adult (>1000 ml) and child (450–750 ml) sizes, with oxygen reservoir/accumulator; valve (clear, operable in cold weather); and mask (adult, child, infant, and neonate sizes)
6. Airways
   - Nasopharyngeal (16F–34F; adult and child sizes)
   - Oropharyngeal (sizes 0–5; adult, child, and infant sizes)
7. Pulse oximeter with pediatric and adult probes
8. Saline drops and bulb suction for infants

b. Monitoring and Defibrillation

All ambulances should be equipped with an automated external defibrillator (AED) unless staffed by advanced life support personnel who are carrying a monitor/defibrillator. The AED should have pediatric capabilities, including child-sized pads and cables or dose attenuator with adult pads.

c. Immobilization Devices

1. Cervical collars
   - Rigid for children ages 2 years or older; child and adult sizes (small, medium, large, and other available sizes)
2. Head immobilization device (not sandbags)
   - Firm padding or commercial device
3. Pelvic immobilization device
4. Upper and lower extremity immobilization devices
   - Joint-above and joint-below fracture (sizes appropriate for adults and children), rigid-support constructed with appropriate material (cardboard, metal, pneumatic, vacuum, wood, or plastic)
5. Impervious backboards (long, short; radiolucent preferred) and extrication device
   - Short extrication/immobilization device (e.g. KED)
   - Long (transport, head-to–feet length) with at least three appropriate restraint straps (chin strap alone should not be used for head immobilization) and with padding for children and handholds for moving patients

d. Bandages

1. Commercially-packaged or sterile burn sheets
2. Bandages
   - Triangular bandages (minimum two safety pins each)
   - ACE bandages
3. Dressings
   - Sterile multitrauma dressings (various large and small sizes)
   - ABDs, 10”x12” or larger
   - 4”x4” gauze sponges or suitable size
4. Gauze rolls
   - Various sizes
5. Occlusive dressing or equivalent
   - Sterile, 3”x8” or larger
6. Adhesive tape
   - Various sizes (including 1” and 2”) hypoallergenic
   - Various sizes (including 1” and 2”) adhesive
7. Arterial tourniquet (commercial preferred)

E. Communication

Two-way communication device between EMS provider, dispatcher, and medical control

f. Obstetrical Kit (commercially packaged is available)

1. Kit (separate sterile kit)
   - Towels, 4"x4" dressing, umbilical tape, sterile scissors or other cutting utensil, bulb suction, clamps for cord, sterile gloves, and blanket
2. Thermal absorbent blanket and head cover, aluminum foil roll, or appropriate heat-reflective material (enough to cover newborn)

g. Miscellaneous

1. Access to patient care protocols
2. Sphygmomanometer (pediatric and adult regular and large size cuffs)
3. Adult stethoscope
4. Thermometer with low temperature capability
5. Heavy bandage or paramedic scissors for cutting clothing, belts, and boots
6. Cold packs
7. Sterile saline solution for irrigation (1-liter bottles or bags)
8. Flashlights (2) with extra batteries and bulbs
9. Blankets
10. Sheets (minimum 4), linen or paper, and pillows
11. Towels
12. Triage tags
13. Emesis bags or basins
14. Bedpan
15. Urinal
16. Wheeled cot (conforming to national standard at the time of manufacture)
17. Folding stretcher
18. Stair chair or carry chair
19. Patient care charts/forms
20. Lubricating jelly (water soluble)

h. Infection Control*

**Latex-free equipment should be available*

1. Eye protection (full peripheral glasses or goggles, face shield)
2. Face protection (for example, surgical masks per applicable local or state guidance)
3. Gloves, nonsterile (must meet NFPA 1999 requirements found at *http://www.nfpa.org/*)
4. Coveralls or gowns
5. Waterless hand cleanser, commercial antimicrobial (towelette, spray, liquid)
6. Disinfectant solution for cleaning equipment
7. Standard sharps containers, fixed and portable
8. Trash bags for disposing of biohazardous waste
9. Respiratory protection (for example, N95 or N100 mask—per applicable local or state guidance)

i. Injury Prevention Equipment

1. All individuals in an ambulance need to be restrained; this includes using Federally approved child safety seats
2. Protective helmet/ jackets or coats/ pants/ boots
3. Fire extinguisher
4. Hazardous material reference guide
5. Reflective safety wear for each crewmember (must meet or exceed ANSI/ISEA performance class II or III if working within the right of way of any federal-aid highway. Visit http://www.reflectivevest. com/federalhighwayruling.html for more information).

Required Equipment: Advanced Life Support: (ALS) Ambulances

For EMT-Paramedic services, include all of the required equipment listed for the basic level provider, plus the following additional equipment and supplies. For EMT-Intermediate services (and other non-paramedic advanced levels), include all of the equipment for the basic level provider and selected equipment and supplies from the following list, based on local need and consideration of pre-hospital characteristics and budget.

A. Airway and Ventilation Equipment

1. Laryngoscope handles with extra batteries and bulbs
2. Laryngoscope blades, sizes 0–4, straight (Miller); sizes 2–4, curved, (Macintosh)
3. Endotracheal tubes (if ALS service scope of practice includes tracheal intubation) sizes 2.5–5.5 mm cuffed and/or uncuffed and 6–8 mm cuffed (1 each), other sizes optional
4. 10-mL non-Luerlock syringes
5. Stylettes for endotracheal tubes, adult and pediatric
6. Magill (Rovenstein) forceps, adult and pediatric
7. End-tidal CO_2 detection capability (adult and pediatric)

8. Alternative airway devices (for example, a rescue airway device such as the ETDLA [esophageal-tracheal double lumen airway], laryngeal tube, or laryngeal mask airway) as approved by local medical direction.

b. Vascular Access

1. Crystalloid solutions, such as Ringer's lactate or normal saline solution (1,000-mL bags x 4); fluid must be in bags, not bottles; type of fluid may vary depending on state and local requirements
2. Antiseptic solution (alcohol wipes and povidone-iodine wipes preferred)
3. IV pole or roof hook
4. Intravenous catheters 14G–24G
5. Intraosseous needles or devices appropriate for children and adults
6. Venous tourniquet, rubber bands
7. Syringes of various sizes
8. Needles, various sizes (one at least 1 ½" for IM injections)
9. Intravenous administration sets (microdrip and macrodrip)
10. Intravenous arm boards, adult and pediatric

c. Cardiac

1. Portable, battery-operated monitor/defibrillator
   - With tape write-out/ recorder, defibrillator pads, quick-look paddles or electrode, or hands-free patches, ECG leads, adult and pediatric chest attachment electrodes, adult and pediatric paddles
2. Transcutaneous cardiac pacemaker, including pediatric pads and cables
   - Either stand-alone unit or integrated into monitor/defibrillator

D. Other Advanced Equipment

1. Nebulizer
2. Glucometer or blood glucose measuring device
   - With reagent strips
3. Large bore needle (should be at least 3.25" in length for needle chest decompression in large adults)
4. A length based pediatric dosing tape or appropriate reference material that converts length to estimated ideal body weight in kilograms for pediatric drug dosing and equipment sizing, based on the most current guidelines.

E. Medications

Medications used on advanced level ambulances should be compatible with current guidelines as published by the American Heart Association's Committee on Emergency Cardiovascular Care, as reflected in the Advanced Cardiac Life Support and Pediatric Advanced Life Support Courses, or other such organizations and publications (ACEP, ACS, NAEMSP, and so on). Medications may vary depending on state requirements and/or local medical control. Drug dosing in children should use processes minimizing the need for calculations, preferably a length-based system. In general, medications may include:

- Cardiovascular medication, such as 1:10,000 epinephrine, atropine, antidysrhythmics (for example, adenosine and amiodarone), calcium channel blockers, beta-blockers, nitroglycerin tablets, aspirin, vasopressor

for infusion

- Cardiopulmonary/respiratory medications, such as albuterol (or other inhaled beta agonist) and ipratropium bromide, 1:1,000 epinephrine, furosemide
- 50% dextrose solution (and sterile diluent or 25% dextrose solution for pediatrics)
- Analgesics, narcotic and nonnarcotic
- Anti-epileptic medications, such as diazepam or midazolam
- Sodium bicarbonate, magnesium sulfate, glucagon, naloxone hydrochloride, calcium chloride
- Bacteriostatic water and sodium chloride for injection
- Additional medications as per local medical director

Optional Equipment

This section is intended to assist EMS providers in choosing equipment that can be used to ensure delivery of quality pre-hospital care. Use should be based on local resources. The equipment in this section is not mandated or required.

A. Optional Basic Equipment

1. Glucometer or blood glucose test strips (per state protocol)
2. Elastic bandages
   - Nonsterile (various sizes)
3. Cellular phone
4. Infant oxygen mask
5. Infant self-inflating resuscitation bag
6. Airways
   - Nasopharyngeal (12, 14 Fr)
   - Oropharyngeal (size 00)
8. Hot/cold packs
9. Neonatal blood pressure cuff
10. Infant blood pressure cuff
11. Pediatric stethoscope
12. Femur traction device (adult and child sizes)
12. Infant cervical immobilization device
13. Pediatric backboard and extremity splints
14. Topical hemostatic agent/bandage
15. Appropriate CBRNE PPE (chemical, biological, radiological, nuclear, explosive personal protective equipment), including respiratory and body protection
16. Applicable chemical antidote auto-injectors (at a minimum for crew members' protection; additional for victim treatment based on local or regional protocol; appropriate for adults and children)

b. Optional Advanced Equipment

1. Respirator
   - Volume-cycled, on/off operation, 100% oxygen, 40–50 psi pressure (child/infant capabilities)
2. Blood sample tubes, adult and pediatric
3. Automatic blood pressure device
4. Nasogastric tubes, pediatric feeding tube sizes 5F and 8F, sump tube sizes 8F–16F
5. Pediatric laryngoscope handle
6. Size 1 curved (Macintosh) laryngoscope blade
7. 3.5–5.5 mm cuffed endotracheal tubes
8. Gum elastic bougies
9. Longer angiocatheters or needles for chest decompression
9. Needle cricothyrotomy capability and/or cricothyrotomy capability (surgical cricothyrotomy can be performed in older children in whom the cricothyroid membrane is easily palpable, usually by the age of 12 years)
10. Alternative airway devices for children (few alternative airway devices that are FDA approved have been studied in children. Those that have been studied, such as the LMA, have not been adequately evaluated in the pre-hospital setting).
11. Atomizers for administration of intranasal medications

Optional Medications

A. Optional Basic Life Support Medications

1. Albuterol
2. Epi-Pens
3. Oral glucose
4. Nitroglycerin (sublingual tablet or paste)

b. Optional Advanced Life Support Medications

1. Anxiolytics
2. Intubation adjuncts including neuromuscular blockers

Interfacility Transport

Additional equipment may be needed by ALS and BLS pre-hospital care providers who transport patients between facilities. Transfers may be done to a lower or higher level of care, depending on the specific need. Specialty transport teams, including pediatric and neonatal teams, may include other personnel such as respiratory therapists, nurses, and physicians. Training and equipment needs may be different depending on the skills needed during transport of these patients. There are excellent resources available that provide detailed lists of equipment needed for interfacility transfer such as the American Academy of Pediatrics Guidelines for Air and Ground Transport of Neonatal and Pediatric Patients.

Any ambulance that, either by formal agreement or circumstance, may be called into service during a disaster or mass casualty incident to treat and/or transport any patient from the scene to the hospital, or to transfer between facilities any patient other than those within their designated specialty population should carry, at a minimum, all equipment, adult and pediatric, listed under "Required Equipment: Basic Life Support (BLS) Ambulances".

Extrication Equipment

Adequate extrication equipment must be readily available to the emergency medical services responders, but is more often found on heavy rescue vehicles than on the primary responding ambulance.

In general, the devices or tools used for extrication fall into several broad categories: disassembly, spreading, cutting, pulling, protective, and patient-related.

The following is necessary equipment that should be available either on the primary response vehicle or on a heavy rescue vehicle.

Disassembly Tools

- Wrenches (adjustable)
- Screwdrivers (flat and Phillips head)
- Pliers
- Bolt cutter
- Tin snips
- Hammer
- Spring-loaded center punch
- Axes (pry, fire)
- Bars (wrecking, crow)
- Ram (4 ton)

Spreading Tools

- Hydraulic jack/spreader/cutter combination

Cutting Tools

- Saws (hacksaw, fire, windshield, pruning, reciprocating)
- Air-cutting gun kit with air supply

Pulling Tools/Devices

- Ropes/chains
- Come-along
- Hydraulic truck jack
- Air bags with air supply

Protective Devices

- Reflectors/flares
- Protective helmet
- Safety goggles
- Fireproof blanket
- Leather gloves
- Jackets/coats/boots

Patient-Related Devices

- Stokes basket
- SKED rescue stretcher

Miscellaneous

- Shovel
- Lubricating oil
- Wood/wedges
- Generator
- Floodlights
- Adsorbent

Local extrication needs may necessitate additional equipment for water, aerial, or mountain rescue.

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(I HAVE HIGHLIGHTED REFERENCES IN GREEN THAT I THINK COULD COME OUT)

(I HAVE HIGHLIGHTED REFERENCES IN GRAY THAT COULD BE UPDATED OR ELIMINATED IF NEWER REFERENCES ARE AVAILABLE)

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