**Division Introduction**

The Division of Pediatric Critical Care plays a vital role in providing care to critically ill children at Children’s Health™ and is continuously making improvements and innovations to ensure the patient care provided is of the highest quality.

Under the direction of Jessica Moreland, M.D., Division Chief, the Division provides top quality care with all of the most recent medical advanced technologies in the 44-bed Pediatric Intensive Care Unit. In addition, Critical Care faculty, in collaboration with the Division of Pediatric Cardiology and the Heart Center at Children’s Health™, provide state-of-the-art cardiovascular critical care services for children with congenital heart disease as well as other cardiac diseases in the 30-bed Cardiovascular Intensive Care Unit. The Division also provides intensive care in the Children’s Medical Center in Plano in an 8-bed PICU.

The Division has a long-standing history of clinical, bench, and translational research, with several NIH-funded laboratories and regular participation in multi-center clinical trials to advance the care of critically ill children.

Some of the country’s brightest pediatric graduates enroll in the Division’s internationally recognized Critical Care Fellowship Program, one of the oldest and largest of its kind in the United States. Teaching of fellows, residents, and medical students takes place at the bedside and during lectures and interactive sessions.

In addition, there is an array of research training opportunities helping fellows learn to ask and answer scientific questions relating to the genetic, molecular, cellular, and physiologic aspects of pediatric critical care medicine.

**Faculty**

The Division has nineteen faculty members and fourteen fellows. Drs. Susan Hupp and Alexandra Volk joined the faculty in 2015.

**Susan R. Hupp, M.D., M.S.**  
Assistant Professor

- **B.S., Honors**  
  Wheeling Jesuit University, Wheeling, WV, 2004  
- **M.D.**  
  Creighton University, Omaha, NE, 2008  
- **M.S.**  
  University of North Carolina, Chapel Hill, NC, 2015

**Postdoctoral Training**

- Residency, Pediatrics  
  Ohio State University/Nationwide Children’s Hospital, Columbus, OH, 2008-2011  
- Chief Resident, Pediatrics  
  Ohio State University/Nationwide Children’s Hospital, Columbus, OH, 2011-2012  
- Fellowship, Pediatric Critical Care  
  Duke University Medical Center, Durham, NC, 2012-2015  
- Research Fellowship  
  Duke Clinical Research Institute, Durham, NC, 2013-2015
Susi Hupp graduated with her Bachelor’s Degree in Biology in 2004 from Wheeling Jesuit University and obtained her M.D. from Creighton University in Omaha, Nebraska in 2008. After completing her fellowship training, she joined the faculty at UT Southwestern as an Assistant Professor. Dr. Hupp practices in both the Pediatric Intensive Care Unit and the Cardiac Intensive Care Unit. Her academic interests are focused on simulation research and educational opportunities.

Alexandra Paige Volk, M.D.
Associate Professor

B.A., summa cum laude
Cornell College, Mt. Vernon, IA, 1996

M.D.
University of Iowa College of Medicine, Iowa City, IA, 2000

Postdoctoral Training
Residency, Pediatrics
University of Iowa, Iowa City, IA, 2000-2003
Fellowship, Pediatric Critical Care
University of Iowa, Iowa City, IA, 2003-2006

A. Paige Davis Volk graduated summa cum laude with a Bachelor’s Degree in Biochemistry and Chemistry from Cornell College. She obtained her M.D. from The University of Iowa Carver College of Medicine in 2000. Dr. Volk remained at The University of Iowa for her residency training in Pediatrics and her fellowship training in Pediatric Critical Care. She was recruited to join the faculty of The University of Iowa upon completion of her postgraduate training in 2006. Dr. Volk was appointed Assistant Professor in 2008 and served as Physician Leader for the UIHC Schwartz Center Rounds from 2011 to 2015. She was Chief Pediatric Advisor to the Hospital Incident Commander for Disaster Management from 2010 to 2015 and Director of the Pediatric Critical Care Fellowship Program from 2014 to 2015. Dr. Volk was recruited to join the faculty at The University of Texas Southwestern Medical Center in 2015 and was promoted to Associate Professor. She is currently the Medical Director for the Children’s Medical Center PICU at the Plano campus.

Honors / Awards

Joshua Koch
- Best Pediatric Specialists, D Magazine

Vinai Modem
- Annual Scientific Award, Society for Critical Care Medicine

Jessica Moreland
- Best Pediatric Specialists, D Magazine

Joshua Wolovits
- Best Pediatric Specialists, D Magazine
Invited Lectures

Joshua Koch

- Pediatric Cardiac Intensive Care Society, Miami, FL, December 2015
  o “Development of Nurse Practitioner Programs in the CICU”

Jessica Moreland

- Annual Pediatric Critical Care Visiting Professor, University of Colorado- Denver Anschutz Medical Campus, Denver, Colorado, April 2015
  o “Anti-inflammatory functions of the NADPH oxidase 2: critical for immune homeostasis”

Lakshmi Raman

- Fellow Research Conference, Children’s Mercy Hospital, Kansas City, MO, November 2015
  o “Cerebral Autoregulation Impairments on ECMO”

Oral & Poster Presentations

Archana Dhar and Vinai Modem

- “Impact of Fluid Balance on Non-renal Organ Recovery in Critically Ill Children Requiring Continuous Renal Replacement Therapy”
  Tadphale SD, Dhar AV, Quigley R, Gollhofer D, Modem V
  o Oral Presentation: International CRRT Conference, San Diego, CA, February 2015
- “Fluid Removal with Continuous Renal Replacement Therapy and ICU Outcomes in Critically Ill Children”
  Tadphale SD, Dhar AV, Gollhofer D, Modem V

Archana Dhar, Peter Luckett and Vinai Modem

- “Fluid Removal Kinetics and ICU Mortality in Critically Ill Children Undergoing Continuous Renal Replacement Therapy (CRRT)”
  Tadphale SD, Dhar AV, Gollhofer D, Luckett P, Quigley RP, Modem V
  o Oral Presentation: PAS/SRP, San Diego, CA, April 2015

Joshua Wolovits

- “PDA Stenting has Better Short Term Morbidity Compared to Surgical BT Shunt in Single Ventricle Patients – is it Time for a Paradigm Shift?”
- “Patients aren’t pancakes…A collaborative effort to prevent pediatric hospital-acquired pressure ulcers.”
  Andrea Torzone, Joshua Wolovits, Rustin Morse.
- "Mechanical ventilation support and liberation protocol is safe and effective in the pediatric cardiac intensive care unit.”
  Brandon Daigle, Brian K. Walsh, Joshua Wolovits.
  o Poster Presentation: Pediatric Cardiac Intensive Care Society, Houston, TX, December 2015
- "Implementation of cardiac assessment team and cardiac-specific pediatric early warning score reduces cardiac arrests and unplanned CICU readmissions.”
  Joscyn Patrick, Joshua Koch, Andrea Torzone, Anna Jones, Joshua Wolovits.
  o Poster Presentation: Pediatric Cardiac Intensive Care Society, Houston, TX, December 2015
**Education and Training**

The educational emphases of the Division of Pediatric Critical Care reflect the diversity of the trainees who rotate through the different PICUs and conduct research on the delivery of critical care to children. We provide educational opportunities for medical students and pediatric residents in addition to our fully-accredited fellowship program. While the major thrusts of educational activities focus on physicians in various stages of training, Division faculty also participate in the education of pediatric nurse practitioners, staff nurses, and respiratory care practitioners.

**Medical Students**

We offer elective opportunities for fourth-year medical students from UT Southwestern and outside institutions to rotate through our general medical/surgical, trauma/neurosurgical, and cardiac intensive care units. Prerequisites include acceptable academic standing at the student's current medical institution and successful completion of a third-year pediatric clerkship. Outside rotators are required to provide a letter of recommendation from their residency program director confirming that these prerequisites are satisfied.

Medical students who select the PICU to fulfill their acute care rotation requirements are exposed to the full range of patients seen in the different units and participate as integral members of the multidisciplinary team of residents, fellows, and faculty. The rotation emphasizes patient-based learning, with the student taking primary responsibility for one or two patients, and using their illness as a jumping off point for learning that combines both didactic and self-directed study.

Other elective opportunities are available for students interested in learning about critically injured patients in a trauma/neurosurgical setting or children recovering from cardiovascular surgery to correct congenital or acquired heart disease.

**Residents**

Pediatric residents rotate through the PICU for one 4 week block during each of their 2nd and 3rd years of residency. This experience exposes residents to a broad spectrum of critically ill children at distinct phases of their training. To enhance this educational experience, our faculty and fellows provide formal didactic teaching on pertinent critical care topics to the pediatric residents during scheduled lectures three days per week.

As they progress from caring for critically ill children for the first time as 2nd year residents to functioning as leaders of the PICU teams as 3rd year providers, the pediatric residents experience both an increasing confidence in their ability to recognize and stabilize a critically ill child and a profound respect for the speed with which illnesses can progress and change the course of a child's and a family's life forever.

Residents from other specialty training programs also rotate through the PICU at varying stages in their training. These include trainees from Anesthesia and Pain Management and Emergency Medicine where critical care experience is a valuable adjunct to their education. Their experience is tailored to their educational needs to some degree, but their presence on the PICU teams is enriching for everyone because of the unique perspective they bring from the world of adult medicine.

**Fellows**

With the objective of providing excellent training in pediatric critical care medicine and preparing individuals to become future leaders in their field, we have trained more than 100 physicians in the art and science of intensive care for critically ill infants and children. Many graduates have become academic leaders within the field, both in the United States and abroad.
Now one of the largest in the United States, the Fellowship Program ranges from 12 to 15 fellows. It emphasizes intense periods of clinical rotations during the early part of the Fellowship, and later shifts to periods of protected time to carry out a research program developed with the help of faculty both within the Division of Pediatric Critical Care Medicine and in the larger UT Southwestern community. In addition to the clinical and research opportunities, the Fellowship Program has a robust didactic curriculum designed to give fellows a foundational knowledge of the pathophysiology of critical illness. Other highlights include a simulation curriculum and journal club. Our fellows have an excellent success rate on the American Board of Pediatric Critical Care sub-board examination.

Research Activities

Division research activities are numerous and diverse, with faculty members engaged in bench, translational, and clinical research projects. There are multiple areas of investigation that we are proud to highlight:

- Cindy Darnell focuses her research on the delineation and improvement of the effectiveness and mitigation of the undesirable effects of the sedative and analgesic medications commonly used in the care of patients in the intensive care unit.
- Joshua Koch serves as the site primary investigator for the multi-center trial, Therapeutic Hypothermia after Pediatric Cardiac Arrest (THAPCA). This trial is funded by the National Heart, Lung, and Blood Institute and began enrollment on September 1, 2009. He is also primary investigator for the project, Prospective Analysis of Regional Cerebral Perfusion Using Head Ultrasound and Multi-Source-Detector Near Infrared Spectroscopy (NIRS) Imaging.
- Peter Luckett’s current research interests include clinical trials in pediatric critical care. In 2002, he was an initial organizing member of the Pediatric Acute Lung Injury and Sepsis Investigators (PALISI) clinical trials group, which recently completed a collaboration with members of the Acute Respiratory Distress Syndrome Network (ARDSnet) as part of the NIH Roadmap contract mechanism entitled “Reengineering Clinical Research in Critical Care.”
- Darryl Miles, works to understand the pathophysiology unique to childhood brain injury and to investigate the mechanisms of traumatic brain injury and neural self-repair. He hopes to contribute to the development of novel therapeutic strategies, ultimately improving the neurocognitive outcome of pediatric acquired brain injury.
- Jessica Moreland focuses her research on better understanding the cell biology of inflammation with a specific interest in neutrophil biology. Her laboratory studies neutrophil priming by infectious and inflammatory stimuli and the role of the NADPH oxidase in pro- and anti-inflammatory signaling. In addition, the laboratory utilizes a murine model of SIRS and multi-organ dysfunction syndrome (MODS).
- Renee Potera’s current research focuses on the role of alveolar macrophage signaling during acute inflammatory lung injury using a murine model of the systemic inflammatory response syndrome.
- Darryl Miles, Joshua Koch, Lakshmi Raman, and Pam Okada, from Pediatric Emergency Medicine, conduct research focused on brain injury. This group participates in three NIH multi-center hypothermia trials investigating the neurologic effect of lowering core body temperature in children with traumatic brain injury (Cool Kids Trial), cardiac arrest (THAPCA), and neonates placed on ECMO for hypoxic respiratory failure.

Clinical Activities

Pediatric Critical Care faculty deliver the highest standard of care for critically ill children. The pediatric intensive care units at Children’s Medical Center Dallas are primary referral centers for North Central and Northeast Texas. Patients with special needs are also referred from throughout Texas, as well as Oklahoma, Arkansas, Louisiana, Mexico, and Latin America.

Depending on their diagnoses, critically ill children are assigned to one of four pediatric intensive care units at Children’s. Specialized medical teams assume primary responsibility for their care in one of these units:

- General medical-surgical pediatric intensive care unit (PICU)
• Pediatric cardiovascular intensive care unit (CVICU)
• Pediatric trauma-neurologic injury intensive care unit (PTICU)
• Level II PICU

The Division, in collaboration with the Division of Pediatric Cardiology and the Heart Center, provides state-of-the-art cardiovascular critical care services for children with congenital heart disease as well as other cardiac diseases. More than 2,000 critically ill patients are admitted each year, giving the facility the highest admission rate in the United States.

2015 Patient Statistics

<table>
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<tr>
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<th>Admissions</th>
<th>Patient (days)</th>
<th>Length of Stay (days)</th>
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<tbody>
<tr>
<td>CVICU</td>
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<tr>
<td>PICU</td>
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<td>Plano Campus</td>
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Current Grant Support

Cindy Darnell-Bowens

Grantor: NIH-National Heart and Lung Institute
Title of Project: Genetic Variation & Biomarkers in Children with Acute Lung Injury
Role: Principal Investigator
Dates: 05/2011 – 02/2015

Grantor: NIH
Title of Project: Genetic Epidemiology of Life-Threatening Influenza in Children
Role: Site Principal Investigator
Dates: 06/2013 – 05/2016

Grantor: NHLBI U01 HL086622-01A1 and U01 HL086649-01A1
Title of Project: Randomized Evaluation of Sedation Titration for Respiratory Failure (RESTORE)
Role: Site Co-Investigator
Dates: 04/2008 – 03/2015

Joshua Koch

Grantor: NHLBI
Title of Project: Therapeutic Hypothermia after Cardiac Arrest
Role: Site Principal Investigator
Dates: 09/2009 – Current

Grantor: NIH- National Heart and Lung Institute
Title of Project: Impact of Hypothermia on MIDAZolam/morphine pharmacokine
Role: Site Principal Investigator
Dates: 04/2012 – 02/2015
Peter Luckett

Grantor: NIH
Title of Project: Heart and Lung Failure – Pediatric Insulin Titration
Role: Site Principal Investigator
Dates: 07/2013 – 06/2015

Grantor: NIH-National Heart and Lung Institute
Title of Project: Age of Blood in Children in Pediatric Intensive Care Units
Role: Site Principal Investigator
Dates: 07/2013 – 05/2015

Darryl Miles

Grantor: NIH
Title: Approached and Decisions for Acute Pediatric TBI (ADAPT Study)
Roles: Site Principal Investigator
Dates: 07/2013 – 06/2016

Jessica Moreland

Grantor: NIH
Title of Project: A Novel Anti-inflammatory Role for the Neutrophil NADPH Oxidase
Role: Principal Investigator
Dates: 08/2015 – 07/2016

Julio Pérez Fontán

Grantor: NICHD K12 HD068369-03 (Child Health Research Career Development Award)
Title of Project: Antecedents and Sequelae of Childhood Onset Disease
Role: Principal Investigator

Renee Potera

Grantor: NIH K12
Title of Project: Child Health Research Career Development Award
Role: Trainee
Dates: 10/2015 – 09/2016

Lakshmi Raman

Grantor: American Heart Association
Title of Project: Evaluation of Neurological risks with cerebral autoregulation impairments in Neonatal Extracorporeal support
Role: Collaborator
Dates: 7/2015 – 06/2017

Grantor: Texas Institute for Brain Injury and Repair
Title of Project: Maintenance of Cerebral Perfusion Pressure in Moderate to Severe Traumatic Brain Injury Attenuates CNS Inflammation of TBI
Role: Principal Investigator
Joshua Wolovits

Grantor: NHLBI
U01 HL086622-01A1 and U01 HL086649-01A1
Title of Project: Randomized evaluation of sedation titration for respiratory failure (RESTORE)
Role: Site Co-Investigator
Dates: 04/2008 – 03/2015

Peer-Reviewed Publications


Book Sections
