

Skills Retention in Pediatric Emergency Medicine: A Compendium of Resources 2007

Committee on Pediatric Emergency Medicine

Contributors

Gerald Schwartz, MD

Ghazala Sharieff, MD

Lee Benjamin, MD

Joseph Finkler, MD

Douglas Holtzman, MD

Maureen McCollough, MD

Introduction

Emergency medicine specialists are expected to treat any presenting complaint and therefore the emergency physician must be competent with life-saving and stabilizing procedures. Competency is based on learning how to do a procedure and then having multiple opportunities to practice and perform that procedure. The provider must know the indications for the procedure as well as the risks involved. The provider needs to be familiar with the equipment and know how to troubleshoot problems should any problems arise. In addition to “knowing” the procedure the provider needs to have hands-on experience doing the procedure multiple times, with supervision as appropriate.

For most of us, our last formal instruction in procedures was during residency training. Once we leave a training program the burden of remaining competent in procedures rests with us. The issue of remaining competent in procedures is most apparent in pediatric emergency medicine. We must balance the need to get a lifesaving procedure right the first time against the fact that many emergency physicians do not see enough sick children to practice one or more of the life-saving and stabilizing procedures on a regular basis.

The question becomes: How does one retain the skills he/she needs to have? There is no one easy or best answer. Providers will need to decide what their needs are, what style of teaching best fills that need, and how much time and financial resources they have available. There are a variety of resources the provider can turn to in order to help with skills retention. The compendium that follows outlines these resources. This compendium is not meant to be an exhaustive list of every modality. Rather, it will give the reader a good idea of what is available and how to obtain more information. Some of these resources are aimed at patients of all ages while others are specifically designed with the pediatric patient in mind. Updates to the Compendium are planned as resources are added or removed.

Web Resources

The American College of Emergency Physicians (ACEP)

www.acep.org

The reader is also referred to the ACEP Bookstore to review their listing of Pediatric EM resources: www.acep.org/bookstore

The American Academy of Pediatrics

www.aap.org

AAP has various links worth reviewing to include:

<http://www.aap.org/nce> Link to the AAP National Conference and Exhibition

<http://www.aap.org/section/PEM/default..cfm> Link to the AAP Section on Pediatric EM

www.pedialink.org/cmefinder Link to AAP sponsored conferences

Emergency Medical Services for Children (EMSC)

<http://bolivia.hrsa.gov/emsc/>

The Pediatric Critical Care Medicine Web site

<http://pedscm.org>

Pediatric Emergency Medicine Database

www.pemdatabase.org

Institute for Healthcare Improvement

www.ihl.org

U.S. Dept. of Health & Human Services

<http://www.hhs.gov>

Centers for Disease Control and Prevention

<http://www.cdc.gov>

Petrack Consulting (offers courses and online resources)

<http://www.petrackconsulting.com>

PEMSoft-The pediatric emergency medicine software

www.pemsoft.com

CME Download.com (Web-based resource including procedure-oriented videos and lectures)

www.cmedownload.com

McGraw Hill's Access Emergency Medicine (Web-based resource including procedure-oriented videos and textbook material)

www.accessemergencymedicine.com

[Details available through the ACEP bookstore]

ACEP's Web-based resource including downloadable videos lectures and mp3 lectures from the 2005 and 2006 ACEP *Scientific Assemblies*
www.selectedpresentations.com

MADSCIENTIST Software: medical learning tools including online ACLS and ATLS simulators
www.madsci.com

Pediatric Emergency Radiology online cases and downloadable software
www.hawaii.edu/medicine/pediatrics/pemxray (Free site)

General Pediatrics Textbooks readable online and downloadable for PDA at
www.hawaii.edu/medicine/pediatrics/pedtext (Free site)

Parenting book, statistics lectures, AED training video for teens
www.hawaii.edu/medicine/pediatrics (Free site)

JumpSTART Pediatric Multicasualty Triage Tool (as well as lectures)
www.jumpstarttriage.com (Free site)

eMedicine Web site-Search under Emergency Medicine
www.emedicine.com

National Guideline Clearinghouse: an extensive listing of clinical guidelines referenced by organization and by disease (including ACEP and AAP guidelines)
www.guideline.gov

MDCalc provides quick access to medical calculations (equations and scores)
www.mdcalc.com

PDA based programs: there are several vendors who sell emergency medicine resources that can be downloaded to a PDA. Some examples include:

Skyscape www.skyscape.com

Unbound Medicine www.unboundmedicine.com

ePocrates www.epocrates.com

Medical Mnemonics (a must see collection of mnemonics)
www.medicalmnemonics.com

McGill (Quebec, Canada) Medicine-EM (an outstanding listing of resources)
www.mcgill.ca/emergency/links/

Brown University listing of Pediatric EM resources (another excellent listing of resources)
http://www.brown.edu/Administration/Emergency_Medicine/ped-em-l.html

Videos and CDs

Airway Management and Intubation Training Products
www.airwaycam.com/items.asp

Jones & Bartlett Publishers: Pediatric Airway Management DVDs; Marianne Gausche-Hill, MD

www.jbpub.com (Search the catalogue under Pediatric Airway)

EMSC (Emergency Medical Services for Children) Pediatric Emergency Care Resource Kit (CD-ROM).

Publication year: 2000. CD contains more than 2000 pages of critical information on pediatric injury and illness prevention, treatment, and rehabilitation. Available thru the EMSC Web site

Pediatric Intraosseous Access (DVD-format). A short 10-minute video focuses on the core PALS skill of establishing intraosseous access in critically ill or injured children. Available through the AHA Web site.

APLS Instructor's Toolkit (CD-ROM). Available on the aplonline.com Web site.

Intubating the Newborn: An Instructional Video - PAL. Available on the AAP Bookstore Web site. Cost: \$99.00

DVD: Cases in Neonatal Resuscitation, 5th Edition. Available on the AAP Web site (in the bookstore) Cost: \$199.95

Delmar Learning's Advanced Life Support Video-Tape 4 (30 minute tape)
Pediatrics: Available online (delmarlearning.com) and covers airway management, intraosseous infusion, nasogastric tube, immobilization

Visual diagnoses of child abuse on CDROM: Available at www.aap.org

Videos aimed at out-of-hospital providers: www.emtskills.com

The New England Journal of Medicine has started publishing teaching videos on their Web site (www.nejm.org). Videos are not specific to Pediatrics but include:

- Paracentesis
- Male Urethral Catheterization
- Nasogastric Intubation
- Lumbar Puncture
- Basic Laceration Repair
- Placement of an Arterial Line
- Thoracentesis

Challenger Corporation: computer-based interactive programs
www.chall.com

Books (Representative sample of what is available, not a complete listing)

The Airway Cam Guide to Intubation and Practical Emergency Airway Management,
www.airwaycam.com

Barkin R, Rosen P: *Emergency Pediatrics. A guide to ambulatory care*; Mosby
Fleisher G, Ludwig S, Henretig F et al: *Textbook of Pediatric Emergency Medicine*;
Lippincott Williams & Wilkins.

Goodman D, Green T, Powell E, et al: *Current Procedures-Pediatrics*; Lange.

Reichman F, Simon, R: *Emergency Medicine Procedures*; McGraw-Hill.

Selbst S, Cronan K: *Pediatric Emergency Medicine Secrets*; Elsevier.

Silverman B, Ludwig S, Fleisher G: *Synopsis of Pediatric Emergency Medicine*;
Lippincott Williams & Wilkins.

Shah B, Lucchesi M: *Atlas of Pediatric Emergency Medicine*; McGraw-Hill.

Sharieff G, Joseph M, Wylie T: *Pediatric Emergency Medicine Quick Glance*; McGraw-Hill.

Strange G, Ahrens W, Lelyveld S, Shafermeyer R: *Pediatric Emergency Medicine. A Comprehensive Study Guide*; McGraw-Hill

Strange G, Ahrens W, McGuillen K et al: *Pediatric Emergency Medicine: Just The Facts*; McGraw-Hill
Walsh-Sukys M, Krug S: *Procedures in Infants and Children*; Elsevier. (often available used)

Zitelli B, Davis H: *Atlas of Pediatric Physical Diagnosis*; Mosby.

Books Dealing With Sedation and Pain Management

Krauss and Brustowicz: *Pediatric Procedural Sedation and Analgesia*, Lippincott Williams & Wilkins.

Tobias J and Deshpande J (eds): *Pediatric Pain Management for Primary Care*, American Academy of Pediatrics.

Mace S, Ducharmen J, Murphy M: *Pain Management and Sedation: Emergency Department Management*; McGraw-Hill.

Other books of interest

Baldwin, GA - *Handbook of Pediatric Emergencies, Softbound, 3/e*, Lippincott Williams & Wilkins.

Barkin, RM - *Pediatric Emergency Medicine: Concepts and Clinical Practice*, Mosby-Year Book.

Beattie, TF (ed). -*Pediatric Emergencies*, CV Mosby.

Crain, EF and Gershel, JC - *Clinical Manual of Emergency Pediatrics*, McGraw-Hill Professional.

Dieckmann, RA, Fiser, DH, and Selbst SM - *Illustrated Textbook of Pediatric Emergency & Critical Care Procedures*, CV Mosby.

Fleisher, GR, Ludwig S - *Pictorial Review of Pediatrics: Acute Care and Emergency Medicine*, Lippincott Williams & Wilkins.

Henretig and King - *Pediatric Emergency Procedures and Techniques*, Lippincott Williams & Wilkins.

King and Henretig - *Pocket Atlas of Pediatric Emergency Procedures*, Lippincott Williams & Wilkins.

Murphy - *Pediatric Triage Guidelines*, Mosby.

Pohl, CA et al - *Pediatrics on Call*, McGraw-Hill Medical.

Reisdorff et al – *Pediatric Emergency Medicine*, Mosby.

Rothrock - *Tarascon Pediatric Emergency Pocketbook*, Tarascon Publishing.

Selbst and Korin - *Preventing Malpractice Lawsuits in Pediatric Emergency Medicine*, American College of Emergency Physicians.

Swischuk - *Emergency Imaging of the Acutely Ill or Injured Child*, Lippincott Williams & Wilkins.

Journals (Representative sample of what is available, not a complete listing)

Pediatric Emergency Care; Ludwig S, Fleisher G (eds); Lippincott, Williams, and Wilkins

Clinical Pediatric Emergency Medicine; Krug S (ed); Elsevier

Pediatric Emergency Medicine Reports; Dietrich A (ed); AHC Media LLC

Pediatric Emergency Medicine Practice; Brown L (ed); EB Medicine

Patient Simulators

Instruction that offers the chance to practice on simulation mannequins is often the best modality for skills retention short of real patient care. The reader is encouraged to check with their local medical schools and training hospitals to see what resources may be available. This is a rapidly expanding area as new teaching simulators are developed and brought to market. Resources worth knowing about:

Society for Simulation in Healthcare: www.ssih.org

Laerdal: www.laerdal.com

Makers of pediatric patient simulator: SimBaby and MegaCode Kid

Access the Simulation User Network for additional resources, including information on simulation centers (under SimLinks)

Medical Education Technologies, Inc: www.meti.com

Makers of pediatric patient simulators: BabySim and PediaSim

EMLRC (Emergency Medicine Learning and Resource Center): www.emlrc.org

Access information on the mobile simulation lab for use within the state of Florida by clicking on EMLRC Mobile Simulation Lab

Medical Equipment

QUICKTRACH- Rusch: www.allmed.net/catalog/item/88/368

Laryngeal Mask Airways: www.lmana.com

Intraosseous Infusion Devices-these devices fall into two broad categories

1) Power driven devices:

-The EZ-IO: www.vidacare.com

-The Bone Injection Gun: www.waismed.com

2) Manually driven devices:

-Jamshidi needle: www.cardinalhealth.com

-Cook needle: www.cookmedical.com

-Sherwood Illinois needle: www.buyemp.com

-F.A.S.T. 1 system: www.pyng.com

Note:

- The Jamshidi needle was sold by Baxter Health Care but is now sold by CardinalHealth.
- Cook Critical Care did sell an intraosseous needle (Sur-Fast) which screwed into the bone marrow. Cook no longer sells this needle but still sells the handle.
- Emergency Medical Products (www.buyemp.com) is listed as one vendor who carries the various types of IO needles (except for the F.A.S.T 1 system) as well as other equipment applicable to emergency medicine.

Individual Broselow tapes: www.savelives.com

Cook Critical Care: www.cookmedical.com

Cook makes many products relevant to pediatric emergency medicine

Look under Critical Care, then Products, and search by Medical Specialty or Product Family, or Product Name (alphabetically)

The following pieces of equipment are representative of what is available

- Enk oxygen flow modulator sets for use with emergency transtracheal catheter ventilation
- Needle cricothyrotomy kits
- Frova intubating introducers
- Intraosseous infusion needles

Tick Remover (O'Tom Tick Twister): www.otom.com

Courses

Getting an overview of what is available:

Consult the ACEP Web site or *Annals of Emergency Medicine* for a listing of upcoming courses

Google Pediatric Emergency Medicine Conferences-a multitude of listings will come up and the reader can review the various offerings

ACEP's annual *Scientific Assembly*: Attendees can take part in a Pediatric Skills Lab where such procedures as intraosseous infusion, airway management, insertion of chest tubes, umbilical vein catheterization, and needle cricothyrotomies are covered

Pediatric Emergency Medicine Conference

www.PedsEducation.org

This site has a listing of online CME as well as interesting cases and Nemours, sponsored conferences to include the yearly Pediatric Emergency Medicine Conference (Orlando in 2007)

Advanced Pediatric Emergency Medicine Assembly

www.acep.org/pemassembly

Individual children's hospitals (e.g. Children's Hospital of Philadelphia) sponsor conferences. A listing of children's hospitals can be found at:

http://pediatric.about.com/od/childrenshospitals/Childrens_Hospitals.htm

Click on the link Children's Hospital Profiles to gain access to the National Association of Children's Hospitals which has additional listings.

Pediatric Advanced Life Support (PALS)

Overview:

The stated goal of PALS is to provide participants with the information needed to recognize infants and children at risk for cardiovascular arrest. The emphasis is on the resuscitation and stabilization of infants and children in respiratory failure, shock, or cardiopulmonary arrest. It is similar in construct to ACLS which is aimed at the adult patient.

I. Courses combine lectures, videos, and labs

II. Audience: the recommended audience includes emergency physicians, pediatricians, family practice physicians, nurses, and paramedics

III. Skills taught include:

- a. Airway techniques to include BVM and intubation
- b. IV techniques to include insertion of IO needles
- c. Use of the AED
- d. Dysrhythmia recognition and treatment
- e. Trauma immobilization and the basics of stabilization

IV. Models used:

- a. Most courses use static mannequins to demonstrate the techniques noted
- b. Some centers are now using a pediatric human patient simulator which can simulate "real" responses to critical interventions

V. Sponsored by the American Heart Association

VI. Certification good for two (2) years

VII. Courses taught: Provider (initial certification), Refresher, and Instructor

- a. Provider Course: two (2) day course-approximately 16 hours
- b. Cost: varies but usually in the \$200-\$300 dollar range
- c. Prerequisite: BLS

VIII. Finding a course:

- Open: The American Heart Association Web site
- Open: Find an Emergency Cardiovascular Care Class
- Open: Find a Class Near You
- Open: CPR and Emergency Cardiovascular Care
- Search: PALS Courses

IX. Summary:

- a. A solid core content course for emergency physicians
- b. A chance to review basic pediatric resuscitation skills with emphasis on the algorithms for resuscitation
- c. Participants should not expect in-depth practice in any one technique
- d. PALS has a more medical orientation than a surgical/trauma orientation
- e. Trauma-related techniques like needle decompression of a tension pneumothorax or chest tube insertion are not part of the standard curriculum

Advanced Pediatric Life Support (APLS)

Overview:

APLS is designed to present the information physicians need to assess and care for critically ill and injured children during the first few hours in the emergency department or office-based setting. Offered by AAP and ACEP.

Procedural topics:

- 1) Length-based resuscitation tape
- 2) C-spine immobilization
- 3) Monitoring: ECG, impedance pneumatography, BP, pulse oximetry, exhaled CO₂
- 4) Oxygen administration
- 5) Suction
- 6) Opening the airway
- 7) Airway adjuncts
- 8) Bag-mask ventilation
- 9) Management of upper airway foreign bodies with Magill forceps
- 10) Emergent intubation
- 11) Rescue airway techniques
- 12) Surgical airway techniques
- 13) Cardioversion and defibrillation, includes AED discussion
- 14) Vascular access
- 15) Thoracic procedures: Needle/tube thoracostomy, pericardiocentesis, thoracotomy
- 16) Miscellaneous: NG/OG intubation, bladder catheterization
- 17) Orthopedic procedures

APLS can be reviewed in a textbook, taken online for CME, or with a 1-2 day course. For hands-on application, a course would need to be taken. APLS offers the following equipment sets for hands on training:

- 1) Airway
- 2) Advanced airway
- 3) Cardiovascular
- 4) Advanced trauma
- 5) Wound closure
- 6) Splinting

Features:

- 1) For the procedures, there is general discussion, indications and equipment, contraindications, technique, complications and pitfalls.
- 2) Photographs, charts, and diagrams assist the understanding of the procedure.
- 3) Sedation/analgesia is included in a separate chapter, not included with procedure section. There is a dedicated PowerPoint as well, included in the instructor toolkit.
- 4) Abuse is covered as an entire chapter with cases on instructor toolkit disc.
- 5) Resuscitation algorithms incorporated into cardiovascular chapter, copy of PALS algorithms. The revised 4th edition incorporates the 2005 changes.

Limitations:

- 1) No discussion of jet oxygenation procedure
- 2) No discussion of CPR procedures

Where can one obtain the materials?

- 1) *acep.org*. Navigate to “bookstore,” and click on Pediatrics prompt. APLS-related materials are listed. APLS online offered as well, with up to 22 modules with CME credit. APLS instructor toolkit also available. Within the APLS description is a link to *aplsonline.com*, where courses may be found.
- 2) *aplsonline.com*. Source for books, online study, instructor toolkit, courses.
- 3) *aap.org*. Navigate to “professional education and resources.” Follow link to *aplsonline.com*

Approximate Costs: The book is \$89.95 for ACEP/AAP members if purchased from the respective organization, \$119.95 for nonmembers. CME cost is \$15 per credit for up to 22 credits

Courses Dedicated to Airway Management (Patients of all ages)

- The Difficult Airway Course: *www.theairwaysite.com*
- Practical Airway Management Course: *www.airwaycam.com/asp.course*
- Advanced Airway Workshop: *www.airwayeducation.com*
- Essentials of Airway Management and Procedural Sedation:
https://ccme.org/airway/orderform.pdf