

The PNCB would like to acknowledge the following acute care Nurse Practitioners who contributed to the 2008-2010 Cardiovascular and Respiratory Self Assessment Exercise

**Beth Bolick, MS, CPNP-AC**  
Evanston, IL 60202

**Gretchen Delametter, CPNP-AC**  
Greensboro, NC 27401

**Elizabeth A. Farrington, PharmD, FCCP, BCPS**  
Durham, NC 27713

**Holly Lieder, MS, CPNP-AC, PC**  
Durham, NC 27710

**Maureen Madden, MS, CPNP-AC**  
Metuchen, NJ 08840

**Elizabeth Preze, MS, CPNP-AC**  
Bolingbrook, IL 60440

**Karin Reuter-Rice, PhD, CPNP-AC**  
Carlsbad, CA 92009

**Michelle Schweitzer, MS, CPNP-AC**  
Raleigh, NC 27615

**Shari Simone, MS, CPNP, FCCM, CCRN**  
Bel Air, MD 21015

**Tara Trimarchi, MSN, CPNP**  
Wynnewood, PA 19096

**Cheryl N. Bartke, MSN, CPNP-AC**  
Harrisburg, PA 17111

**Sharron Docherty, PhD, CPNP-AC  
CPNP-PC**  
Hillsborough, NC 27278

**Adele Foerster, MS, CPNP-AC**  
Silver Spring, MD 20905

**Lisa Keeler, MSN, CPNP-AC**  
Andover, MA 01810-1417

**Andrea Kline, MS, CPNP-AC**  
Chicago, IL 60647

**Kelly Nicklas, MSN, CPNP-AC**  
Morrisville, NC 27560

**Kristen Osborn, MSN, CPNP-AC**  
Birmingham, AL 35243

**Lisa Ring, MSN, CPNP-AC**  
Alexandria, VA 22308-1238

**Bonnie Stojadinovic, MSN, CPNP-AC**  
Waukesha, WI 53188-5553

**Vicki Stringfellow, MSN, CPNP-AC**  
Lexington, KY 40515

**Barbara Wise, PhD, CPNP-AC**  
Glenwood, MD 21738

**Lauren Sorce, MS, CPNP-AC**  
Park Ridge, IL 60068

**Patricia McGahey-Oakland, MS, CPNP-AC**  
Houston, TX 77057

**Riza Mauricio, MS, CPNP-AC**  
Sugarland, TX 77478

**Kelly Keefe Marcoux, CPNP-AC**  
Neshanic Station, NJ 08853

## References for the Acute Care Cardiac Self Assessment Module

A note on resources:

- Elsevier texts are available to you at a 10% discount with no shipping fees. Visit [www.pncb.org](http://www.pncb.org) and log in to access the Elsevier discount portal.
- Check your hospital library for availability of the resources listed. Most will offer interlibrary loan service if a text or journal is unavailable in their collection.
- If you are a member of the American Association of Critical-Care Nurses (AACN), you have access to CINAHL, a literature database, available at their website: [www.aacn.org](http://www.aacn.org).

### Cardiac Acute Care SAE: Reference List

#### **Textbooks:**

Park, MK. (2006) Pediatric Cardiology for Practitioners, 5<sup>th</sup> ed. Mosby, St. Louis.

Vetter, VL. (2006) Pediatric Cardiology: The Requisites in Pediatrics. Mosby/Elsevier, Philadelphia.

McMillan J, Feigin R, DeAngelis J & Jones M.(Ed), (2006) Oski's Pediatric Principle and Practice . Lippincott Williams & Wilkins, Philadelphia

Jonas, RA, (ed). Seminars in Thoracic and Cardiovascular Surgery: Pediatric Cardiac Surgery Annual. 2007 Elsevier

Kliegman RM, Behrman RE, Jenson HB, and Stanton BF. Eds. (2007) Nelson Textbook of Pediatrics, 18<sup>th</sup> ed. Saunders Elsevier, Philadelphia.

Perkin RM, Anas NG, and Swift JD. (2007) Pediatric Hospital Medicine: Textbook of Inpatient Management. Lippincott, Williams and Wilkins, Philadelphia.

Wheeler D, Wong H and Shanley T. (2007) Pediatric Critical Care Medicine: Basic Science and Clinical Evidence Springer, Cambridge.

Nichols, DG (ed) Rogers Textbook of pediatric Critical Care, 4<sup>th</sup> ed. Lippincott, Williams and Wilkins.

Nichols DG, Cameron DE, Greeley WJ, Ungerleider MD and Spevak MD. (2006) Critical Heart Disease In Infants and Children. Mosby, Chicago.

Slonim AD & Murray, MP. (2006) Pediatric Critical Care Medicine. Lippincott, Williams and Wilkins, Philadelphia.

Taketomo CK, Hodding JH & Kraus DM., eds. (2009) Pediatric Dosage Handbook, 16<sup>th</sup> ed. Lexicomp, Hudson, Ohio.

Osborn, L., DeWitt, T., First, L., & Zenel, J. Eds.,(2005) Pediatrics. Philadelphia: Elsevier Mosby.

## **Content Areas**

### **Cardiac Assessment**

#### ***Objective:***

1. Through the use of physical exam techniques, radiological studies and hemodynamic monitoring, identify findings of cardiovascular compromise or congenital heart disease.

Stebor, AD. Basic principles of noninvasive blood pressure measurement in infants. *Advances in Neonatal Care*. 2005: October.

Shaw, E.G. & Gold, M. (2008, Aug. 26). Electrical Alternans, Retrieved October 1, 2009, from <http://emedicine.medscape.com/article/154706-overview>

O'Conner, M, McDaniel, N., and Brady, W.J. The pediatric electrocardiogram: Part I: Age regulated interpretation. *Am J Emerg Med*. 2008; 26(4): 506-512.

Lidegran MK., Mosskin M., Ringertz HG. Cranial CT for diagnosis of intracranial complications in adult and pediatric patients during ECMO: clinical benefits in diagnosis and treatment. *Acad Radiol* 14(1): 2007;62-71.

### **Congenital Defects**

#### ***Objectives***

1. Identify clinical signs and symptoms of several congenital heart defects, such as ALCAPA, tetralogy of fallot and transposition of the great vessels.
2. List diagnostic features and supportive management techniques of specific congenital defects.
3. Associate potential cardiac disease/defects with genetic diagnoses such as Crouzon and Marfan syndromes.

Silberbach, M & Hannon, D. Presentation of congenital heart disease in the neonate and young infant. *Pediatrics in Review*. 28(4); 2007: 123 – 129.

McMahon CJ, Penny DJ, Nelson DP, et al. Preterm infants with congenital heart disease and bronchopulmonary dysplasia: postoperative course and outcome after cardiac surgery. *Pediatrics*. 2005;116:423-430.

Colan SD; Lipshultz SE; Lowe AM; Sleeper LA; Messere J; Cox GF, et al. Epidemiology and cause specific outcome of hypertrophic cardiomyopathy in children: findings from the pediatric cardiomyopathy registry. *Circulation*. 115(6); 2007: 773-781.

Ford, J.W. (2006). Neonatal ECMO: Current controversies and trends. *Neonatal Network* 25(4), 229-238.

## Cardiovascular Surgery

### Objectives:

1. Compare surgical correction to catheterization procedures for congenital cardiac defect repair.
2. Identify potential post-operative complications from varying cardiac surgical procedures.
3. List possible rationale for acute rejection following heart transplantation.

Bar Ziv SM, MCCrindle BW, & West LJ. Outcomes of pediatric patients bridge to heart transplantation from extracorporeal membrane oxygenation support. *ASAIO J* 53(1): 2007;97-102.

Bauer J., Thul J., Valeske K. et al. (2005). Perioperative management in pediatric heart transplantation. *Thorac Cardiovasc Surg*, 53, Supple2:S155-S158.

Ratnasamy, C., Kinnamon, DD, Lipshultz, SE and Rusconi, P. Associations between neurohormonal and inflammatory activation and heart failure in children. *American Heart Journal*. 155(3); 2008: 527-533. available online at Medscape, <http://www.medscape.com/viewarticle/571012> , accessed October 1, 2009

Heart Transplantation, Medscape on-line: <http://www.emedicine.com/ped/TOPIC2797.HTM>, accessed October 1,2009

Hunt, SA & Haddad, F. Changing face of heart transplantation. *J Am Coll Cardiology*. 52(8); 2008; 587-598. available online: <http://www.medscape.com/viewarticle/577657>, accessed October 1,2009.

Delaney JW, Moltedo JM, Dziura JD, et al. Early post operative arrhythmias after pediatric cardiac surgery. *Journal of Thoracic and Cardiovascular Surgery*. 131(6); 2006: 1296-1300.

Kirklin JK. (2005). Is biopsy proven cellular rejection an important clinical consideration in heart transplantation? *Current Opinion in Cardiology*, 20, 127-131.

LeRoy S, Elixson EM, O'Brien P, Tong E, Turpin S, Uzark K. Recommendations for preparing children and adolescents for invasive cardiac procedures: a statement from the American Heart Association pediatric nursing subcommittee of the council on cardiovascular nursing in collaboration with the council on cardiovascular diseases of the young. *Circulation*. Nov. 2003; 2550 – 2564.

Dixon V; Macauley C; Burch M; Sebire NJ, Unsuspected rejection episodes on routine surveillance endomyocardial biopsy post heart transplantation in pediatric patients. *Pediatric Transplant*; 11(3): 2007; 286-290

McKiernan CA, Lieberman SA. Circulatory Shock in Children: An Overview. *Pediatr Rev*. 2005;26(12):445-453.

McMahon CJ, Penny DJ, Nelson DP, et al. Preterm infants with congenital heart disease and bronchopulmonary dysplasia: postoperative course and outcome after cardiac surgery. *Pediatrics*. 2005;116:423-430.

Jone, PN, Schowengerdt, KO. Prenatal diagnosis of congenital heart disease. *Pediatric Clinics of North America*. 2009; 56(3) 709-715.

## **Congestive Heart Failure/Cardiac Tamponade**

### ***Objective:***

1. Recognize signs and symptoms and discuss treatment modalities for congestive heart failure and cardiac tamponade.

Nir A; Lindinger A; Rauh M; Bar-Oz B; Laer S; Schwachtgen L; et al. NT-pro-B-type natriuretic peptide in infants and children: reference values based on combined data from four studies. *Pediatric Cardiology* 2009; 30(1); 3-8.

Colan SD; Lipshultz SE; Lowe AM; Sleeper LA; Messere J; Cox GF, et al. Epidemiology and cause specific outcome of hypertrophic cardiomyopathy in children: findings from the pediatric cardiomyopathy registry. *Circulation*. 115(6); 2007: 773-781.

Ratnasamy, C., Kinnamon, DD, Lipshultz, SE and Rusconi, P. Neurohormonal and inflammatory activation and heart failure in children. *American Heart Journal*. 155(3); 2008: 527-533.  
available online at Medscape, <http://www.medscape.com/viewarticle/571012> , accessed October 7, 2008

Gessler P; Knirsch W; Schmitt B; Rousson V; von Eckardstein A. Prognostic values of plasma N-terminal pro-brain natriuretic peptide in children with congenital heart defects and open heart surgery. *J Pediatrics*. 148(3): 2006: 372-376.

Valley VT. & Fly CA. (2006). Pericarditis and cardiac tamponade. Emedicine.com  
<http://emedicine.medscape.com/article/759642-followup> Accessed October 1, 2009.

## **Hypertension**

### ***Objectives:***

1. Identify the physiological rationale for primary and secondary hypertension.
2. List appropriate oral pharmacotherapy for pediatric hypertension.
3. Identify clinical findings and management of pediatric hypertensive crisis.

Chiolero A, Bovet P, Paradis G, Paccaud F. Has blood pressure increased in children in response to the obesity epidemic? *Pediatrics*. 2007;119(3):545-553

Feld LG & Corey H. Hypertension in childhood. *Pediatrics in Review*. 28(8); 2007: 283-319.

Patel HP & Mitsnefes M. (2005). Advances in the pathogenesis and management of hypertensive crisis. *Current Opinions in Pediatrics*, 17, 210-214.

Suresh, S, Mahajan, P, Kamat, D. Emergency management of pediatric hypertension. *Clinical Pediatrics*. 44; 2005: 739-745.

Rodriguez-Cruz, E. and Ettinger, LM. (Nov. 7, 2008). Hypertension Emedicine:  
<http://emedicine.medscape.com/article/889877-overview> Accessed October 1, 2009.

## **Sudden Cardiac Death**

### ***Objectives:***

1. List potential predisposing factors for sudden cardiac death in children.
2. Discuss cardiac complications from the use of cocaine.
3. Compare dilated versus obstructive cardiomyopathy.
4. Identify fatal cardiac arrhythmias in children.

Nir A; Lindinger A; Rauh M; Bar-Oz B; Laer S; Schwachtgen L, et al. NT-pro-B-type natriuretic peptid in infants and children: reference values based on combined data from four studies. *Pediatric Cardiology* 2009;30(1); 3-8.

Cox GF, Sleeper LA, Lowe AM, Towbin JA, Colan SD, Orav EJ, et al. Factors associated with establishing a causal diagnosis for children with cardiomyopathy. *Pediatrics*. 118(4); 2006: 1519-1531.

Substance Use: Cocaine Cardiomyopathy (March, 2008) Emedicine, <http://emedicine.medscape.com/article/152535->, accessed: October 1, 2009.

Colan SD; Lipshultz SE; Lowe AM; Sleeper LA; Messere J; Cox GF, et al. Epidemiology and cause specific outcome of hypertrophic cardiomyopathy in children: findings from the pediatric cardiomyopathy registry. *Circulation*. 115(6); 2007: 773-781.

McKiernan CA, Lieberman SA. Circulatory Shock in Children: An Overview. *Pediatr Rev*. 2005;26(12):445-453.

Ratnasamy, C., Kinnamon, DD, Lipshultz, SE and Rusconi, P. Neurohormonal and inflammatory activation and heart failure in children. *American Heart Journal*. 155(3); 2008: 527-533. available online at Medscape, <http://www.medscape.com/viewarticle/571012> , accessed October 7, 2008

Ventricular fibrillation. Online emedicine: <http://www.emedicine.com/ped/TOPIC2398.HTM>, accessed October 7, 2008

## **Chest Pain**

### ***Objective:***

Assess the pediatric patient and list differential diagnoses in a child with chest pain.

Lane JR & Ben-Shacker G. Myocardial infarction in healthy adolescents. *Pediatrics*. 2007;120(4):e938-e943.

McKiernan CA, Lieberman SA. Circulatory Shock in Children: An Overview. *Pediatr Rev*. 2005;26(12):445-453.

Roddy, MG, Lange, PA, Klein, BL. Cardiac Trauma in Children. *Clinical Pediatric Emergency Medicine*, 2005; 6: 234-243.

## **EKG**

### **Objectives:**

1. Review EKG findings of children with long QT syndrome. Calculate the QTc from an EKG strip.
2. Identify supraventricular tachycardia on EKG and associated pediatric abnormalities.

Atkins, DL, Scott, WA, Blaufox, AD, Law, IH, Dick, M, Geheb, F, et al. Sensitivity and specificity of an automated external defibrillator algorithm designed for pediatric patients. *Resuscitation*. 76(2): 168-174.

American Academy of Pediatrics Committee on Pediatric Emergency Medicine; American Academy of Pediatrics Section on Cardiology and Cardiac Surgery, Markenson D. Ventricular fibrillation and the use of automated external defibrillators on children. *Pediatrics*. 2007 Nov;120(5):1159-61.

O'Conner, M, McDaniel, N., and Brady, W.J. The pediatric electrocardiogram: Part I: Age regulated interpretation. *Am J Emerg Med*. 2008: 26(4): 506-512.

Colan SD; Lipshultz SE; Lowe AM; Sleeper LA; Messere J; Cox GF; et al. Epidemiology and cause-specific outcome of hypertrophic cardiomyopathy in children: findings from the Pediatric Cardiomyopathy Registry. *Circulation*. 115(6): 2007; 773-781.

Calabro, M.P., Cerrito, M., Luzzza, F., Oreto, G. (2008). Supraventricular tachycardia in infants: epidemiology and clinical management. *Current Pharmaceutical Design*, 14, 723-728.

Manole, M., Saladino, R.A.(2007). Emergency departmental management of the pediatric patient with supraventricular tachycardia. *Pediatric Emergency Care*, 23, 176-185.

Dubnov-Raz, G, Juurlink, DN, Gogelman, R, Merlob, P, Ito, S, Koren, G & Finkelstein, Y. (2008). Antenatal use of selective serotonin-reuptake inhibitors and QT interval prolongation in newborn. *Pediatrics*, 122, e710-e715.

Schlechte, EA, Boramanand, N, Funk, M. (2008). Supraventricular tachycardia in the pediatric primary care setting: age related presentation, diagnosis, and management. *Journal of Pediatric Health Care*, 22, 289-299.

## **Pulmonary Hypertension**

### **Objective:**

1. Identify the use and administration of prostacyclin in a child with pulmonary hypertension.
2. Describe the World Health Organization classification of pulmonary hypertension in children and the pathophysiological causes from heart disease.

Lamoners AE., Hislop AA, Flynn Y, Haworth SG. (2007). Epoprostenol treatment in children with severe pulmonary hypertension, *Heart*, 93(6), 739-43.

Shah P & Ohlsson A. (2007). Sildenafil for pulmonary hypertension in neonates. Cochrane Database System Review

Huddleston, AJ, Knoderer, CA, Morris, JL, Ebenroth, ES, Sildenafil for the treatment of pulmonary hypertension in pediatric patients. *Pediatric Cardiology* 2009; 30(7); 871-872.

Rothstein, R., Paris, Y, Quizon, A. Pulmonary hypertension. *Pediatrics in Review*. 2009; 30(2); 39 – 45.

### **Cardiac Infectious Disease**

#### **Objectives:**

1. List potential areas of cardiac infectious disease in pediatric patients, including viral and bacterial origins.
2. Discuss diagnosis, treatment and potential cardiac effects resulting from Kawasaki disease.

Checchia, PA & Kulik, TJ. Acute viral myocarditis: diagnosis. *Pediatric Critical Care Medicine, supp.* 7(6); 2006: S8 – S11.

Feltes, TF & Adata, I. Immunotherapies for acute viral myocarditis in the pediatric patient. *Pediatric Critical Care Medicine, supp.* 7(6); 2006: S17 – S20.

Rodriguez-Cruz, E. Viral Myocarditis. Emedicine. (October 9, 2008)  
<http://emedicine.medscape.com/article/890740-overview> Accessed: October 1, 2009

Milana, C. & Chandran, L. (2006). What's new in Kawasaki disease. *Contemporary Pediatrics*,23(7),available on-line  
<http://www.contemporarypediatrics.com/contpeds/article/articleDetail.jsp?id=356254&searchString=kawasaki%20disease>

Shekerdeman, L, et al. Acute viral myocarditis: Epidemiology and pathophysiology. *Pediatric Critical Care Medicine, supp.* 7(6); 2006: S2 – S7.

Valley VT. & Fly CA. (2006). Pericarditis and cardiac tamponade. Emedicine.com (6/15/06) reviewed 8/31/06

### **Miscellaneous**

#### **Objectives:**

1. Identify treatment for a child with calcium channel ingestion.
2. Describe the mechanism of injury to the heart when a child sustains a blow to the chest.
3. Discuss candidacy for extracorporeal membrane oxygenation process and when to terminate the treatment.
4. Determine a class I indication for placement of a permanent pacemaker.
5. List indications, side effects and contraindications of commonly used cardiac medications.

Bar Ziv SM, MCCrindle BW, & West LJ. Outcomes of pediatric patients bridge to heart transplantation from extracorporeal membrane oxygenation support. *ASAIO J* 53(1): 2007;97-102.

Beardsmore CS, Westaway J, Killer H, et al. How does the changing profile of infants who are referred for Extracorporeal membrane oxygenation affect overall respiratory outcome. *Pediatrics*. 2007;120(4):e762-e768.

Yabek,SM. Commotio cordis. Emedicine. 9/4/2009.  
<http://emedicine.medscape.com/article/902504-overview>, Accessed October 1, 2009.