**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 a 12-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**

Jennifer Thompson joined the Division in 2017, bringing the total to twenty-three faculty and thirteen fellows.

**Jennifer Thompson, M.D.**  
Faculty Associate

- **B.A., summa cum laude**  
  Saint Anselm College, Manchester, NH, 1992
- **M.D.**  
  Tufts University School of Medicine, Medford, MA, 1996

**Postdoctoral Training**

- Residency, Pediatrics  
  Naval Medical Center, Hampton, VA, 1997-1999
- Fellowship, Pediatric Critical Care Medicine  
  UT Southwestern Medical Center/Children’s Health, Dallas, TX, 2001-2004

**Interests**

- Pain control and sedation
Honors / Awards

Promotions

- Michael Green, Associate Professor
- Lakshmi Raman, Associate Professor
- Maeve Sheehan, Professor

Invited Lectures

Archana Dhar

- Panelist for Schwartz Center Rounds: Exploring Diversity in the Workplace, Children’s Medical Center, Dallas, TX, February 2017
- Simulations for National Neonatal Pediatric and Adult ECMO Training Course Center, Children’s Medical Center, Dallas, TX, March 2017

Raymond Nkwantabisa

- North Texas Regional Nursing Conference, Plano, TX, June, 2017
  - “The Choking Game”

Lakshmi Raman

- South West Asian ELSO Conference, Doha, Qatar, February 2017
  - “Patient management and monitoring on VA ECMO”
  - “Patient management and monitoring on VV ECMO”
  - “Cerebral autoregulation and neuroinflammation on ECMO”

Conference Presentations

Anton-Martin P, Papacostas M, Lee E, Nakonezny P, Green ML.

Poster, Society of Critical Care Medicine Annual Congress, Honolulu, HI, January 2017
“Underweight Status is an Independent Predictor of Hospital Mortality in Pediatric Patients on ECMO”


Poster, Society of Critical Care Medicine Annual Congress, Honolulu, HI, January 2017
“Effects of Negative Pressure Ventilation on Hemodynamics in Patients with Cavopulmonary Shunts”

Badawy M, Darnell Bowens C, Reynolds T, Young G, Mittal V.

Poster, Pediatric Academic Societies Meeting, San Francisco, CA, May 2017
“Impact of a Bronchiolitis Clinical Pathway on Emergency Department Resource Utilization: Sustaining Long Term Guideline Implementation through Data Driven Practice”

Bourguet-Vincent (McMichael) A, Zimmerman K, Ozment C.

Poster, Society of Critical Care Medicine Annual Congress, Honolulu, HI, January 2017
“Use of Prophylactic Fresh Frozen Plasma Administration During Neonatal and Pediatric ECMO”
Darnell Bowens C, Badawy M, Davila S, Zepeda M, Kravitz B, Thomsen C, Mittal V.

Poster, Pediatric Academic Societies Meeting, San Francisco, CA, May 2017
“Ripple Effect of Emergency Department and Inpatient Bronchiolitis Clinical Practice Guideline (CPG) Implementation on Critically Ill Children”

Efune P, Darnell Bowens C, Sheehan M, Morse R, Robertson T, Malone T.

Poster, Pediatric Academic Societies Meeting, San Francisco, CA, May 2017
“Improving Reliability with a Care Goal “Bundle” in the PICU”

Josclynn Patrick MSN, RN, CPNP-PC/AC; Anna Jones MSN, RN, CPNP-PC/AC; Molly King MSN, MPH, RN, CPNP; Andrea Torzzone MSN, RN, CPNP, CNS; Corinne Anton PhD; Erin Gordon DO.

Poster, Cardiology 2017: Children’s Hospital of Philadelphia, Orlando, FL, February 2017
“Creation of a Comprehensive Inpatient Cardiac Developmental Care Program”

Koch J.

Poster, Cardiology 2017: Children’s Hospital of Philadelphia, Orlando, FL, February 2017
“Cardiac Pediatric Early Warning Score: Maintenance of a culture change through improved communication”


Oral, Pediatric Hospital Medicine Conference, Nashville, TN, July 2017
“High Flow Nasal Cannula Use in Bronchiolitis: A Six Year Practice Analyses”


Oral, Pediatric Academic Societies Meeting, San Francisco, CA, May 2017
“Trends in Heated High Flow Nasal Cannula Use in Hospitalized Children with Bronchiolitis and its Impact on Intubation Rate, Ward Length Stay, and Air Leak Syndrome: A Six Year University Pediatric Practice Analysis”

Mittal V, Badawy M, Zepeda M, Daigle B, Manly D, Badawy M.

Poster, Pediatric Academic Societies Meeting, San Francisco, CA, May 2017
“Effect of Long Term Bronchiolitis Guideline Implementation on Non-Guideline Eligible Complex Medical Children Hospitalized with Acute Bronchiolitis”

Mittal V, Badawy M, Zepeda M, Darnell Bowens C, Daigle S, Manly D.

Poster, Pediatric Hospital Medicine Conference, Nashville, TN, July 2017
“Bronchiolitis Guideline Implementation Impact Medically Complex Children”

Mittal V, Zepeda M, Darnell Bowens C, Badawy M, Davila S, Kravitz B, Thompsen C.

Poster, Pediatric Hospital Medicine Conference, Nashville, TN, July 2017
“Ripple Effect of Inpatient Bronchiolitis Guideline Implementation in PICU”

Pandiyan P, Raman L, Stowe A, Ortega S, Windsor J.

Oral, Pediatric Academic Societies Meeting, San Francisco, CA, May 2017
“Inflammation and Cerebral Autoreactivity in Patients Undergoing ECMO Therapy – A Pilot Study”

Poster, Pediatric Academic Societies Meeting, San Francisco, CA, May 2017
“Use of Continuous Albuterol Nebulization Treatment on a 24/7 Attending-Only Inpatient Pediatric Asthma Unit”

Potera R, Cao M, Jordan LF, Hook JS, Moreland JG.

Poster, Phagocytes Gordon Research Conference, Waterville Valley, NH, June 2017
“Pulmonary chemokine secretion mediates neutrophilic lung injury in Nox2 deficient mice”

Raman L, Dalton H, Thomas J, Buttram S, Flake A.

Oral, Pediatric Academic Societies Meeting, San Francisco, CA, May 2017
“Cerebral Autoregulation – What is New on ECMO”

Watt K, Lam L, Hupp S.

Oral, Pediatric Academic Societies Meeting, San Francisco, CA, May 2017
“Developmental Pharmacokinetics of Methadone from Infants to Adolescents”

Yagnik P, Modem V, Dhar A.

Oral, Society of Critical Care Medicine Annual Congress, Honolulu, HI, January 2017
“N-Terminal Pro-B-Type Natriuretic Peptide as a Predictor of Volume Status in Critically Ill Children”

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 Emergency Medicine and on an elective basis from Family 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 currently has 13 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 time on quality initiatives and improving daily care for critically ill children.
- Erin Gordon focuses her current research on breast milk (donor or maternal) and neurodevelopmental outcomes in those with congenital or acquired heart disease. Dr. Gordon is the primary UTSW investigator for a multi-center industrial study evaluating the growth velocity and clinical outcomes of infants with single ventricle physiology fed an exclusive human milk diet with early nutritional fortification following surgical repair.
- 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’ focus is to advance the care of Neurocritical illness in children and learn how the brain responds to injury to better understand what we can do to improve neurologic outcomes. He is the UTSW principal investigator for multi-center studies investigating the Approaches and Decisions after Pediatric Traumatic Brain Injury (ADAPT) and MRI Biomarkers of Long-term Recovery after Childhood TBI. Dr. Miles is currently leading projects using ultrasound and transcranial doppler technology to noninvasively measure intracranial pathology in brain related injured children, and has an ongoing long-term database describing the genetic and prognostic influencers of recovery after TBI. He is a member of the Center for Cerebrovascular Disorders at Children’s Medical Center and the Pediatric Neurocritical Care Research Group.
- Ali McMichael’s current research focuses on anticoagulation during extracorporeal membrane oxygenation. Her projects include finding the best test for anticoagulation for pediatric patients, identifying risk factors for hemostatic complication during ECMO, and exploring alternative therapies for anticoagulation.
- 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.
- Lakshmi Raman’s interest is in brain injury and the care of ECMO (extracorporeal membrane oxygenation) patients. She is currently working on understanding the risk of neurological injuries on ECMO. She had funding from American Heart Association to do a pilot study on neonatal ECMO patients. She is also collaborating with Dr. Ann Stowe in the Neurorepair lab to study neuroinflammation on ECMO patients. This study was funded by Extracorporeal Life Support Organization and Center for translational medicine. In addition, she does research using both local and ELSO data base
- Lakshmi Raman and Darryl Miles, in collaboration with Dr. Ann Stowe, have received a grant from the Texas Institute of Brain Injury and Repair (TIBIR) studying the effects of cerebral perfusion pressure in severe traumatic brain injury on central nervous system inflammation after pediatric TBI.

Clinical Activities

Pediatric Critical Care faculty deliver the highest standard of care for critically ill children. The pediatric intensive care units at Children’s Health are primary referral centers for North Central and Northeast Texas. Depending on their diagnoses, critically ill children are assigned to one of four pediatric intensive care units at Children’s, 3 intensive care units on the Dallas Campus and one intensive care unit on the Plano campus. Specialized medical teams assume primary responsibility for their care in one of these units:
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.

**Patient Statistics**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVICU</td>
<td>6,590</td>
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<tr>
<td>PICU</td>
<td>12,025</td>
</tr>
<tr>
<td>Plano Campus</td>
<td>1,734</td>
</tr>
</tbody>
</table>

**Current Grant Support**

**Cindy Darnell-Bowens**

- **Grantor:** Gerber Foundation
- **Title of Project:** Exogenous melatonin administration for primary prevention
- **Role:** Site Principal Investigator
- **Dates:** 11/16/2017 – 11/15/2019

**Erin Gordon**

- **Grantor:** Prolacta Bioscience
- **Title of Project:** A randomized controlled trial to evaluate growth velocity
- **Role:** Site Principal Investigator
- **Dates:** 11/27/17 – 11/27/2022

**Joshua Koch**

- **Grantor:** INC Research
- **Title of Project:** A Phase 3b, Multicenter, Open-Label, Randomized Withdraw
- **Role:** Site Principal Investigator
- **Dates:** 12/01/2015 – 05/31/2018

**Peter Luckett**

- **Grantor:** Aerogen LTD
- **Title of Project:** Comparison of Vibrating Mesh Nebulizer versus Jet Nebulizer
- **Role:** Site Principal Investigator
- **Dates:** 06/13/16-06/12/2021
Grantor: Washington University in St. Louis, MO  
Title of Project: Age of Blood in Children in Pediatric Intensive Care Units  
Role: Site Principal Investigator  
Dates: 07/15/2013-05/31/2018

Grantor: Boston Children’s Hospital  
Title of Project: HALF-PINT Heart and Lung Failure - Pediatric Insulin Titration trial  
Role: Site Principal Investigator  
Dates: 07/01/2013-06/30/2017

Ali McMichael

Grantor: Euro Extracorporeal Life Support Organization  
Title of Project: Pilot study of bivalirudin versus heparin anticoagulation for neonatal and pediatric extracorporeal membrane oxygenation  
Role: Site Principal Investigator  
Dates: 06/01/2017-05/31/2018

Darryl Miles

Grantor: NIH  
Title: Approached and Decisions for Acute Pediatric TBI (ADAPT Study)  
Roles: Site Principal Investigator  
Dates: 07/2013 – 06/30/2017

Grantor: NIH  
Title: Magnetic Resonance Imaging (MRI) Markers of Outcome after Severe Pediatric Traumatic Brain Injury (TBI)  
Roles: Principal Investigator  
Dates: 04/2016 – 03/31/2018

Jessica Moreland

Grantor: NIH  
Title of Project: A Novel Anti-inflammatory Role for the Neutrophil NADPH Oxidase  
Role: Principal Investigator  
Dates: 08/2014 – 07/31/2017

Julio Pérez Fontán

Grantor: NICHD K12 HD068369-07 (Child Health Research Career Development Award)  
Title of Project: Antecedents and Sequelae of Childhood Onset Disease  
Role: Principal Investigator  
Dates: 12/2010 – 11/2017

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 – 06/30/2018
**Grantor:** Extracorporeal Life Support Organization  
**Title of Project:** Prospective analysis of neuroinflammation, neuronal injury and potential autoreactivity in children with cardiorespiratory failure with and without extracorporeal life support (ECMO)  
**Role:** Research Mentor  
**Dates:** 01/31/2016-01/30/2017

**Peer-Reviewed Publications**


