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Pericardial Effusion with a Properly Placed Umbilical Venous Catheter

By Ahmad A. Aboaziza, MD; Darshan Shah, MD; Jennifer Gibson, MD; Otto H. Teixeira, MD

Introduction

Pericardial effusion caused by Umbilical Venous Catheter (UVC) is described with intracardiac location of the tip of the UVC. Mechanisms of injury range from direct myocardial perforation to thrombus formation and myocardial necrosis.

Case Presentation

A preterm, 27-week, appropriate-for-gestational age female was immediately transferred to the Neonatal Intensive Care Unit (NICU) after delivery due to prematurity and Respiratory Distress Syndrome (RDS). Her Apgar scores were 6 and 8 at 1 and 5 minutes, respectively. A physical exam revealed an active preterm female in moderate respiratory distress with subcostal retractions. Vital signs included: a temperature of 100.9° F, a heart rate of 189bpm, a respiratory rate of 61bpm, blood

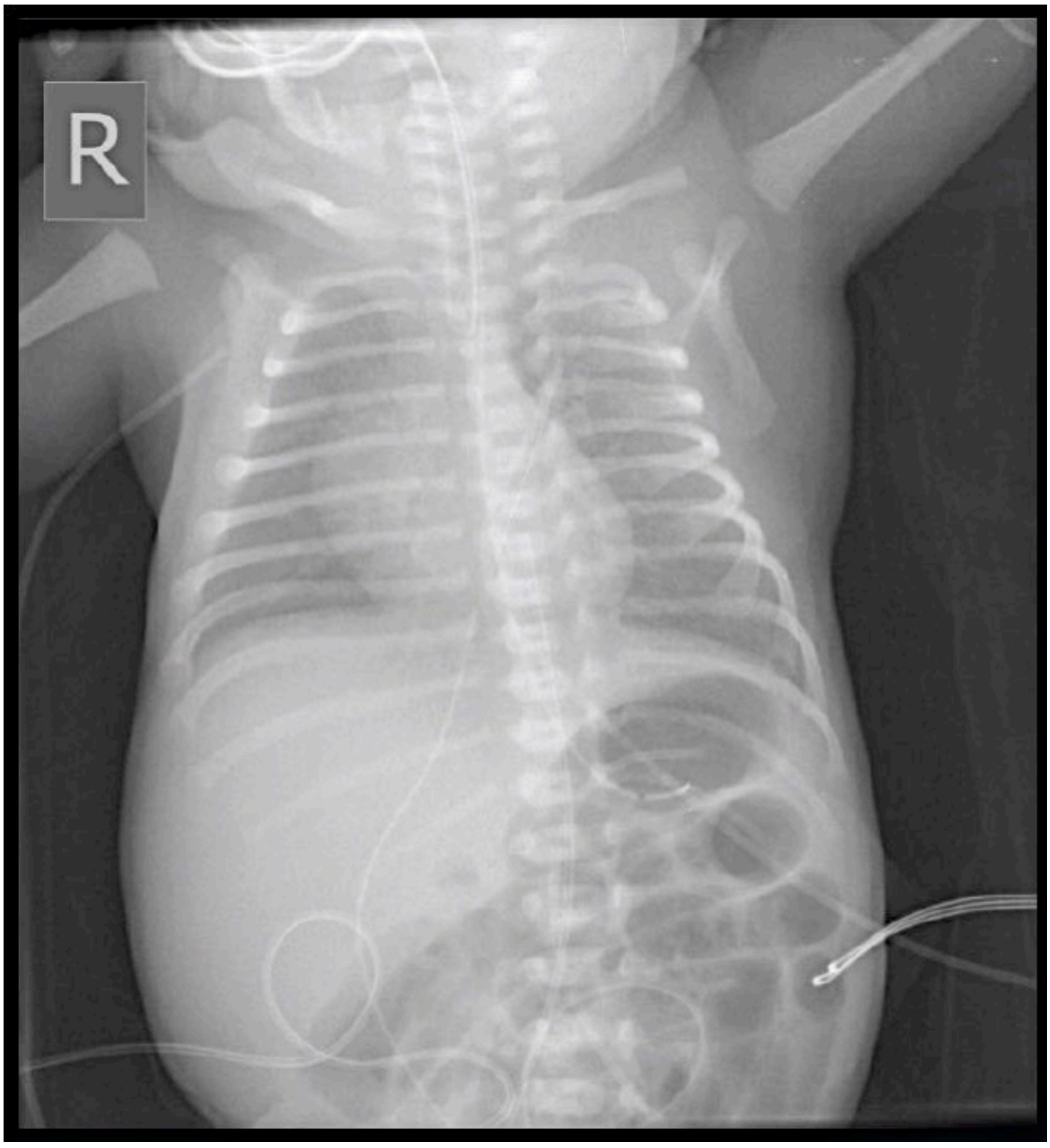

Figure1. Chest- X-ray (PA view) showing UVC and UAC line placements.

PEDINOTES

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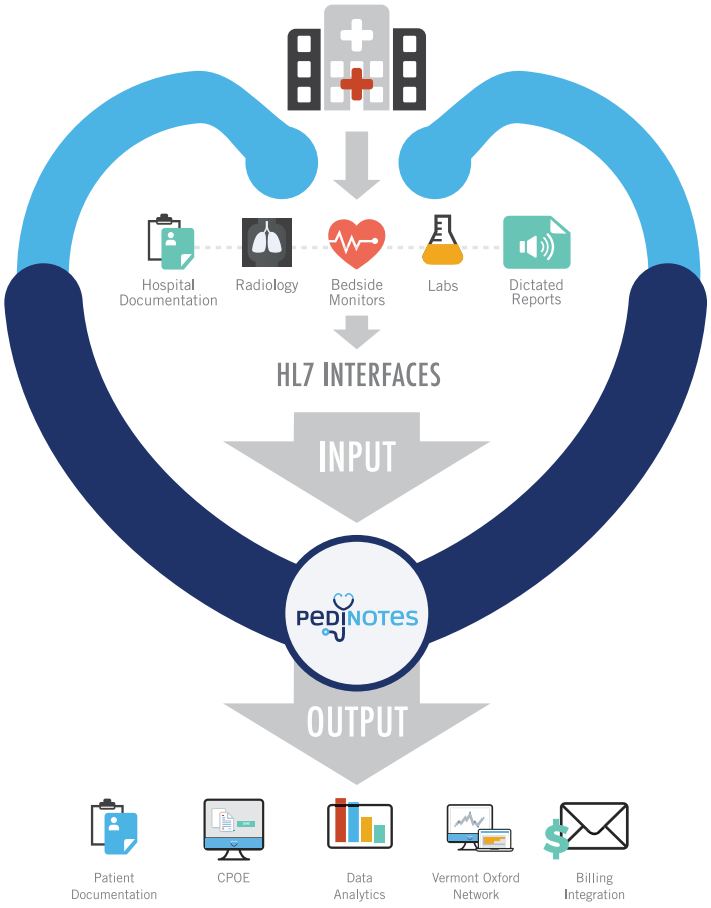

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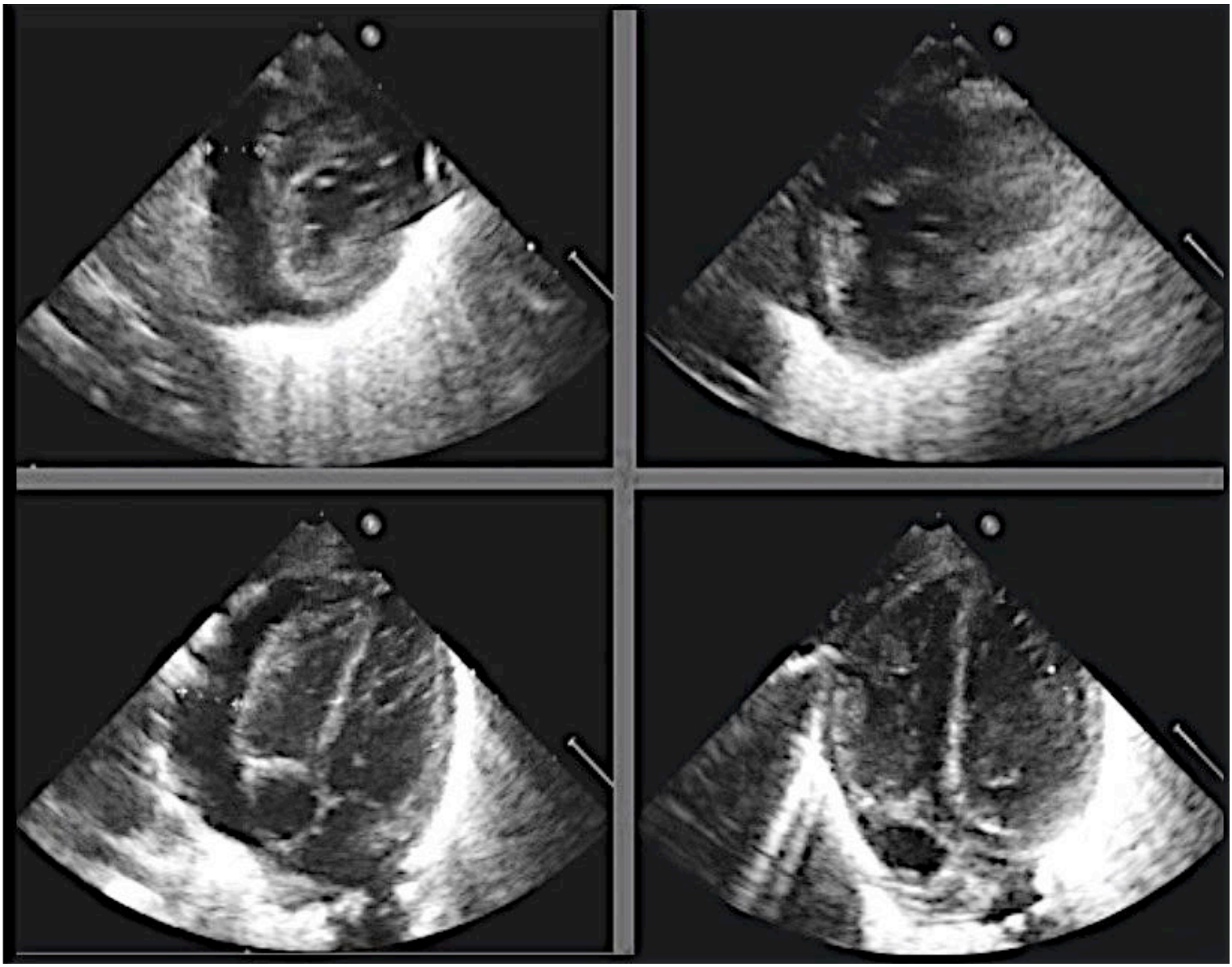

Figure 2. Echocardiograms (apical 4-chamber and short axis view) before and after UVC removal.

pressure 57/27mmhg, and a weight 1335g. On lung auscultation there were diffuse rhonchi over both lung fields. Mild hypotonia was present. The remainder of the exam was unremarkable.

Umbilical artery and venous lines were placed upon arrival to the NICU. As demonstrated in Figure 1, the umbilical arterial catheter tip was located at the level of the T6, and the umbilical venous catheter tip projected at the cavoatrial junction.

On Day of Life (DOL) 1, an echocardiogram did not show any pericardial effusion.

Repeat imaging showed the arterial line with its tip at the T7 level and the venous line with its tip at the T6 level.

On DOL 3, an echo showed a small circumferential pericardial effusion. The X-ray showed 'optimal position' of the UVC. Echocardiograms failed to show the catheter tip in the heart on Day 1 or on Day 3. Ejection fraction was 91.7%. Clinically, the infant deteriorated and required intubation for worsening blood gas.

On DOL 4, a repeat echo showed a moderate circumferential pericardial effusion with no evidence of cardiac tamponade. The effusion was mainly located posteriorly, and was slightly larger compared to the previous day. Ejection fraction remained unchanged. In view of these findings, the umbilical lines were then removed, and a PICC line was placed.

On DOL 5, the pericardial effusion had decreased, as the infant remained stable on vent support.

By DOL 7, there was no pericardial effusion seen on echocardiogram.

Discussion

It is possible for a properly placed UVC to cause pericardial effusion, as happened with our patient. Even if the UVC is not in the heart, it is always important to take it out ASAP in the event of pericardial effusion. Pericardial effusion associated with UVC may be treated conservatively if signs of cardiac tamponade are absent.

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Review various elements of HRF treatment, including:

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- The pathophysiology of HRF
- Optimizing oxygenation in HRF
- Evidence for the earlier use of inhaled nitric oxide in the treatment of HRF

Satyan Lakshminrusimha, MD
Chief, Division of Neonatology
Women and Children's Hospital of Buffalo

Ashley Darcy Mahoney, PhD, NNP-BC
Neonatal Nurse Practitioner, South Dade Neonatology
Assistant Professor, Emory University School of Nursing

Indication

INOMAX is indicated to improve oxygenation and reduce the need for extracorporeal membrane oxygenation in term and near-term (>34 weeks gestation) neonates with hypoxic respiratory failure associated with clinical or echocardiographic evidence of pulmonary hypertension in conjunction with ventilatory support and other appropriate agents.

Important Safety Information

- INOMAX is contraindicated in the treatment of neonates dependent on right-to-left shunting of blood.
- Abrupt discontinuation of INOMAX may lead to increasing pulmonary artery pressure and worsening oxygenation.
- Methemoglobinemia and NO_2 levels are dose dependent. Nitric oxide donor compounds may have an additive effect with INOMAX on the risk of developing methemoglobinemia. Nitrogen dioxide may cause airway inflammation and damage to lung tissues.
- In patients with pre-existing left ventricular dysfunction, INOMAX may increase pulmonary capillary wedge pressure leading to pulmonary edema.
- Monitor for PaO_2, inspired NO_2, and methemoglobin during INOMAX administration.
- INOMAX must be administered using a calibrated INOmax DS_{IR}® Nitric Oxide Delivery System operated by trained personnel. Only validated ventilator systems should be used in conjunction with INOMAX.

Please see Brief Summary of Prescribing Information on adjacent page.

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INOmax® (nitric oxide gas)

Brief Summary of Prescribing Information

INDICATIONS AND USAGE

Treatment of Hypoxic Respiratory Failure

INOmax® is indicated to improve oxygenation and reduce the need for extracorporeal membrane oxygenation in term and near-term (>34 weeks) neonates with hypoxic respiratory failure associated with clinical or echocardiographic evidence of pulmonary hypertension in conjunction with ventilator support and other appropriate agents.

CONTRAINDICATIONS

INOmax is contraindicated in neonates dependent on right-to-left shunting of blood.

WARNINGS AND PRECAUTIONS

Rebound Pulmonary Hypertension Syndrome following Abrupt Discontinuation

Wean from INOmax. Abrupt discontinuation of INOmax may lead to worsening oxygenation and increasing pulmonary artery pressure, i.e., Rebound Pulmonary Hypertension Syndrome. Signs and symptoms of Rebound Pulmonary Hypertension Syndrome include hypoxemia, systemic hypotension, bradycardia, and decreased cardiac output. If Rebound Pulmonary Hypertension occurs, reinstate INOmax therapy immediately.

Hypoxemia from Methemoglobinemia

Nitric oxide combines with hemoglobin to form methemoglobin, which does not transport oxygen. Methemoglobin levels increase with the dose of INOmax; it can take 8 hours or more before steady-state methemoglobin levels are attained. Monitor methemoglobin and adjust the dose of INOmax to optimize oxygenation.

If methemoglobin levels do not resolve with decrease in dose or discontinuation of INOmax, additional therapy may be warranted to treat methemoglobinemia.

Airway Injury from Nitrogen Dioxide

Nitrogen dioxide (NO_2) forms in gas mixtures containing NO and O_2. Nitrogen dioxide may cause airway inflammation and damage to lung tissues.

If there is an unexpected change in NO_2 concentration, or if the NO_2 concentration reaches 3 ppm when measured in the breathing circuit, then the delivery system should be assessed in accordance with the Nitric Oxide Delivery System O&M Manual troubleshooting section, and the NO_2 analyzer should be recalibrated. The dose of INOmax and/or FiO_2 should be adjusted as appropriate.

Worsening Heart Failure

Patients with left ventricular dysfunction treated with INOmax may experience pulmonary edema, increased pulmonary capillary wedge pressure, worsening of left ventricular dysfunction, systemic hypotension, bradycardia and cardiac arrest. Discontinue INOmax while providing symptomatic care.

ADVERSE REACTIONS

Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice. The adverse reaction information from the clinical studies does, however, provide a basis for identifying the adverse events that appear to be related to drug use and for approximating rates.

Controlled studies have included 325 patients on INOmax doses of 5 to 80 ppm and 251 patients on placebo. Total mortality in the pooled trials was 11% on placebo and 9% on INOmax, a result adequate to exclude INOmax mortality being more than 40% worse than placebo.

In both the NINOS and CINRGI studies, the duration of hospitalization was similar in INOmax and placebo-treated groups.

From all controlled studies, at least 6 months of follow-up is available for 278 patients who received INOmax and 212 patients who received placebo. Among these patients, there was no evidence of an adverse effect of treatment on the need for rehospitalization, special medical services, pulmonary disease, or neurological sequelae.

In the NINOS study, treatment groups were similar with respect to the incidence and severity of intracranial hemorrhage, Grade IV hemorrhage, periventricular leukomalacia, cerebral infarction, seizures requiring anticonvulsant therapy, pulmonary hemorrhage, or gastrointestinal hemorrhage.

In CINRGI, the only adverse reaction (>2% higher incidence on INOmax than on placebo) was hypotension (14% vs. 11%).

Based upon post-marketing experience, accidental exposure to nitric oxide for inhalation in hospital staff has been associated with chest discomfort, dizziness, dry throat, dyspnea, and headache.

DRUG INTERACTIONS

Nitric Oxide Donor Agents

Nitric oxide donor agents such as prilocaine, sodium nitroprusside and nitroglycerine may increase the risk of developing methemoglobinemia.

OVERDOSAGE

Overdosage with INOmax is manifest by elevations in methemoglobin and pulmonary toxicities associated with inspired NO_2. Elevated NO_2 may cause acute lung injury. Elevations in methemoglobin reduce the oxygen delivery capacity of the circulation. In clinical studies, NO_2 levels >3 ppm or methemoglobin levels >7% were treated by reducing the dose of, or discontinuing, INOmax.

Methemoglobinemia that does not resolve after reduction or discontinuation of therapy can be treated with intravenous vitamin C, intravenous methylene blue, or blood transfusion, based upon the clinical situation.

Possible causes of pericardial effusion in this setting include direct trauma to the endothelial wall during UVC placement or irritation to the endothelial lining caused by hyperosmolar infusates.

"It is possible for a properly placed UVC to cause pericardial effusion, as happened with our patient. Even if the UVC is not in the heart, it is always important to take it out ASAP in the event of pericardial effusion. Pericardial effusion associated with UVC may be treated conservatively if signs of cardiac tamponade are absent."

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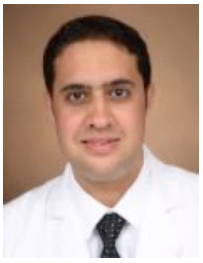

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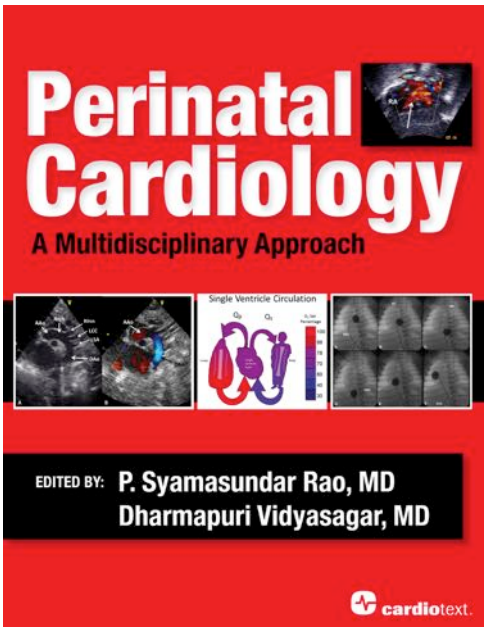
e-Book Review: Perinatal Cardiology: A Multidisciplinary Approach

By John W. Moore, MD, MPH



"Perinatal Cardiology: A Multidisciplinary Approach," Edited by: P. Syamasundar Rao, MD, DCH, FAAP, FACC, FSCAI; University of Texas Medical School at Houston, Children's Memorial Hermann Hospital, Houston, Texas and Dharmapuri Vidyasagar, MD, MSc, FAAP, FCCM, PhD (Hon), University of Illinois at Chicago, Chicago, Illinois.

In the current era, paper textbooks have literally been placed on the "back shelf." Doctors Rao and Vidyasagar clearly understand this. They have edited an e-book, which is available to purchase and download from Cardiotext Publishing in Minneapolis, Minnesota (https://cardiotextpublishing.com/perinatal-cardiology). You can also get additional detail on the chapters and the authors.

In present day practice, Perinatal Cardiology has itself become a distinct medical discipline. Nearly all infants born with Complex Congenital Heart Disease in the United States have been identified as fetuses. Their parents have been counseled, and plans for comprehensive care starting at the time of fetal diagnosis, through delivery and the neonatal period have been made. Often plans include neonatal cardiac surgery and/or cardiac intervention. The success of these cardiac treatments often depend on optimal care of the fetus, timely and controlled delivery and resuscitation of the infant, and optimal stabilization and critical care of the infant prior to cardiac treatments.

Doctors Rao and Vidyasagar have edited and authored a comprehensive and detailed text on all aspects of perinatal cardiology.

In the Forward, Rao and Vidyasagar identify three objectives of this e-book: First, to provide readers with an overview of advances in the disciplines of perinatology, neonatology, cardiology, and cardiac surgery with regard to early diagnosis and timely treatment options. In addition, readers will find discussions of the multidisciplinary approaches commonly employed today in managing infants with congenital cardiac lesions. Lastly, this book provides current evidence-based therapeutic approaches for treatment of the fetus and the newborn with congenital cardiac lesions.

The objectives are achieved in forty-four chapters, written by variety of authors. However, it's fair to say that Doctor Rao himself has written or contributed to the majority of these chapters. That said, the chapters are wide ranging, covering such diverse topics as MRI and CT imagining and anesthesia, as well as common topics such as oximetry screening, and treatment of premature lung disease and the PDA. In addition, there are detailed chapters on each of the individual congenital cardiac lesions (e.g. Truncus Arteriosus), as well as acquired problems such as cardiomyopathy.

My favorite chapter is on cardiac embryology. Always a complicated subject, Rao et. al. have succeeded in making this material understandable through clear and concise text and simple but complete diagrams.

I highly recommend this book. It is really all you need to be up-to-date on Perinatal Cardiology, and to manage your practice. Whether you are a pediatric cardiologist, a perinatologist, a neonatologist or you are in training to be one of these specialists; this is a terrific reference and guide for you. If you are a cardiac or pediatric surgeon, this book will also be of interest to you because it covers the comprehensive care and management of your surgical patients.

Furthermore, the Editors and Staff of *Congenital Cardiology Today* and *Neonatology Today* are particularly pleased that Rao and Vidyasagar have selected many diagrams and figures from their previous publications in our newsletters to appear in the e-Book.

CCT

"I highly recommend this book. It is really all you need to be up-to-date on Perinatal Cardiology, and to manage your practice. Whether you are a pediatric cardiologist, a perinatologist, a neonatologist or you are in training to be one of these specialists; this is a terrific reference and guide for you. If you are a cardiac or pediatric surgeon, this book will also be of interest to you because it covers the comprehensive care and management of your surgical patients. "

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CONTEMPORARY FORUMS

THE FETUS & NEWBORN

IMPROVING OUTCOMES IN PERINATAL AND NEONATAL CARE

LAS VEGAS

PRECONFERENCE: NOVEMBER 8, 2017
MAIN CONFERENCE: NOVEMBER 9–11, 2017

IN AFFILIATION WITH:
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RADY CHILDREN'S HOSPITAL - SAN DIEGO

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CONFERENCE OBJECTIVES

THIS CONFERENCE WILL ENABLE NEONATAL CLINICIANS TO:

- Describe new diagnostic tools and procedures, including the Sepsis Calculator, use of Ultrasound at the bedside and Rapid Human Genome Sequencing.
- Identify pre- and postoperative management of newborns with surgical conditions.
- Evaluate the effects on the neonate of prenatal drug exposure and maternal hypertensive-related crises.
- Determine optimal nutrition strategies utilizing evidence-based choice of formula, hypoglycemia management protocols and consideration of specific nutritional requirements of neonates.
- Investigate practical, realistic approaches to partnering with families to create a sense of collaboration and transparency.

WHO SHOULD ATTEND?

EVERYONE INVOLVED IN THE CARE OF HIGH-RISK NEWBORNS INCLUDING:

- Neonatologists
- Pediatricians
- Pharmacists
- Clinical Nurse Specialists
- Nurse Practitioners
- Staff Nurses
- Nurse Managers
- Physician Assistants
- Educators and Instructors
- Case Managers
- Transport Teams
- Respiratory Therapists

REGISTER ONLINE AT CONTEMPORARYFORUMS.COM OR BY CALLING 800-377-7707

Clinical Trials

Mathematical Modeling to Predict the Duration of Thrombocytopenia in Neonates

This study is currently recruiting participants.

Sponsor: Boston Children's Hospital
Collaborators: Beth Israel Deaconess Medical Center
National Institutes of Health (NIH)
National Heart, Lung, and Blood Institute (NHLBI)
University of Iowa

Information provided by (Responsible Party): Martha Sola-Visner, Boston Children's Hospital

ClinicalTrials.gov Identifier: NCT02802982
First received: June 14, 2016
Last updated: December 6, 2016; Last verified: December 2016

Purpose: Parents of infants who have been thrombocytopenic for 3-4 days will be approached for consent to enter the study. For the purposes of the study, thrombocytopenia will be defined as a platelet count <60,000/uL or a platelet count <100,000/uL that prompted a platelet transfusion. Following enrollment, the platelet count will be followed in each infant. Participants will enter the study if on day 5 or later after the onset of thrombocytopenia (defined as above) infants either have a platelet count <60,000/uL or a platelet count <100,000/uL for which a platelet transfusion is ordered.

Condition: Neonatal Thrombocytopenia

Study Type: Observational

Study Design: Observational Model: Case-Only

Time Perspective: Prospective

Primary Outcome Measures:

- Prediction of the duration of thrombocytopenia in neonates. [Time Frame: 3 years] to develop clinically useful parameters to predict the duration of thrombocytopenia in neonates, using mathematical modeling.

Biospecimen Retention: Samples Without DNA

A single blood sample drawn (approx. 800 mcL total) for a complete blood count with IPF and for determination of a panel of factors important in the regulation of thrombopoiesis (including TPO, IL-6, IL-11, IL-3, PF-4, VEGF, IGF-1, IGF-II, TGF-ß, HGF, PDGF, and Epo).

In addition, left-over blood from clinically indicated studies will be collected from the clinical laboratory, processed and stored at -80C for future cytokine studies. Samples will continue to be collected and serial platelet counts with IPF followed until resolution of the thrombocytopenia, defined as a platelet count >60,000/uL for five days without platelet transfusions.

Estimated Enrollment: 40

Study Start Date: April 2013

Estimated Study Completion Date: December 2017

Estimated Primary Completion Date: December 2016 (Final data collection date for primary outcome measure)

Detailed Description: Parents of infants who have been thrombocytopenic for 3-4 days will be approached for consent to enter the study. For the purposes of the study, thrombocytopenia will be defined as a platelet count <60,000/uL or a platelet count <100,000/uL that prompted a platelet transfusion. Following enrollment, the platelet count will be followed in each infant. Participants will enter the study if, on day 5 or later after the onset of thrombocytopenia (defined as above), infants either have a platelet count <60,000/uL or a platelet count <100,000/uL for which a platelet transfusion is ordered. If criteria are met, eligible infants will have a single blood sample drawn (approx. 800 mcL total) for a complete blood count with Immature Platelet Fraction (IPF) and for determination of a panel of factors important in the regulation of thrombopoiesis (including: TPO, IL-6, IL-11, IL-3, PF-4, VEGF, HGF, PDGF, and Epo). Importantly, in patients who are being transfused for platelet counts <100,000/uL, this sample will need to be obtained immediately prior to the platelet transfusion. If the patient has a platelet count <60,000/uL and is not being transfused, the blood can be obtained at any time.

Following this initial sample, a platelet count with IPF will be obtained any time a CBC is ordered for clinical indications, using left-over blood stored in the clinical laboratory for <24 hrs (only 100 mcL are needed for this). In addition, left-over blood from clinically indicated studies will be collected from the clinical laboratory, processed and stored at -80C for future cytokine studies. Samples will continue to be collected and serial platelet counts with IPF followed until resolution of the thrombocytopenia, defined as a platelet count >60,000/uL for five days without platelet transfusions.

In addition, research nurses will collect and record the infants' demographic data (including: gestational age, days of life, birth weight), diagnoses, clinical condition at the time of study entry (respiratory and/or hemodynamic support), time and volume of platelet transfusions, coagulation tests, liver enzymes, and tests of kidney function. Moderate and severe bleeding will also be recorded, using criteria defined a priori.

Eligibility

Ages Eligible for Study: Up to 3 Months (Child)

Sexes Eligible for Study: All

Accepts Healthy Volunteers: No

Sampling Method: Non-Probability Sample

Study Population: Infants who have been thrombocytopenic for 5 days will be approached for the study.

Inclusion Criteria:
- Are admitted to one of the participating NICUs or the CICU at BCH;
- Have a post-conceptional age (gestational age + age in weeks) between 23 and 48 weeks; and
- Have had thrombocytopenia, defined as a platelet count <60,000/uL or a platelet count <100,000/uL but receiving platelet transfusions, for ≥ 5 days.

Exclusion Criteria:
- Are on ECMO; or
- Are not expected to survive by the attending neonatologist.

Contacts and Locations: Choosing to participate in a study is an important personal decision. Talk with your doctor and family members or friends about deciding to join a study. To learn more about this study, you or your doctor may contact the study research staff using the contacts provided below. For general information, see Learn About Clinical Studies.

Contacts

Contact: Martha Sola-Visner, MD; 617-919-4845
martha.sola-visner@childrens.harvard.edu

Contact: Vanessa J Young, RN, BA; 617-355-8330
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Principal Investigator: Munish Gupta, MD

Sponsors and Collaborators
- Boston Children's Hospital
- Beth Israel Deaconess Medical Center
- National Institutes of Health (NIH)
- National Heart, Lung, and Blood Institute (NHLBI)
- University of Iowa

Investigators

Principal Investigator: Martha Sola-Visner, MD
Boston Children's Hospital

Responsible Party: Martha Sola-Visner, MD
Boston Children's Hospital

ClinicalTrials.gov Identifier: NCT02802982

Other Study ID Numbers:
- IRB-P00005413
- 5R01HL069990-11 (US NIH Grant/Contract Award Number)

Study First Received: June 14, 2016

Last Updated: December 6, 2016

Individual Participant Data

Plan to Share IPD: No

Keywords provided by Martha Sola-Visner, Boston Children's Hospital:
- Thrombocytopenia
- Neonates

Additional relevant MeSH terms:
- Thrombocytopenia
- Thrombocytopenia, Neonatal Alloimmune
- Blood Platelet Disorders
- Hematologic Diseases
- Infant, Newborn, Diseases

ClinicalTrials.gov processed this record on June 23, 2017

For more detailed and up-to-date information, go to:
https://clinicaltrials.gov/show/NCT02802982

National Perinatal Association's 2017 Annual Conference Summary - *Perinatal Mental Health: Advocating for the Health & Wellbeing of Families*

By Andrea Werner Insoft, LICSW, ACSW; Stephen Lassen, PhD

Members of the NPA write a regular column in *Neonatology Today*.

The National Perinatal Association (NPA) held its 38th Annual Conference, entitled *Perinatal Mental Health: Advocating for the Health & Wellbeing of Families,* in Atlanta, GA March 9th-11th, 2017. We welcomed 125 attendees representing over twenty disciplines including: parents, physicians, midwives, nurses, medical students, social workers, psychologists, family therapists, physical therapists, occupational therapists, hospital administrators, and administrators of community organizations.

The theme of Perinatal Mental Health was evident in the excellent programming, including professionals from many disciplines and parents who shared their personal journeys of navigating perinatal anxiety and mood disorders. There was productive and meaningful collaboration amongst conference attendees throughout the conference activities.

The conference was started with two half-day seminars sponsored by NPA's Family Advocacy Network (FAN). Birdie Gunyon Meyer, RN, MA, CLC, focused on building a network of support for those experiencing perinatal mood and anxiety disorders. Birdie is the coordinator of the Perinatal Mood Disorders Program at Indiana University Health and is the Past-President and Chair of Education for Post-Partum International. Cheryl Milford, EdS shared ways to better care for ourselves, as we care for these fragile families.

Dr. Margaret Howard, PhD, a psychologist from the Alpert Medical School at Brown University, provided an excellent overview of perinatal emotional complications and their treatment. She described the Mother-Baby Day Hospital at Women's and Infants Hospital in Rhode Island, which is the nation's first specialized psychiatric hospital program designed specifically for pregnant and postpartum women and their infants. Dr. Howard emphasized the importance of such programs that target perinatal emotional complications while:

1. eliminating the separation of mother and baby during a critical period,
2. supporting breastfeeding mothers, and
3. being able to observe and evaluate the mother-baby day, leading to individualized treatment interventions.

Dr. Howard presented outcome data showing significant decreases in depressive symptoms, increased overall functioning and high satisfaction among mothers who participated in the program.

Susan Myers, RN, from the University of North Carolina Center for Women's Mood Disorders provided participants with a detailed and clinically-relevant overview of perinatal mood and anxiety disorders, specific diagnostic categories, highlighting that there is no single etiology for perinatal moods disorders. Susan focused on the need to treat anxiety and sleep deprivation pharmacologically as a first step. Resolving these issues can support ongoing treatment. Susan's passion and expertise for providing appropriate and effective pharmacologic treatment for specific mood disorders was a focus of her presentation and provided essential clinical knowledge for practitioners and women.

"The Role of the Psychologist in the NICU" was discussed by Dr. Chavis Patterson, PhD, psychologist and Director of Psychosocial Services in the Department of Neonatology at the Children's

Hospital of Philadelphia. Dr. Patterson described his role in facilitating the development of many different kinds of psychosocial support for parents who have an infant in the Neonatal Intensive Care Unit (NICU). He described the "NICU Survival Guide" that is given to families as their baby is admitted to the NICU. This guide addresses a variety of topics relevant to parents' experience in the NICU, and has been well-received. Dr. Patterson highlighted how the role of psychologist extends also to NICU staff, who struggle to cope with and manage psychosocial challenges in the NICU. He outlined various strategies for educating and supporting staff, both formal and informal modalities.

Kara Wahlin, MFT and Founder of NICU Healing, presented on the trauma and stigma of perinatal mood disorders. Her talk revolved around the fact that trauma, stigma and shame are often endemic to perinatal mood disorders, and that empathy, understanding and acceptance are the most critical components to facilitating change and "opening up" a family to clinical assistance. She highlighted how critical it is that providers ask questions, remembering that each story is unique and that each family has their own gauge of pain. By normalizing adaptive responses, identifying cultural differences and our own biases, and empowering clients, we can all lessen the effects of trauma and enable families to be more open to support.

Honoring NPA's interdisciplinary focus, Jenene Wood Craig, PhD, MBA, OTRL, and Cheryl Milford, EdS, gave a presentation on Neuroprotective Care and Perinatal Mental Health. Through their talk, we came to understand the concepts and tenets of interdisciplinary neuroprotective care, describe common emotions expressed by parents in the NICU, describe how interdisciplinary neuroprotective care facilitates parental confidence and competence in caring for their baby, and benefits attachment and mental health.

Lisa Tremayne, RN was the final presenter of the conference. Lisa is a passionate and dedicated nurse advocate for women with perinatal mood disorders. She discussed the innovative Perinatal Mood and Anxiety Disorder Center at Monmouth Medical Center in New Jersey. Lisa helped to develop and implement the program in the mid-2000s. The program's success facilitated its move to the OB/GYN Department at Monmouth in 2014. This multidisciplinary program provides: peer-to-peer support groups, individual and group therapy, telephone follow-up, a private Facebook page for women, and a Mom Mentor program. The program is the only perinatal mood disorder treatment program in New Jersey.

While we learned so much from the experts at this conference, one of the most amazing outcomes was the feeling of connectedness and compassion among all the attendees. We share a dual passion that includes: caring for families who are affected by perinatal mood and anxiety disorders, and caring for each other. It is our sincere hope that many of these connections will continue to blossom and thrive in the years to come.

NPA's 39th Annual Conference will be held in Loma Linda, CA, March 14th-16th, 2018 at Loma Linda University Children's Hospital. The conference theme will be *Perinatal Substance Use: Evidence-based Solutions and Support for the Family.* International experts from multiple disciplines, and the true experts, recovering families themselves, will be present to share and dialogue about the national emergency we are experiencing, and what we can effectively do to provide solutions and support. Learn more at www.nationalperinatal.org.

NT

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How to Attack Africa's Neonatal Mortality Problem

Newswise — Giving birth at home is the most significant risk factor for neonatal deaths in major sections of Africa – a continent that continues to be plagued by the highest neonatal mortality rates in the world, indicates a new study by Michigan State University scholars.

In both East and West Africa, a substantial proportion of births are still delivered without a doctor or other health-care professional. Unprotected water sources and older mothers giving birth also help explain why home-births are so dangerous.

The findings are meant to provide guidance toward the United Nations' longstanding goal of reducing deaths among children under 5-years-old. Worldwide, child mortality rates decreased 53% between 1990 and 2015, according to the U.N.

Africa, however, had the smallest reductions in child morality rates during that 25-year period and still has the highest neonatal morality rate of 28 deaths per 1,000 live births. Nearly half of under-5 child deaths occur during the neonatal period (the first 30 days of life). The U.N.'s newest goals – the Sustainable Development Goals, a 15-year strategy launched in early 2016 – include reducing the neonatal mortality rate in all countries to 12 deaths per 1,000 live births.

"Africa still has quite a way to go in terms of reducing neonatal mortality and where interventions are targeted is going to be very important," said Sue Grady, Associate Professor of Geography and Lead Investigator of the study.

Grady and a team of students analyzed demographic and health-survey data for mothers in 14 sub-Saharan African countries, for a total sample of 344,264 births. The findings are published online in the journal *Geospatial Health*.

Among the findings and recommendations:

- Women reported unreliable transportation services to a health-care facility and inability to pay for the high cost of maternity care, including prenatal visits. Public officials should continue focusing on enhancing the availability, accessibility and quality of health-care services, the authors argue.
- Officials should focus on ensuring the availability of affordable clean water and sanitation for hygienic delivery conditions, particularly in rural communities. Exposure to unclean water after birth can contribute to umbilical cord and intestinal infections in the baby.
- Health-care financing should include training of health professionals such as midwives and even relatives who can recognize and address complications, including asphyxia, infections and the need for child warmth and breastfeeding immediately after delivery.
- Given the trend toward women having children later in life, health officials should emphasize improvements in prenatal care, including family planning education and increased training of birth attendants to manage and encourage deliveries for women of advanced maternal age at health-care facilities.
- Cultural barriers pertaining to neonatal mortality should be addressed. The study found that female babies in West Africa were more likely to die, perhaps due partly to a gender bias and preference for sons. Mothers also reported not wanting their last child.

Interventions should include continuing to provide education to women and empowering them to make their own decisions on contraceptive use, Grady said. Further research should explore the reasons why some mothers express not wanting their last child.

National Leader in Fetal Surgery Joins Lurie Children's Hospital; Hospital launches The Chicago Institute for Fetal Health

Aimen Shaaban, MD

Newswise — Aimen Shaaban, MD, a pediatric surgeon and leading expert in the area of fetal surgery, has joined Ann & Robert H. Lurie Children's Hospital of Chicago as Director of The Chicago Institute for Fetal Health and as Professor of Surgery at Northwestern University Feinberg School of Medicine effective July 1, 2017.

The Chicago Institute has a multidisciplinary, multi-institutional mandate to provide a complete spectrum of care for the fetus and mother ranging from prevention of disease to in utero fetal surgery. This addition helps support Lurie Children's mission to provide the best possible care for our patients and their families.

Since 2012 Dr. Shaaban has been a fetal surgeon and the Director of the Center for Fetal Cellular and Molecular Therapy at Cincinnati Children's Hospital Medical Center, and Professor of Surgery at the University of Cincinnati College of Medicine.

"Dr. Shaaban's unique skills are shared by only a handful of pediatric surgeons in the world," said Marleta Reynolds, MD, Surgeon-in-Chief. "He has been studying and practicing fetal surgery for over 20 years, and we are very pleased to have him join the Division of Pediatric Surgery at Lurie Children's. His comprehensive skill set, medical expertise, and vision will

expand the care we can provide to families through The Chicago Institute for Fetal Health."

Prior to his work in Cincinnati, from 2008-2012, Dr. Shaaban served as an Associate Professor of Surgery with Tenure and as Director of the Laboratory for Fetal Cellular Therapy at the University of Iowa Carver College of Medicine. Before that, from 2002-2008 he served as Assistant Professor of Surgery at the University of Wisconsin Medical School.

Dr. Shaaban has lectured nationally and internationally and is among the most well-respected fetal intervention surgeons in the world. His clinical research contributions surround the diagnosis and treatment of congenital diseases such as: spina bifida, congenital diaphragmatic hernia (CDH), sacrococcygeal teratoma (SCT), congenital pulmonary airway malformation (CPAM), gastroschisis, omphalocele, Twin-Twin Transfusion Syndrome (TTTS), and fetal bladder outlet obstruction (BOO). He has published extensively in these areas and receives support for his basic science research program from the National Institutes of Health.

"Fetal surgery is a highly complex symphony of multidisciplinary expertise that comes together to achieve the daunting mission of correcting congenital defects of the fetus, while still in the mother's womb," said Fizan Abdullah, MD, PhD, Division Head of Pediatric Surgery. "Dr. Shaaban has proven himself to be a visionary who has made exceptional contributions to the clinical and research arenas. I am so thrilled to welcome such a surgeon of national and international renown to the faculty here at Lurie Children's."

Dr. Shaaban received his medical degree from the University of Illinois College of Medicine. He completed his general surgery residency at the University of Iowa Hospitals and Clinics and his pediatric surgical residency and post-doctoral fellowship in fetal surgery research at Children's Hospital of Philadelphia.

Ann & Robert H. Lurie Children's Hospital of Chicago is the only children's hospital in Illinois, and one of only a very few in the country, recognized by the American College of Surgeons as a Level I pediatric surgery center, the highest quality designation possible. It is ranked as one of the nation's top children's hospitals in the *U.S. News & World Report*, and is the pediatric training ground for Northwestern University Feinberg School of Medicine. Last year, the hospital served more than 174,000 children from 50 states and 48 countries.

Children's Hospital of Philadelphia and Mount Sinai Health System Mark Milestone in Fetal Medicine and Children's Heart Program

Newswise — Children's Hospital of Philadelphia (CHOP) and the Mount Sinai Health System took another step forward the end of May in their 18-month-old alliance with the official opening of their Fetal Medicine Program and the affiliation of the Mount Sinai Children's Heart Center with the Cardiac Center at CHOP.

Officials from both hospitals participated in a ribbon-cutting ceremony held at the new facility at The Mount Sinai Hospital's Annenberg Building.

The Fetal Medicine Program will offer access to an unprecedented scope of services. This program provides mothers carrying fetuses at risk for or identified with possible anomalies a "one-stop experience" that includes a comprehensive diagnostic evaluation and consultation. Specifically, in a single-day visit, the patient will undergo state-of-the-art diagnostic testing, which may include: ultrasound, echocardiography, and fetal magnetic resonance imaging (MRI),

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Credit: Mount Sinai Health System
From Left to Right: Dr. David L. Reich, President and CEO of The Mount Sinai Hospital; Dr. Dennis Charney, Anne and Joel Ehrenkranz Dean at the Icahn School of Medicine at Mount Sinai; Dr. Kenneth L. Davis, Mount Sinai Health System President and CEO; Ms. Madeline Bell, Children's Hospital of Philadelphia President and CEO; and Dr. Lisa Satlin, System Chair at the Department of Pediatrics at Mount Sinai Health System.

and then meet with a team of Mount Sinai and CHOP experts to discuss the presumptive diagnosis and options for treatment. All diagnostic testing will be performed at The Mount Sinai Hospital; images will be read by specialists in Fetal Radiology at CHOP and Mount Sinai in coordination with Mount Sinai Maternal-Fetal Medicine specialists using telemedicine video links. Once the diagnostics are reviewed, and depending on the presumptive diagnosis, a conference with each patient and her family may include a maternal fetal medicine specialist, pediatric cardiologist, pediatric surgeon, geneticist, and other relevant pediatric subspecialists. CHOP subspecialists will participate in these family meetings by video conferencing. The program is the only one in New York City offering such convenience and level of services.

The new affiliation of the Mount Sinai Children's Heart Center and the CHOP Cardiac Center brings to New York access to unparalleled expertise and resources from one of the nation's leading pediatric cardiac centers. The affiliation includes Heart Disease as early as 12-14 weeks gestation utilizing fetal echocardiography. The results of the fetal imaging can then allow the clinical care team, comprised of providers at Mount Sinai and CHOP collaborating via telemedicine technology, to develop an optimal plan for care. The Children's Heart Center at Mount Sinai Hospital—overseen by the Divisions of Pediatric Cardiology and Cardiac Surgery—provides a continuum of care from fetal

through adult life, and will now have access to the expertise of CHOP's Cardiac Center in areas such as Pediatric Cardiac Intensive Care and Pediatric Cardiothoracic Surgery. The Children's Heart Center offers exceptional pediatric cardiology and Cardiac Surgical Services, including: echocardiography, exercise testing, Holter monitoring, interventional cardiology and angiography, and cardiovascular genetics. The Mount Sinai and CHOP teams can provide joint expertise at all points of treatment through direct consultation and use of telehealth technology.

The alliance between Mount Sinai and Children's Hospital of Philadelphia was announced in the fall of 2015, and includes three services: Fetal Medicine, Pediatric Cardiac Care, and Pediatric Oncology. This collaboration is intended to give patients and their families access to the most advanced diagnostics and treatments delivered by Mount Sinai and CHOP experts close to home at select Mount Sinai locations.

"Mount Sinai is pleased to collaborate with CHOP, a world-renowned institution, to ensure excellent patient care," said Kenneth L. Davis, MD, President & CEO of the Mount Sinai Health System. "Our goal is to offer the highest quality maternal, fetal, and pediatric care to patients—especially those with complex needs—across a large health system and a fast-growing ambulatory care network. And together, we will be uniquely positioned to recruit and retain the best faculty in the region."

"CHOP is pleased to mark this milestone in the relationship between two health care institutions that are totally dedicated to caring for the health of children and their families," said Madeline Bell, President & CEO of Children's Hospital of Philadelphia. "The alliance with the Mount Sinai Health System continues to evolve and reflects both a shared vision to better serve families in the New York region and a mutual professional respect and admiration between our organizations," Bell said.

The Mount Sinai Health System is an integrated health system committed to providing distinguished care, conducting transformative research, and advancing biomedical education. Structured around seven hospital campuses and a single medical school, the Health System has an extensive ambulatory network and a range of inpatient and outpatient services—from community-based facilities to tertiary and quaternary care.

Physicians are affiliated with the renowned Icahn School of Medicine at Mount Sinai, which is ranked among the highest in the nation in National Institutes of Health funding per investigator. The Mount Sinai Hospital is in the "Honor Roll" of best hospitals in America, ranked No. 15 nationally in the 2016-2017 "Best Hospitals" issue of *U.S. News & World Report.* The Mount Sinai Hospital is also ranked as one of the nation's top 20 hospitals in Geriatrics, Gastroenterology/GI Surgery, Cardiology/Heart Surgery, Diabetes/Endocrinology, Nephrology, Neurology/Neurosurgery, and Ear, Nose & Throat, and is in the top 50 in four other specialties. New York Eye and Ear Infirmary of Mount Sinai is ranked No. 10 nationally for Ophthalmology, while Mount Sinai Beth Israel, Mount Sinai St. Luke's, and Mount Sinai West are ranked regionally. Mount Sinai's Kravis Children's Hospital is ranked in seven out of ten pediatric specialties by *U.S. News & World Report* in "Best Children's Hospitals." For more information, visit www.mountsinai.org/.

The Children's Hospital of Philadelphia was founded in 1855 as the nation's first pediatric hospital. Through its long-standing commitment to providing exceptional patient care, training new generations of pediatric healthcare professionals and pioneering major research initiatives, Children's Hospital has fostered many discoveries that have benefited children worldwide. Its pediatric research program is among the largest in the country. In addition, its unique family-centered care and public service programs have brought the 546-bed hospital recognition as a leading advocate for children and adolescents. For more information, visit www.chop.edu.

Study Identifies Commonalities in Fatal or Near-Fatal Child

Newswise — Analysis of fatal and near-fatal physical Child Abuse Cases of children under 4 years of age revealed that psychosocial risk factors in the home, such as criminal history, were present in all cases. Two-thirds of the cases with prior medical records available (nine children) involved unexplained or atypical bruising – bruises on non-mobile infants, bruises on the ears, buttocks or eyes, and patterned bruises consistent with inflicted injury. All nine of these children suffered subsequent brain injury, resulting in four deaths. Findings were published in *Child Abuse & Neglect*.

"Our study highlights the unfortunately missed opportunities to intervene when unexplained or atypical bruising was noted, allowing children to remain in high-risk environments where more severe or fatal injuries later occurred," says Mary Clyde Pierce, MD, from Stanley Manne Children's Research Institute at Ann & Robert H. Lurie Children's Hospital of Chicago. "We need to raise awareness that atypical bruising in young children may signal child abuse and must be investigated to prevent escalating harm."

Each year, approximately 3 million children are the subjects of reports to state child protection agencies, and around 1,500 children are fatally injured from identified maltreatment, according to the U.S. Department of Health and Human Services.

Pierce and colleagues conducted retrospective state record reviews of 20 near-fatal and fatal physical child abuse cases from the Commonwealth of Kentucky. The majority of children were under 1 year of age. The commonalities they found included: psychosocial risk factors (100%), traumatic brain injury (90%), bruising (80%), fractures (35%), absence of a trauma history at initial presentation (80%), male caregiver at the time of the fatal or near-fatal event (70%) and prior unexplained bruising (50%).

Data was abstracted from all available medical, social and legal documents, and such comprehensive access allowed researchers to gain a more complete understanding of the children's history, environment and injuries.

The majority of child abuse cases in the study were associated with four or more psychosocial risk factors. These include criminal history, prior child social service involvement, domestic or intimate partner violence, negative interpretations of the child's behaviors, and mental health problems or substance abuse.

"Although the predictive value of each of the commonalities we identified cannot be determined from this case series study, our findings will help guide future prospective studies in larger populations," says Pierce, an Emergency Medicine physician at Lurie Children's and Professor of Emergency Medicine at Northwestern University Feinberg School of Medicine. "Our ultimate goal is to inform collaborative strategies for child abuse prevention."

Research at Ann & Robert H. Lurie Children's Hospital of Chicago is conducted through the Stanley Manne Children's Research Institute. The Manne Research Institute is focused on improving child health, transforming pediatric medicine and ensuring healthier futures through the relentless pursuit of knowledge. Lurie Children's is ranked as one of the nation's top children's hospitals in the *U.S.News & World Report.* It is the pediatric training ground for Northwestern University Feinberg School of Medicine. Last year, the hospital served more than 198,000 children from 50 states and 51 countries.

Study Finds Early-Life Pain May Lead to Obesity Risk, Especially in Females

Inflammatory pain at birth changes how the hippocampus, a part of the brain associated with memory and eating behavior, works later in life, and this pain also causes adult rats to eat more frequently and in larger amounts, according to a study by Georgia State University and the Charlie Norwood VA Medical Center.

The study found early-life inflammatory pain increases sucrose intake in adult male and female rats, and it decreases the expression of a protein that is critical for memory, activity-regulated cytoskeleton-associated protein (Arc), in hippocampal neurons following the consumption of a sweetened solution. In addition, the effects of neonatal pain are more pronounced in female rats and can be reduced in all rats by administering morphine at the time early-life pain is experienced.

The findings demonstrate for the first time that one brief episode of inflammatory pain on the day of birth has a long-lasting, sex-dependent effect on the intake of food into adulthood. The results are published in the journal *Physiology & Behavior.*

Previous studies have found a connection between memory and overeating. In humans, disrupting the encoding of the memory of a meal, such as by watching television or playing computer games, increases the amount of food consumed at the next meal. On the contrary, recalling and enhancing the memory of a meal decreases the amount of food ingested at a future meal.

In this study, the researchers induced neonatal inflammatory pain by injecting an inflammatory agent into a rat pup's paw on the day of birth. Some of the rats received morphine at the time of the inflammatory pain. Then, rats were trained to consume a sucrose solution at a specific time and location daily, and the researchers measured the rats' sucrose intake and sucrose-associated Arc expression in the dorsal hippocampus into adulthood. Sucrose solution was used as the meal because it's pleasant and rewarding to rats, can't be hoarded and overconsumption of sweetened beverages contributes to the development of obesity.

The study found male and female rats that experienced pain on the day of birth ate more of the sucrose solution at each meal than rats that didn't experience pain. However, there were differences between the sexes. Female rats that experienced pain consumed more during each meal and also returned to the sucrose feeding tube sooner after each meal. In addition, female rats exposed to pain at birth showed

OCTOBER MEDICAL MEETING FOCUS

The 8th Phoenix Fetal Cardiology Symposium
October 27-31, 2017
The Camby Hotel, 2401 E Camelback Road, Phoenix, AZ 85016
www.fetalcardio.com

Program Directors:
- Christopher Lindblade, MD, Director, Fetal Heart Program Arizona Pediatric Cardiology, Phoenix Children's Hospital
- Julia Solomon, MDCM, Director, Fetal Diagnostic Center Physicians Group of Arizona, IASIS Healthcare
- Norman Silverman, MD, Professor Emeritus in Pediatrics, Division of Pediatric Cardiology – Stanford University
- Anita Moon-Grady, MD, Director, Fetal Cardiovascular Program – UCSF Medical I Center, Professor of Pediatrics, Division of Pediatric Cardiology

Overview: The *8th Phoenix Fetal Cardiology Symposium*, a four-day conference, will discuss important concepts in congenital heart disease as well as the most recent advances in imaging, diagnosis and management of fetal cardiac abnormalities. Additionally, this year's lecture program will have a 1 ½ day focus on the emerging specialty of fetal intervention and the related cardiac implications.

Two pre-conference tracks offered on Friday October 27th include: Fetal & Neonatal Cardiac Pathology Specimen Review Course and Preparation for the ARDMS Fetal Echocardiography Examination.

Faculty Includes: Beverly Coleman, MD, FACR; Mary Donofrio, MD, FAAP, FACC, FASE; Mark Evans, MD; Helena Gardiner, MD, PhD; Lisa Hornberger, MD; Edgar Jaeggi, MD, FRCP(CP); Anthony Johnson, DO; Christopher Lindblade MD; Lynn Litwinowich, RN, MBA, MHSA; Ericka McLaughlin, DO; Erik Michelfelder, MD; Anita Moon-Grady, MD; Shaine Morris, MD, MPH; Mishella Perez, BS, RDMS, RDCS; Michael Puchalski, MD; Kavitha Pundi, MD; Robert Puntel, MD, FAAP, FACC; Rashmi Rao, MD; Norman Silverman, MD; Julia Solomon, MDCM, FACOG; Diane Spicer, PA; Amy Svenson, MD; Wayne Tworetzky, MD; Kathleen Van Leeuwen, MD; Tim Van Mieghem, MD, MPH

Selected Topics Include: Fetal & Neonatal Cardiac Pathology Specimen Review Course; Sequential Segmental Analysis and the Morphologic Method; Atrial, Ventricular, and Atrioventricular Septal Defects; TOF, TGA, DORV; Hands-On Teaching, Specimen Review; Questions and Review; Preparation for ARDMS Fetal Echo Board Certification; The Fetal Shunts- How Does Prenatal Circulation Differ?; Anatomy of the Fetal Shunts Ductal Shunts- What Can Go Wrong?; Are You An Andersonian or Van Praaghian? Approaches to Segmental Cardiac Anatomy; Mitral Regurgitation in the Fetus; Fetal Aortic Stenosis- Spectrum of Disease, Features and Evolution; Put A Ring on It- Abnormalities of the Arch; Systemic Venous Abnormalities; Tricuspid Valve Abnormalities; Malalignment of the Conus- Spectrum of Abnormalities; Multidisciplinary Collaboration in Fetal Cardiology- Where We Are Now? 22q11 Deletion- It's More Than the Heart; The Case that Gave Me Chest Pain
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fewer cells expressing the Arc protein when they consumed sucrose.

The researchers suggest that female rats are more vulnerable to pain at birth than males, and this could be related to hormone changes during the period around birth. Male rats experience a surge of testosterone during the early postnatal period, which could protect them from some of the adverse effects of neonatal pain. Female rats don't experience a similar hormone change.

Rats that received morphine after experiencing early-life pain didn't show the same eating increases as pain-inflicted rats that didn't receive morphine. This suggests changes in eating behavior resulted from the experience of pain.

"Our research may have implications for humans because newborn rats are comparable to third-trimester human infants in terms of brain development and can be used as a model for premature human infants born into the Neonatal Intensive Care Unit (NICU)," said Dr. Marise Parent, Professor of Neuroscience and Psychology and Associate Director of the Neuroscience Institute at Georgia State. "Premature infants in the NICU can undergo numerous painful and invasive procedures each day, more than half without pain relievers. Our study suggests that inflammatory pain experienced by infants in the NICU may contribute to the increased food consumption and obesity observed in this population, and that when possible, preventing pain in NICU infants could reduce the increased risk for obesity in this vulnerable population."

Co-authors of the study include: Drs. Yoko O. Henderson and Anne Z. Murphy of Georgia State; Rebecca Nalloor of the Charlie Norwood VA Medical Center in Augusta; and Almira Vazdarjanova of Augusta University and the Charlie Norwood VA Medical Center.

The study was funded by the National Science Foundation and the U.S. Department of Veterans Affairs.

To read the study, visit http://www.sciencedirect.com/science/article/pii/S0031938416305881

Upcoming Medical Meetings

6th National Neonatal Simulation Conference
Sep. 26-27, 2017; Southampton, UK
www.mproveonline.com/conference

7th International Arab Neonatal Care Conference
Sep. 29-Oct. 1, 2017; Dubai Festival City
http://ancc2017.info

8th Phoenix Fetal Cardiology Symposium
Oct. 27-31, 2017; Phoenix, AZ USA
www.fetalcardio.com

The Fetus & Newborn: Improving Outcomes in Perinatal and Neonatal Care
Nov. 8-11, 2017; Las Vegas, NV USA
www.contemporaryforums.com

20th International Conference on Neonatology and Perinatology
Dec. 4-6, 2017; Madrid, Spain
http://neonatology.conferenceseries.com

Hot Topics in Neonatology
Dec. 10-13, 2017; Washington, DC USA
https://www.hottopicsinneonatology.org

Specialty Review in Neonatology
Feb. 20 - 25, 2018; Orlando, FL USA
www.specialtyreview.com

NEO: The Conference on Neonatology
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www.neoconference.com

39th Annual NPA Conference
Mar. 14-16, 2018; Loma Linda, CA USA
http://nationalperinatal.org/annualconference2018

Workshop on Neonatal-Perinatal Practice Strategies
Apr. 13-15, 2018; Scottsdale AZ, USA
https://shop.aap.org/2018-workshop-on-neonatal-perinatal-practice-strategies/

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