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MCHB/EMSC

March 2009

**Pediatric Equipment for BLS
and ALS Ambulances**

March 26, 2009

**Moderator:
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Pediatric Equipment for BLS and ALS Ambulances

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EQUIPMENT FOR AMBULANCES

HISTORY OF EQUIPMENT LIST

- THE AMERICAN COLLEGE OF SURGEONS COMMITTEE ON TRAUMA (ACSCOT) DEVELOPED THE FIRST LIST NEARLY FOUR DECADES AGO AS PART OF THEIR MISSION TO IMPROVE CARE OF THE TRAUMA PATIENT
- DR. "DEKE FARRINGTON" WAS THEN PRESIDENT OF THE AMERICAN ASSOCIATION FOR THE SURGERY OF TRAUMA (AAST) AND WROTE AN ARTICLE CALLED "DEATH IN A DITCH" (CIRCA 1967) ON THE SUBJECT OF TRAUMA CARE (OR LACK THEREOF)

HISTORY OF EQUIPMENT LIST

- DR. FARRINGTON ESTABLISHED THE ORIGINAL 81-HOUR FIRST AID TRAINING CURRICULUM (THE PROTOTYPE OF WHAT LATER BECAME THE EMT-AMBULANCE COURSE) IN 1962
- MARKED BEGINNING OF FORMAL TRAINING IN PREHOSPITAL CARE OF INJURED PATIENTS
- HAS BEEN CALLED THE “FATHER OF MODERN EMS”

HISTORY OF EQUIPMENT LIST

- AMERICAN COLLEGE OF EMERGENCY PHYSICIANS PUBLISHED SIMILAR LIST IN 1988
- BECAME JOINT EFFORT IN 2000
- FIRST TIME THAT THE ACSCOT DEVELOPED A CONSENSUS DOCUMENT WITH ANOTHER ORGANIZATION

HISTORY

- NATIONAL ASSOCIATION OF EMS PHYSICIANS JOINED THE EFFORT IN 2005
- 2005 LIST ADDED RESOURCES FOR HOMELAND SECURITY
- 2009 LIST UPDATES PEDIATRIC RECOMMENDATIONS

DEFINITION AND DEVELOPMENT OF A CHILD

- First year of life
neonate 0-28 days
infant 29 days to 1 year
- Child >1 year to 11 years
toddler 1-3
preschooler 3-5
middle childhood 6-11
- Adolescents 12-18 years

DEFINITION AND DEVELOPMENT OF A CHILD

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 RESUSCITATION

PRINCIPLES OF PREHOSPITAL CARE

EMSC PERFORMANCE MEASURES

66: Operational capacity to provide pediatric emergency care

*66b

Pediatric equipment for BLS and ALS patient care units according to national guidelines

ORGANIZATION OF THE LIST

BLS AND ALS RECOMMENDATIONS:

- REQUIRED EQUIPMENT
(ALS INCLUDES ALL EQUIPMENT ON BLS LIST)
- OPTIONAL EQUIPMENT
- OPTIONAL MEDICATIONS

OTHER SECTIONS OF THE DOCUMENT:

- INTERFACILITY TRANSPORT
- APPENDIX
(EXTRICATION EQUIPMENT)
- SELECTED REFERENCES

REQUIREMENTS FOR 66b

CHILDREN COME IN ALL SIZES

ALS AMBULANCES MUST HAVE ALL OF THE EQUIPMENT ON THE REQUIRED BLS LIST AS WELL AS EQUIPMENT ON THE REQUIRED ALS LIST

RATIONALE FOR EQUIPMENT ON LIST

THE GOAL WAS TO BE LESS PROSCRIPTIVE WHEN IT CAME TO DEVICES WITHOUT GOOD EVIDENCE TO JUSTIFY USE, DEVICES THAT ARE RARELY USED, DEVICES WITH MULTIPLE SIZES WHERE IT MAY BE PRACTICAL TO CARRY ONLY A FEW FUNCTIONAL SIZES THAT WILL ADAPT TO ALL AGE GROUPS

**REQUIRED EQUIPMENT
BASIC LIFE SUPPORT
AMBULANCES**

VENTILATION AND AIRWAY

- FLEXIBLE SUCTION CATHETERS
tonsillar and flexible suction catheters, 6F-16F are commercially available (have at least one between 6 and 10F and one between 12 and 16F)
- ADULT AND CHILD TRANSPARENT MASKS AND NASAL CANNULAS both non-rebreathing and valveless (infant optional)

VENTILATION AND AIRWAY

- BAG-VALVE MASK DEVICE
- ADULT (>1000 ml)
 - CHILD (450-750 ml)
 - INFANT IS OPTIONAL
- MASKS
- ADULT
 - CHILD
 - INFANT
 - NEONATE

AIRWAYS

- NASOPHARYNGEAL
16-34F sizes (12 and 14 optional)
- OROPHARYNGEAL
0-1 infant
2-3 child
4-5 adult
(listing depends on manufacturer)
(00 optional)

VENTILATION AND AIRWAY

- PULSE OXIMETER WITH PEDIATRIC AND ADULT PROBES
- SALINE DROPS AND BULB SUCTION FOR INFANT
(obstetrical kit has bulb suction also)

MONITORING AND DEFIBRILLATION

- MUST HAVE AUTOMATED EXTERNAL DEFIBRILLATOR (AED) UNLESS STAFFED BY ALS PERSONNEL AND CARRYING A MONITOR/DEFIBRILLATOR
- AED SHOULD HAVE PEDIATRIC CAPABILITIES, INCLUDING CHILD-SIZED PADS AND CABLES

IMMOBILIZATION DEVICES

- **CERVICAL COLLARS**
child and adult sizes to properly fit
≥2 year old
- **HEAD IMMOBILIZATION DEVICE**
- **LOWER EXTREMITY TRACTION,
LOWER AND UPPER EXTREMITY
IMMOBILIZATION DEVICES**
all in adult and child sizes

IMMOBILIZATION DEVICES

- **THE EMSC STAKEHOLDER GROUP
RECOGNIZED THAT COMMERCIALY
AVAILABLE COLLARS MAY NOT
ALWAYS FIT THE CHILD <2 YEARS
AND IMMOBILIZATION TECHNIQUES
IN THIS AGE GROUP MAY NEED TO
BE MODIFIED DEPENDING ON SIZE
OF THE CHILD AND AVAILABLE
EQUIPMENT**

IMMOBILIZATION DEVICES

- **IMPERVIOUS BACKBOARDS
(LONG, SHORT) AND
EXTRICATION DEVICE**
 - Short (extrication, head-to-pelvis length)
 - Long (transport, head to feet), with at least 3 appropriate restraint straps (chin strap alone should not be used for head immobilization), with padding for children and handholds for moving patients

STANDARD FOR ALL AGES

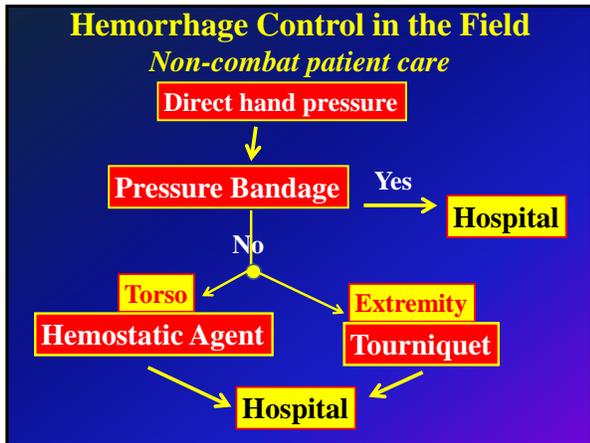
- BANDAGES
 - ARTERIAL TOURNIQUET
- COMMUNICATION
- INFECTION CONTROL
- EXTRICATION EQUIPMENT (see appendix)

ARTERIAL TOURNIQUETS

- NATIONAL REGISTRY OF EMTS (NREMT) has revised Bleeding Control and Shock Management skill station instruments to reflect recommendations of the PREHOSPITAL TRAUMA LIFE SUPPORT COURSE (PHTLS)

PHTLS RECOMMENDATION

“If external bleeding from an extremity cannot be controlled by pressure, application of a tourniquet is the reasonable next step in hemorrhage control.”



Tourniquets: a review of current use with proposals for expanded prehospital use
 Doyle GS Taillac PP
 Prehosp Emerg Care (2008 Apr-Jun)
 12(2):241-56

- Lifesaving in modern battlefield casualty care
- Law enforcement, disaster, mass casualty environments
- Extension to civilian prehospital care

OBSTETRICAL KIT

- COMMERCIALY PACKAGED AVAILABLE
- USUALLY INCLUDES THE BULB SUCTION REQUIRED UNDER REQUIRED BLS VENTILATION AND AIRWAY EQUIPMENT
- APPROPRIATE HEAT PRESERVING MATERIAL TO COVER A NEWBORN

MISCELLANEOUS

- PEDIATRIC AND ADULT BP CUFFS (*infant optional*)
- ADULT STETHOSCOPE (*pediatric optional*)
- LENGTH/WEIGHT BASED TAPE OR APPROPRIATE PEDIATRIC REFERENCE FOR EQUIPMENT SIZING AND DRUG DOSING

INJURY PREVENTION EQUIPMENT

- ALL INDIVIDUALS IN AN AMBULANCE NEED TO BE RESTRAINED BUT THERE IS CURRENTLY NO NATIONAL STANDARD FOR TRANSPORT OF UNINJURED CHILDREN
- SEE NHTSA WEBSITE FOR LIST OF EMS APPROVED CHILD OCCUPANT PROTECTION DEVICES
<http://www.nhtsa.gov>

SAFE TRANSPORT OF THE UNINJURED CHILD

- NHTSA Child Passenger Safety Seat Technician Certification states a child safety seat **SHOULD NOT** be used after it has been involved in a crash (NHTSA “crash” guidelines are included within the curricula)
- The AAP recommends that child safety seats not be used after a crash

**REQUIRED EQUIPMENT
ADVANCED LIFE SUPPORT
AMBULANCES**

VENTILATION AND AIRWAY

- **LARYNGOSCOPE BLADES**
straight (Miller) sizes 0-4
curved (MacIntosh) sizes 2-4
- **ENDOTRACHEAL TUBES (2 each)**
sizes 2.5-5.5 mm uncuffed
sizes 6.0-8.0 mm cuffed
- **Magill forceps, adult and pediatric**

VENTILATION AND AIRWAY

**END-TIDAL CO₂ DETECTION
CAPABILITY**

- **COLORIMETRIC**
2 sizes: adult and pediatric
- OR**
- **QUANTITATIVE**
digital (one size)

VASCULAR ACCESS

- INTRAVENOUS CATHETERS
14G-24G
- INTRAOSSEOUS
NEEDLES/DEVICES APPROPRIATE
FOR CHILDREN AND ADULTS

VASCULAR ACCESS

- INTRAVENOUS
ADMINISTRATION SETS (microdrip
and macrodrip)
- INTRAVENOUS ARM BOARDS
adult and pediatric

CARDIAC

PORTABLE, BATTERY-OPERATED MONITOR/DEFIBRILLATOR

- adult and pediatric chest attachment
electrodes
 - adult and pediatric paddles
- ### TRANSCUTANEOUS CARDIAC PACEMAKER
- including pediatric pads and cables
 - stand alone or integrated into
monitor/defibrillator

OTHER ADVANCED

(new entry)

- **LARGE BORE NEEDLE (SHOULD BE AT LEAST 3.25" IN LENGTH FOR NEEDLE CHEST DECOMPRESSION IN LARGE ADULTS)**

(ALSO MAY BE NEEDED IN LARGE ADOLESCENTS)

MEDICATIONS

(pre-loaded syringes when available)

- **SHOULD BE COMPATIBLE WITH CURRENT GUIDELINES (AHA or other national organization)**
- **MAY VARY DEPENDING ON STATE REQUIREMENTS**
- **DRUG DOSING IN CHILDREN SHOULD USE PROCESSES THAT MINIMIZE THE NEED FOR CALCULATIONS, PREFERABLY A LENGTH-BASED SYSTEM**

OPTIONAL BASIC EQUIPMENT

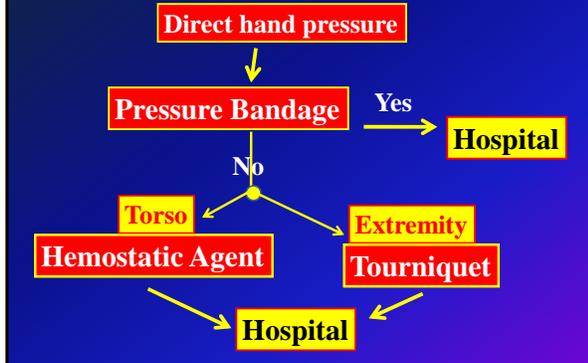
- **INFANT OXYGEN MASK**
- **INFANT SELF-INFLATING RESUSCITATION BAG**
- **12 and 14 NASOPHARYNGEAL AIRWAYS**
- **00 OROPHARYNGEAL AIRWAY**
- **NEONATAL AND INFANT BP CUFFS**
- **PEDIATRIC STETHOSCOPE**

OPTIONAL BASIC EQUIPMENT

- INFANT CERVICAL IMMOBILIZATION DEVICE
- PEDIATRIC BACKBOARD AND EXTREMITY SPLINTS
- TOPICAL HEMOSTATIC AGENT
- APPLICABLE CHEMICAL ANTIDOTE AUTOINJECTORS (appropriate for adults and children)

Hemorrhage Control in the Field

Non-combat patient care



HEMOSTATIC AGENT

- GAUZE IMPREGNATED WITH KAOLIN (CLAY)
- KAOLIN IS ACTIVE INGREDIENT IN KAOPECTATE
- ADSORBENT ACTION
- TESTED IN ANIMALS
- MILITARY IS USING IT

- Experience with chitosan dressings in a civilian EMS system.

Brown MA, Daya MR, Worley JA.

J Emerg Med. 2007;Nov 14

(doi:10.1016/j.jemermed.2007.05.043)

- A special report on the chitosan-based hemostatic dressing: experience in current combat operations.

Wedmore I, McManus JG, Pusateri AE,

Holcomb JB.

J Trauma. 2006;60(3):655–658

OPTIONAL BASIC EQUIPMENT

- ALTERNATIVE AIRWAY DEVICES (e.g. 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

OPTIONAL BASIC EQUIPMENT

- 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 prehospital setting. It is clear that mastering BVM techniques may be lifesaving.

**ALTERNATIVE AIRWAY DEVICES FOR
USE IN CHILDREN REQUIRING
PREHOSPITAL AIRWAY MANAGEMENT**
Update and Case Discussion

Scott Youngquist, MD, Marianne Gausche-
Hill, MD, and David Burbulys, MD
Pediatric Emergency Care 2007: 23(4),
250-261

**OPTIONAL ADVANCED
EQUIPMENT**

- **RESPIRATOR**
Volume-cycled, on/off operation,
100% oxygen, 40–50 psi pressure
(child/infant capabilities)
- **BLOOD SAMPLE TUBES**, adult and
pediatric

**OPTIONAL ADVANCED
EQUIPMENT**

- **NASOGASTRIC TUBES**
pediatric feeding tubes: 5F and 8F
sump tube sizes 8F–16F
- Pediatric laryngoscope handle
- Size 1 curved (MacIntosh)
laryngoscope blade
- **3.5–5.5 mm cuffed endotracheal tubes**

**PEDIATRIC CUFFED
ENDOTRACHEAL TUBES**

- THEORETICAL ADVANTAGES IN PREHOSPITAL CARE
 - fit can be adjusted
 - may decrease the rate of unplanned extubations
 - seal can prevent aspiration
- REQUIRES SPECIALIZED TRAINING

- Cuffed tubes in children (editorial).
James I.
Paediatr Anaesth. 2001;11(3):259–263
- Postal survey of cuffed or uncuffed tracheal tubes used for paediatric tracheal intubation.
Orliaguet G, Renaud E, Lejay M, et al.
Paediatr Anaesth. 2001;11(3):277–281

**OPTIONAL ADVANCED
EQUIPMENT**

- 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

- Optional Basic Life Support Medications
 1. Albuterol
 2. Epi pens
 3. Oral glucose
 4. Nitroglycerin (sublingual tablet or paste)
- Optional Advanced Life Support Medications
 1. Anxiolytics
 2. Intubation adjuncts including neuromuscular blockers

INTERFACILITY TRANSPORT

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.

INTERFACILITY TRANSPORT

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.

FOOTNOTE: TOPICS SUBJECTED TO EVIDENCE EVALUATION FOR CHILDREN

- CHILD SAFETY AND BOOSTER SEATS APPROVED FOR EMS USE
- ALTERNATIVE AIRWAY DEVICES
- SPINAL IMMOBILIZATION DEVICES INCLUDING COLLARS
- PREHOSPITAL USE OF CUFFED ENDOTRACHEAL TUBES

FOOTNOTE: TOPICS SUBJECTED TO EVIDENCE EVALUATION FOR ALL AGES

- ARTERIAL TOURNIQUETS
- HEMOSTATIC AGENTS

EVIDENCE EVALUATION

The results of the pediatric evidence evaluation including full citations will be provided in a companion article authored by the primary reviewers of the topics and the EMSC Stakeholders Group.

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Questions & Answers

Thank you for joining us
for this webcast event.

Archives of this event and many
others are located at,
www.mchcom.com
