



Policy Statement—Equipment for Ambulances

Almost 4 decades ago, the Committee on Trauma 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 2 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 3 organizations adhere to the principle that emergency medical services (EMS) providers at all levels must have the appropriate equipment and supplies to optimize prehospital delivery of care. The document was written to serve as a standard for the equipment needs of emergency ambulance services in both the United States and Canada.

EMS providers care for patients of all ages, who have a wide variety of medical and traumatic conditions. With permission from the ACS Committee on Trauma, ACEP, and NAEMSP, the current revision includes updated pediatric recommendations developed by members of the federal Emergency Medical Services for Children (EMSC) Stakeholder Group. 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 (BLS) and advanced life support (ALS) patient care units. This document will be used as the standard for this performance measure. The American Academy of Pediatrics (AAP) has also officially endorsed this list.

For purposes of this document, the following definitions have been used: a neonate is 0 to 28 days old, an infant is 29 days to 1 year old, and a child is >1 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 prehospital 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

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ABBREVIATIONS

ACS—American College of Surgeons
ACEP—American College of Emergency Physicians
NAEMSP—National Association of EMS Physicians
EMS—emergency medical services
EMSC—Emergency Medical Services for Children
BLS—basic life support
ALS—advanced life support
LMA—laryngeal mask airway

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the effective monitoring, integration, and evaluation of all components of the patient's care.

Integral to this process is medical oversight of prehospital care by using preexisting 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.

The following list is divided into equipment for BLS and 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: BLS AMBULANCES

A. Ventilation and Airway Equipment

1. Portable and fixed suction apparatus with a regulator (per federal specifications; see Federal Specification KKK-A-1822F reference)
 - Wide-bore tubing, rigid pharyngeal curved suction tip; tonsillar and flexible suction catheters, 6F–16F, are commercially available (have 1 between 6F and 10F and 1 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 nonrebreathing and valveless; nasal cannulas (adult, child)
5. Bag-valve mask (manual resuscitator)
 - Hand-operated, self-reexpanding bag; adult (>1000 mL) and child (450–750 mL) sizes, with oxygen reservoir/accumulator; valve (clear, disposable, 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 ALS personnel who are carrying a monitor/defibrillator. The AED should have pediatric capabilities, including child-sized pads and cables.

C. Immobilization Devices

1. Cervical collars
 - Rigid for children aged 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. Lower extremity (femur) traction devices
 - Lower extremity limb-support slings, padded ankle hitch, padded pelvic support, traction strap (adult and child sizes)
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, head-to-pelvis length) and long (transport, head-to-feet length) with at least 3 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. Triangular bandages
 - Minimum of 2 safety pins each
3. Dressings
 - Sterile multitrauma dressings (various large and small sizes)
 - ABDs, 10 × 12 in or larger
 - 4 × 4-in gauze sponges or suitable size
4. Gauze rolls
 - Various sizes
5. Occlusive dressing or equivalent
 - Sterile, 3 × 8 in or larger
6. Adhesive tape
 - Various sizes (including 1 and 2 in), hypoallergenic
 - Various sizes (including 1 and 2 in), adhesive
7. Arterial tourniquet (commercial preferred)

E. Communication

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

F. Obstetrical Kit (Commercial Package Is Available)

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

G. Miscellaneous

1. Sphygmomanometer (pediatric and adult regular- and large-sized cuffs)
2. Adult stethoscope
3. Length/weight-based tape or ap-

- propriate reference material for pediatric equipment sizing and drug dosing based on estimated or known weight
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-L bottles or bags)
 8. Flashlights (2) with extra batteries and bulbs
 9. Blankets
 10. Sheets (minimum of 4), linen or paper, and pillows
 11. Towels
 12. Triage tags
 13. Disposable emesis bags or basins
 14. Disposable bedpan
 15. Disposable 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*

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 1999 National Fire Protection Association requirements, which can be found at www.nfpa.org)
4. Coveralls or gowns
5. Shoe covers
6. Waterless hand cleanser, commercial antimicrobial (towelette, spray, liquid)

7. Disinfectant solution for cleaning equipment
8. Standard sharps containers, fixed and portable
9. Disposable trash bags for disposing of biohazardous waste
10. Respiratory protection (for example, N95 or N100 mask—per applicable local or state guidance)

*Latex-free equipment should be available.

I. Injury-Prevention Equipment

1. All individuals in an ambulance need to be restrained (there is currently no national standard for transport of uninjured children)
2. Protective helmet
3. Fire extinguisher
4. Hazardous material reference guide
5. Traffic-signaling devices (reflective material triangles or other reflective, nonigniting devices)
6. Reflective safety wear for each crew member (must meet or exceed American National Standards Institute/International Safety Equipment Association performance class II or III if working within the right of way of any federal-aid highway; visit www.reflectivevest.com/federal-highwayruling.html for more information)

REQUIRED EQUIPMENT: ALS AMBULANCES

For emergency medical technician-paramedic services, include all of the required equipment listed for the basic-level provider, plus the following additional equipment and supplies. For emergency medical technician-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, on the basis of local need and consideration of prehospital characteristics and budget.

A. Airway and Ventilation Equipment

1. Laryngoscope handle with extra batteries and bulbs
2. Laryngoscope blades, sizes 0–4, straight (Miller); sizes 2–4, curved, (MacIntosh)
3. Endotracheal tubes, sizes 2.5–5.5 mm uncuffed and 6–8 mm cuffed (2 each), other sizes optional
4. Meconium aspirator adaptor
5. 10-mL non-Luerlock syringes
6. Stylettes for endotracheal tubes, adult and pediatric
7. Magill (Rovenstein) forceps, adult and pediatric
8. Lubricating jelly (water soluble)
9. End-tidal CO₂–detection capability
 - Colorimetric (adult and pediatric) or quantitative capnometry

B. Vascular Access

1. Crystalloid solutions, such as Ringer's lactate or normal saline solution (1000-mL bags × 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. Intravenous-fluid pole or roof hook
4. Intravenous catheters, 14–24 gauge
5. Intraosseous needles or devices appropriate for children and adults
6. Venous tourniquet, rubber bands
7. Syringes of various sizes, including tuberculin

8. Needles, various sizes (1 at least 1½ in for intramuscular 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 long for needle chest decompression in large adults)

E. Medications (Preloaded Syringes When Available)

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. Drug dosing in children should use processes that minimize the need for calculations,

preferably a length-based system. In general, medications may include:

- Cardiovascular medication such as 1:10 000 epinephrine, atropine, anti-dysrhythmic agents (eg, adenosine and amiodarone), calcium-channel blockers, β blockers, nitroglycerin tablets, aspirin, vasopressor for infusion
- Cardiopulmonary/respiratory medications such as albuterol (or other inhaled β agonist) and ipratropium bromide, 1:1000 epinephrine, furosemide
- 50% dextrose solution (and sterile diluent or 25% dextrose solution for pediatrics)
- Analgesics, narcotic and nonnarcotic
- Antiepileptic 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 BASIC EQUIPMENT

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

A. Optional Equipment

1. Glucometer (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 (12F, 14F)
 - Oropharyngeal (size 00)
7. Alternative airway devices (eg, a rescue airway device such as the esophageal-tracheal double-lumen airway [ETDLA], laryngeal tube, or laryngeal mask airway [LMA]) as approved by local medical direction
 8. Alternative airway devices for children (few alternative airway devices that have been approved by the Food and Drug Administration have been studied in children; those that have been studied, such as the LMA, have not been adequately evaluated in the prehospital setting)
 9. Neonatal blood pressure cuff
 10. Infant blood pressure cuff
 11. Pediatric stethoscope
 12. Infant cervical immobilization device
 13. Pediatric backboard and extremity splints
 14. Topical hemostatic agent
 15. Appropriate chemical, biological, radiologic, nuclear, explosive personal protective equipment (CBRNE PPE), 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 feed-

ing tube sizes 5F and 8F, sump tube sizes 8F–16F

5. Pediatric laryngoscope handle
6. Size 1 curved (MacIntosh) laryngoscope blade
7. 3.5- to 5.5-mm cuffed endotracheal tubes
8. 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)

OPTIONAL MEDICATIONS

A. Optional BLS Medications

1. Albuterol
2. EpiPens
3. Oral glucose
4. Nitroglycerin (sublingual tablet or paste)

B. Optional ALS Medications

1. Anxiolytic agents
2. Intubation adjuncts including neuromuscular blockers

INTERFACILITY TRANSPORT

Additional equipment may be needed by ALS and BLS prehospital 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.

APPENDIX: EXTRICATION EQUIPMENT

Adequate extrication equipment must be readily available to the EMS 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

Pulling tools/devices

- Ropes/chains
- Come-along
- Hydraulic truck jack
- Air bags

Protective devices

- Reflectors/flares
- Hard hats
- Safety goggles
- Fireproof blanket

- Leather gloves
 - Jackets/coats/boots
- Patient-related devices

- Stokes basket

Miscellaneous

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

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

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