

## FROM THE DIRECTOR'S DESK

Welcome to the Winter 2005 edition of CenterNews. We appreciate the opportunity to share medical news and information with you. As such, we are pleased to announce that our website [www.mombaby.org](http://www.mombaby.org) has received a new look for the New Year. The site has been reorganized to make it easier for patients and providers to navigate, and new information and resources have been added. This site will continue to expand over the next several months. We hope that you will take a few minutes to check out the site and bookmark it as a favorite. As always, we appreciate your feedback on our content along with requests for more information on maternal – infant topics. We are here to serve you!

## UNC ECMO PROGRAM

The University of North Carolina has launched a new ECMO program providing state of the art life support for critically ill neonates and pediatric patients. ECMO (extracorporeal membrane oxygenation) can provide hemodynamic and respiratory support in children with reversible cardiac or lung disease. ECMO, also known as extracorporeal life support (ECLS), is similar to the cardiopulmonary bypass used in the operating room but has been adapted to allow for much longer duration of bypass. The techniques for ECMO were developed in the late 1970's and early 80's and to date nearly 30,000 cases have been recorded in the international registry. Although the evolution of sophisticated methods of conventional respiratory support including the use of nitric oxide and high frequency ventilation have decreased the need for ECMO over the past decade, there remains a significant group of patients for whom ECMO can make the difference between life and death.



**Daniel von Allmen, MD**, Chief of Pediatric Surgery

The new program at UNC combines the extensive ECMO experience of a broad group of physicians from pediatric surgery, critical care medicine and neonatology with new state-of-the-art bypass equipment. The most common indications for ECMO are in near term newborns with reversible lung disease and following cardiac surgery in infants with congenital heart disease. Initially it will be possible to treat 2 patients simul-

taneously and it is anticipated that 8 to 12 patients will be treated during the first year.

Bypass requires full anticoagulation and the most common serious complications are related to bleeding. Neonates less than 35 weeks' gestation and 2-2.5 kg in weight are not candidates for ECMO because of the risk of intraventricular hemorrhage and technical difficulties with placing the cannulas. The typical ECMO course can range from several days to more than two weeks, although the longer the course, the less likely a successful outcome. Similarly, the longer a patient is ventilated prior to starting ECMO, the greater the underlying lung damage and less likely the patient will survive. In general, once a patient has been ventilated for more than 7 to 10 days, they are no longer candidates for ECMO support.

Improved survival in neonates has been demonstrated in a number of well-designed studies although survival figures vary based on the indication for bypass. Patients with meconium aspiration have the highest survival rates (95%) while those with congenital diaphragmatic hernia and post-op cardiac patients have survival rates that are significantly lower (45-50%).

The reinstatement of the ECMO program at UNC adds an important tool for the support of infants with respiratory insufficiency or congenital cardiac lesions. Mothers carrying fetuses likely to suffer one of these problems can now be offered potential access to every available method of life support for their child.

*Dr. Daniel von Allmen, MD*  
Associate Professor,  
Division Chief of Pediatric Surgery  
Surgeon in Chief of the NC Children's Hospital

## HYPEREMESIS GRAVIDARUM: UPDATE ON ETIOLOGY, COMPLICATIONS AND THERAPY

Morning sickness, or nausea and vomiting of pregnancy is very common, with some reports quoting up to a 70% incidence in the first trimester. Hyperemesis gravidarum, or pathologic nausea and vomiting of pregnancy leading to maternal and fetal morbidity, is relatively uncommon occurring in only 0.5-2% of pregnant women. The etiology of these disorders is unclear, but is very likely multi-factorial.



**Thomas Trevett, MD**, Fellow, Maternal-Fetal Medicine

There is evidence of a genetic predisposition with increased frequency in siblings and offspring as well as identical twins. Some research suggests a primarily gastrointestinal disorder with erratic or uncoordinated emptying of the upper GI tract associated with decreased lower esophageal sphincter tone from increased progesterone levels of pregnancy. Other data point to a reset of the "emetic center" of the brain secondary to elevated hormones of pregnancy.

Regardless of etiology, hyperemesis gravidarum is associated with significant perinatal and maternal morbidity if left untreated. Maternal complications can

# SIDS happens in our communities

After more than a decade of a significant decline in Sudden Infant Death Syndrome (SIDS) rates, following the 1992 American Academy of Pediatrics' "Back To Sleep" recommendation<sup>1</sup>, the downward trend in SIDS has begun to level and may be on the rise in North Carolina. In our state approximately 100 infants die suddenly and unexpectedly each year. North Carolina's SIDS rate of 0.8 deaths per 1,000 live births in 2002 and in 2003 exceeds the 2002 national SIDS rate of 0.57 deaths per 1,000 live births.

The exact cause of SIDS remains unknown but researchers are investigating genetic, cardiac, respiratory and behavioral factors.<sup>2</sup> A higher incidence of SIDS during 2-4 months of age, greater risk among pre-term and low birthweight infants, higher risk among infants exposed to tobacco smoke in utero and after birth and the prone sleeping position lend credence to the triple risk model as a paradigm for understanding SIDS. This model suggests an infant is most vulnerable to SIDS when there is a convergence of developmental and neuro-physiological, genetic and environmental factors.

As of May 1, 2004, licensed childcare providers caring for infants 12 months of age or younger are required to place healthy infants on their backs to sleep (a waiver may apply), develop and communicate a written *Safe Sleep Policy*, take Infant/Toddler Safe Sleep and SIDS Risk Reduction in Child Care (ITS-SIDS) training and implement other precautionary measures. Since February 2003, more than 24,800 childcare providers have become ITS-SIDS certified.

Although health professionals across North Carolina have been active increasing SIDS awareness and education, infant safe sleep practices in hospitals and related parent education appear inconsistent. Policies governing infant sleep safety in newborn nurseries may be non-existent or inadequate. A deficit in par-

ent education about SIDS during pregnancy persists after the baby's arrival and prior to hospital discharge. Spanish language education about SIDS is insufficient and the "back to sleep" transition of NICU graduates ready for discharge appears variable.

Downstream from the hospital setting, North Carolina childcare licensing requirements stipulate a signed medical waiver by an infant's primary care physician when a medical condition contraindicates the supine sleep position. Inappropriate requests by parents for this medical waiver should not lead to the inappropriate use of the medical waiver by physicians.

Medical professionals have an opportunity to strengthen SIDS risk reduction practices and to inform patients that SIDS risk reduction begins before the baby is born. For those providers working in the hospital setting, does your hospital nursery have a comprehensive infant safe sleep policy that is consistent with

national standards? Is parent education in hospitals about creating a safe sleep environment and continuing safe sleep practices at home as routine as car seat safety education? Because breastfeeding is a predictor for co-sleeping mothers and infants (a SIDS risk factor) are you coupling an infant sleep safety message with breastfeeding education? If your answers to these questions are not an unequivocal "YES" room exists for improvement in policy and in practice.

In October 2004, as part of their N.C. Back To Sleep Campaign, the North Carolina Healthy Start Foundation announced a new initiative to increase the promotion of infant sleep safety practices, training and education in hospitals. To learn more about this initiative contact: [Chris@NCHealthyStart.org](mailto:Chris@NCHealthyStart.org) or call the North Carolina Healthy Start Foundation at 929-828-1819. Visit: [www.NCHealthyStart.org](http://www.NCHealthyStart.org) to learn more about statewide efforts to promote women's health, a healthy pregnancy and to reduce infant mortality.

**Baby's Safe Sleep**

- Keep room temperature 68° - 72° F. Not over 75° F
- Use a firm mattress with a tight-fitting sheet
- Remove toys, stuffed animals and pillows when baby sleeps
- Check on sleeping baby
- Keep cigarette smoke away
- Keep baby's face and head uncovered
- Do not use wedges and bumper pads
- Keep baby from overheating, dress baby in layers that can be easily removed

Place baby at the foot of the crib  
If you use a blanket:  
• Use a light blanket  
• Tuck it along the sides and foot of crib  
• Cover baby from chest down

**ALWAYS PUT HEALTHY BABIES ON THEIR BACKS TO SLEEP**

Take these steps to lower the risk of Sudden Infant Death Syndrome (SIDS)

**STOMACH TO PLAY** **BACK TO SLEEP**

[www.NCHealthyStart.org](http://www.NCHealthyStart.org) or call **1-800-367-2229**  
NC Family Health Resource Line

## References

- American Academy of Pediatrics – *Task Force on Infant Sleep Position and Sudden Infant Death Syndrome*. Task Force Members: J. Katwinkel, Chairperson, J.G. Brooks, M.E. Keenan, M. Malloy.  
*Changing concepts of sudden infant death syndrome: implications for infant sleeping environment and sleep position*. Pediatrics. 2000;105(3):650-656.
- Willinger, M. New directions in fetal and infant mortality research. Presentation at the Association of SIDS and Infant Mortality Programs Fifteenth Annual Conference March 14, 2002. Boston, MA.

Christine O'Meara, MA, MPH  
Communications Specialist &  
Program Coordinator  
North Carolina Healthy Start Foundation

Continued from page 1

include significant weight loss (defined as loss of > 5% of pre-pregnancy weight), severe dehydration, electrolyte abnormalities (which can lead to cardiac dysrhythmias and even sudden cardiac death), acute renal failure and renal tubular necrosis.

Initial therapy for hyperemesis can be undertaken through outpatient management - avoidance of "nausea triggers," small, frequent meals along with the addition of pyridoxine (vitamin B<sub>6</sub>). Second line therapy includes the addition of a half tablet of doxylamine (Unisom®) and other antiemetics as promethazine (Phenergan®), prochlorperazine (Compazine®), and metaclopramide (Reglan®) (see table). Ondansetron (Zofran®) should be reserved for cases when these agents fail due to its expense. Intermittent intravenous fluid and electrolyte replacement can usually be undertaken in an outpatient setting when patients present with dehydration and ketonuria. If emesis has been prolonged, hospitalization with more aggressive intravenous fluid replacement therapy is indicated. Thiamine (vitamin B<sub>1</sub>) should be added to these fluids to prevent Wernicke's encephalopathy. IV antiemetics are begun, and if successful within 24 hours, a bland liquid diet is initiated. In women who are unable to restart their diet, a brief course of IV corticosteroids is warranted. If no response is seen by 72 hours, these should be discon-

tinued. If there is an improvement in symptoms, therapy should be continued with a slow taper over two weeks. Once oral intake is tolerated, diet is advanced to a bland solid diet with small quantities. Antiemetics are then converted to oral or rectal forms, and the patient is discharged once she is able to tolerate the diet and antiemetic regimen.

For intractable cases of hyperemesis gravidarum especially those complicated by multiple hospital admissions and/or a weight loss of > 5% of pre-pregnancy weight, supplemental nutrition is warranted. Peripheral



**Kenneth J. Moise, Jr., MD**, Professor, Obstetrics and Gynecology Director, Division of Maternal-Fetal Medicine

parenteral nutrition will rarely allow for appropriate caloric intake. Central total parenteral hyperalimentation (TPN) has been the mainstay of therapy until recent times. Complications with central access catheters led to the introduction of the PICC lines, however these too are associated with septicemia and thrombosis in pregnancy. Today, enteral feeding through a gastrostomy/jejunostomy feeding tube is the preferred method of nutrition in these severe cases. Line placement is usually through endoscopic visualization. Complications such as infection, hepatotoxicity, and thrombosis are virtually eliminated and the brush border of the GI tract is maintained through stimulation by the enteral feeding solutions. Baseline metabolic caloric needs are increased by 100 kcal/day for each trimester to support normal fetal growth.

Today, new pharmacologic agents and methods of nutrition can allow for a successful outcome in these pregnancies. For more information, please see [www.mombaby.org](http://www.mombaby.org) (then click on *Medical Updates* and *Ob Algorithms*) for further details of the inpatient management of hyperemesis gravidarum.

*Thomas Trevett, MD  
Fellow, Maternal-Fetal Medicine*

*Kenneth J. Moise, Jr., MD  
Professor, Obstetrics and Gynecology  
Director, Division of Maternal-Fetal Medicine*

MEDICATION (generic name)	MEDICATION (brand name)	DOSE	FREQUENCY
Pyridoxine (B6)	None	25 – 50 mg	2X daily
Doxylamine	Unisom	_ tab	1 – 2X daily
Metaclopramide	Reglan	25 – 50 mg	3 - 4X daily
Promethazine (oral) (suppositories)	Phenergan 12.5, 25, 50 mg	25 – 50 mg 3 – 4X daily	3X daily
Prochlorperazine (oral) (spansules) (suppositories)	Compazine	5 – 10 mg 10 – 15 mg SR 2.5, 5, 25 mg	3 – 4X daily 2X daily 2X daily
Ondansetron	Zofran	4 – 8 mg	4X daily

## Etiology and Recurrence Risks in Congenital Heart Disease

After a baby is born with congenital heart disease, a common question that arises is what is the risk is for a subsequent child to have heart problems. In general the causes of most forms of congenital heart disease are thought to be due to some as yet undetermined genetic-environmental interaction, however some causes of congenital heart disease are known. These generally are fall into three categories, chromosomal, syndromic, and environmental exposures. Known chromosomal anomalies that are associated with congenital heart disease include trisomy 21 (Down syndrome), trisomy 18, trisomy 13, and Turners syndrome (XO syndrome). Certain syndromes are associated with congenital heart disease, and in some of these a specific chromosomal anomaly has been identified as the cause. Examples of these include Noonan syndrome, Holt-Oram syndrome, Williams syndrome, and

DiGeorge syndrome. Additionally exposure to certain medications, maternal autoimmune disorders, and maternal viral or bacterial illnesses have been associated with an increased risk of congenital heart disease. Maternal medications associated with congenital heart disease include phenytoin, lithium, retinoic acid, and warfarin. Maternal systemic lupus erythematosus has been shown to cause cardiac rhythm abnormalities. Finally maternal rubella, cocksackie virus, and toxoplasmosis have all been associated with an increased risk of structural heart disease.

The incidence of congenital heart disease in



**John Cotton, MD**, Associate Professor of Pediatrics, Co-Director

the normal population is 8 out of every 1000 newborns or 0.8%. Of those 8 children, only 4 will require some sort of surgical intervention. If one sibling has congenital heart disease the risk for the next baby increases to 2% – 4%. In certain left-sided obstructive lesions, the recurrence risk may be as high as 10%. If there are two affected children in the family the risk is even higher for the next baby to be affected. If one of the parents has congenital heart disease the risk of transmission to their offspring is about 5%. Chromosomal abnormalities may also affect the next pregnancy. Once a child is born with congenital heart disease, genetic counseling for the family is recommended to define recurrence risks and address parental concerns.

*John Cotton, MD  
Associate Professor of Pediatrics  
Co-Director*

# CenterNews

W I N T E R 2 0 0 5

## EDITOR

Sarah Verbiest, MPH, MSW

## EDITORIAL BOARD

Diane Marshall, MD, MPH

Timothy Weiner, MD

John Cotton, MD  
Co-Director

Kenneth J. Moise, Jr., MD  
Co-Director

## DESIGN

University Design Services

## CONTACT US

Campus Box 7181  
Chapel Hill, NC 27599-7181  
PH: 919-843-7863  
FAX: 919-843-7866  
EMAIL: [cmih@med.unc.edu](mailto:cmih@med.unc.edu)

## Bowes-Cefalo Young Researcher Grants Awarded

**D**rs. Angela Gantt and Theresa Harper are the 2005 recipients of the Bowes-Cefalo Young Researcher Award. Dr. Gantt's work focuses on the analysis of a prospective cross-sectional physician survey that queries academic obstetricians on the management of women at risk of premature delivery. Dr.



**Angela Gantt, MD, MPH,**  
Assistant Professor  
in Women's  
Primary Healthcare,  
OB/GYN  
Department

Harper's research will analyze data collected as part of a randomized clinical trial of acupuncture for the prevention of postdates induction. This award was established in 2000 by Dr and Mrs. Watson Bowes and Dr. and Mrs. Robert Cefalo to offer start-up resources to study obstetric issues associated with maternal and fetal morbidity and/or mortality.



**Terry Harper, MD,**  
Instructor and  
Fellow, Division of  
Maternal Fetal  
Medicine

The Mission of the Center for Maternal and Infant Health is to improve the health of North Carolina's women and infants through clinical services, early identification and treatment, research, advocacy, and public and medical / allied health education.