

Clinical: *Detroit Medical Center (DMC):* WSU is directly involved with healthcare delivery through its partnership with the DMC. The DMC is the leading academically integrated healthcare system in metropolitan Detroit and the largest healthcare provider in southeast Michigan. The DMC has a combined total of over 2,000 licensed beds, making it one of the largest multi-hospital complexes in the U.S. Each year, DMC hospitals log more than 87,000 admissions and nearly 900,000 outpatient visits. Providing this care are over 2,400 physicians, 900 residents and fellows, 1,000 medical students and 13,000 full time employees. The DMC's Central Campus is located over 110 acres in north-central Detroit and is contiguous with the WSU campus. The DMC Central Campus includes Children's Hospital of Michigan, Detroit Receiving Hospital, Harper University Hospital, Hutzel Women's Hospital, and the Rehabilitation Institute of Michigan. Also located on the central campus and partnering with the DMC are the Karmanos Cancer Institute and the Kresge Eye Institute. The DMC also operates Sinai-Grace Hospital, Huron Valley Hospital and the DMC Surgery Hospital in the Detroit metropolitan area. All of these institutions are affiliated with WSU. In addition to the DMC facilities, WSU is closely affiliated with the Southeast Michigan Center for Medical Education (SEMCME) which provides affiliation between WSU and eight other major urban and suburban hospitals in the Detroit metropolitan area. WSU is also closely affiliated with the John D. Dingell Veterans Administration Medical Center which is located adjacent to the DMC Central Campus.

Children's Hospital of Michigan (CHM): The CHM is a freestanding children's hospital that provides care for children from Michigan, the U.S. and several other countries in more than 40 pediatric specialties. With 228 beds, CHM is the fifth largest pediatric institution in the U.S. and has the second busiest emergency department with over 90,000 visits annually. Each year, CHM admits over 13,000 children to its inpatient services and has over 125,000 outpatient visits in its ambulatory clinics. CHM is an American College of Surgeons accredited Level 1 Pediatric Trauma Center. CHM offers the state's only dedicated pediatric and neonatal transport team which uses a dedicated ground ambulance, and air ambulance via helicopter and fixed wing aircraft that are designed for the special needs of pediatric patients. The Regional Poison Control Center is located within CHM. Child Health Advocacy Programs at CHM include the Helppie Institute for Child Health Advocacy, Kohl's Trauma Related Injury Prevention Program, Child Protection Center and Palliative Care Services. CHM inpatient units include the 38-bed PICU, 32-bed Neonatal ICU, 8-bed cardiology unit with advanced monitoring capabilities, 8-bed dialysis unit, 6-bed bone marrow transplant unit, and a neurology unit with EEG and audiovisual monitoring. The new CHM Specialty Center which opened in 2013 is located across the street from the hospital and provides outpatient care, research and education for children and their families. The CHM staff is comprised of more than 200 pediatricians, 125 pediatric specialists, 100 residents and fellows, 600 pediatric nurses and over 1000 employees with a special understanding of children's needs.

Pediatric Intensive Care Unit (PICU) at CHM: The PICU at CHM is a multidisciplinary 38-bed intensive care unit. The PICU admits over 1,500 medical and surgical patients each year. The pediatric intensivists are the primary attendings for all medical patients and co-manage all surgical patients admitted to the PICU. The PICU is staffed by 12 pediatric intensivists, 7 pediatric critical care fellows, 121 full-time pediatric critical care nurses, one full-time pediatric nurse practitioner, 30 full-time respiratory therapists (2-3 per shift) and one social worker. PICU nursing administrative staff consists of an Associate Vice President, one Manager, two Clinical Managers, one Educator, and one Lead Preceptor. Procedures routinely performed in the PICU include tracheal intubation, conventional and high frequency mechanical ventilation, central and arterial line placement, bronchoscopy, continuous venovenous hemodialysis and extracorporeal membrane oxygenation. Each PICU bed is equipped for advanced hemodynamic, respiratory and neurologic monitoring (Philips IntelliVue Monitors, Boeblingen, Germany) which includes

telemetry, two central stations and a satellite station. Vital signs, intake and output, and fluid and medication administration are recorded hourly. A College of American Pathologist accredited blood gas laboratory complete with two blood gas analyzers that perform oximetry and electrolyte analysis is located within the PICU. Fifteen centrally located computers, 31 portable computers on wheels, and 14 portable hand-held computers are located within the PICU and provide immediate access to the DMC-wide Clinical Information System (CIS). CIS is an electronic medical record that includes charted information such as physician dictations, progress notes, orders, order status, laboratory reports, radiology reports, pathology reports, demographics, admissions, discharges and transfers. Office space for nursing administrative staff is located on the unit. On-call rooms for PICU attending staff, fellows, and residents are also located on the unit. *The extensive clinical facilities of the DMC, CHM and CHM PICU contribute to the potential success of CPCCRN clinical research activities at WSU by providing the necessary patient population who will serve as research participants.*

Pediatric Trauma Center: CHM is the first American College of Surgeons (ACS) verified, free-standing Level 1 Pediatric Trauma Center in Michigan. ACS verification confirms the CHM Pediatric Trauma Center is committed to the highest quality trauma care for all injured patients. The Trauma Center provides care to injured children and their families from the time of injury through rehabilitation and recovery (see PM&R, below). Emergency transport for pediatric trauma patients is provided by PANDA One, Michigan's only dedicated pediatric and neonatal ambulance service and transport team. Trauma patients are cared for in the PICU, step-down unit, burn unit, as needed, and have available 24-hour emergency CT scans, angiographies and other diagnostic procedures (see Imaging Capabilities, below). Additionally, an operating room is reserved for trauma patients 24 hours a day. The Trauma Center is a member of the State of Michigan Region 2 South State Trauma System, Regional Disaster Network and Detroit East Medical Control Authority. It also provides leadership in community based injury prevention and pediatric continuing education for healthcare professionals throughout southeast Michigan. The staff conducts, evaluates and disseminates evidence based research and outcomes regionally, nationally and internationally. *The Pediatric Trauma Center contributes to the potential success of CPCCRN clinical research activities at WSU by providing a cadre of trauma specialists and a pediatric trauma population to investigate new preventive and treatment strategies for traumatic injury.*

Pediatric Physical Medicine and Rehabilitation (PM&R): The Division of PM&R at CHM consists of 4 board certified Pediatric Physiatrists, 3 nurses, one nurse practitioner, and support personnel. Physiatry clinics are held at CHM as well as at 5 other sites in central and southeastern Michigan. These clinics had a total of over 6800 outpatient visits in 2013. Specialty clinics run by the CHM Division of PM&R include Myoelectric Upper Extremity Prosthetic Clinic, Muscular Dystrophy Clinic, Myelomeningocele/Spinal Cord Injury Clinic, Wound Care Clinic, and Alcohol Block and Botulinum Toxin Clinic. The Division of PM&R also manages the Intrathecal Baclofen Pump Program, in conjunction with the Department of Neurosurgery. The Division of PM&R manages inpatient rehabilitation services, including an active consult service and an inpatient Rehabilitation Unit within CHM. The inpatient unit had 105 admissions in 2013 serving patients with a variety of conditions including traumatic brain injury, spinal cord injury, burns, stroke, and Guillain-Barre Syndrome. The Division of PM&R participates in the National Spina Bifida Patient Registry. Other active areas of research include spasticity, gait analysis and spina bifida. The Division of PM&R actively participates in the education of numerous medical students, physician assistant students, therapy students and residents who rotate through both the inpatient and outpatient services. *These rehabilitation professionals and facilities contribute to the potential success of CPCCRN clinical research activities at WSU by providing the*

necessary expertise and environment to conduct long term follow-up on research participants that includes functional status and morbidity after critical illness.

Respiratory Therapy: The Dept. of Respiratory Therapy at CHM is comprised of 50 full-time respiratory therapists, a clinical manager, an education coordinator, and equipment and clerical staff. General responsibilities of respiratory therapists include all aspects of oxygen delivery, blood drawing and blood gas analysis, chest physiotherapy, aerosol medication administration, pulse oximetry and capnography monitoring. Additional responsibilities of respiratory therapists in the PICU include set-up and maintenance for all methods of mechanical ventilation including conventional, non-invasive and high frequency ventilation, pulmonary function testing, delivery of nitric oxide and assistance with bronchoscopy. The CHM Extracorporeal Membrane Oxygenation (ECMO) Program has capabilities for 4 simultaneous ECMO patients. Three senior therapists are trained to set up the ECMO circuit, prime the pump, and place the patient on ECMO following cannulation. Another 25 therapists are trained to provide bedside care for patients on ECMO. About 30 patients per year receive ECMO at CHM for an average duration of 7 days. Respiratory therapists are active members of the Cardiopulmonary Resuscitation (CPR) Team and respond to all in-hospital and emergency room arrests. Respiratory therapists are an integral part of the Intensive Care Transport Team. The Transport Team provides assessment, stabilization and transport of patients from referral centers throughout Michigan and Ontario, Canada. Respiratory therapists also staff the Pediatric Pulmonary Medicine Clinic and the Allergy Clinic where they perform pulmonary function testing and sweat testing. Therapists also coordinate home care equipment such as home oxygen therapy, nebulizers, and invasive and noninvasive ventilators. The Dept. of Respiratory Therapy actively participates in research activities at CHM and WSU, and provides clinical education for several local colleges including Ferris State College, Macomb Community College, Oakland Community College, and Wayne County Community College. *These respiratory therapy resources contribute to the potential success of CPCCRN research activities at WSU, especially those related to pediatric respiratory failure and its management.*

Investigational Drug Services (IDS): The Dept. of Pharmaceutical Services at CHM maintains an Investigational Drug Service (IDS) which is responsible for all investigational drugs dispensed and administered throughout the hospital. The IDS is staffed by two full time research pharmacists and a pharmacy technician and is available 24 hours per day, 7 days per week. The IDS has been in operation since 1985. In any given year, the IDS coordinates, monitors, and dispenses study medications for 20-50 ongoing studies. These include NIH sponsored studies, drug manufacturer sponsored studies and CHM staff generated studies. The IDS has also been the primary pharmacy site coordinator for multi-center studies. The IDS provides the following services to investigators: study protocol review; identification of pharmacy-related issues; advising on study drug administration methods and processes; dispensing process development; pharmacy and healthcare provider in-services; maintaining study files such as WSU IRB approvals, protocol amendments, drug accountability and inventory receipts; verifying patient consent; preparation of study medications; dispensing of inpatient and outpatient prescriptions; preparation and maintenance of drug accountability log sheets; perpetual inventory control; climate monitoring; development of randomization tables; patient randomization; compliance monitoring; pharmacokinetic calculation and monitoring; patient education; drug study sponsor and regulatory audits and meetings; study closure activities including balancing account records, inventory return to the sponsor, and completion of any other forms or correspondence. *These IDS services contribute to the potential success of CPCCRN research activities at WSU, especially those related to pediatric drug trials.*

Imaging Capabilities: The Dept. of Pediatric Imaging at CHM consists of 8 board certified pediatric radiologists, 16 nurses, 56 technicians and 3 administrative personnel. The Dept. of Pediatric Imaging has a Pediatric Radiology Fellowship Program accredited by the American Council of Graduate Medical Education with one fellow per year. Aparna Joshi, MD is the Chief of the Dept. and is strongly committed to the clinical, research and academic aspects of the department. Dr. Thomas Slovis, the former Chief of the Dept. remains in the department as a staff radiologist; he is the past Editor-in-Chief of the journal *Pediatric Radiology* and Senior Editor of editions 10 and 11 of the well-known textbook *Caffey's Pediatric Diagnostic Imaging*. Several of the radiology faculty members are involved in clinical research projects using magnetic resonance imaging (MRI) and positron emission tomography (PET). The Dept. of Pediatric Imaging provides the full spectrum of imaging modalities and services for pediatric in- and outpatients. These include digital fluoroscopy, ultrasound, nuclear medicine, computerized tomography (CT), magnetic resonance imaging (MRI), positron emission tomography (PET), angiography and interventional radiology. The Picture Archival Communication System (PACS), a remote access system, allows imaging studies to be viewed from any network location within CHM and the DMC, including the PICU. *The Dept. of Pediatric Imaging facilities and resources, as detailed below, are available to Dr. Meert as needed to accomplish research proposed by the CPCCRN.*

- Ultrasound: The ultrasound suite contains 2 Acuson Sequoia and 2 Toshiba ultrasound machines that are connected to PACS. All of the ultrasound machines are portable and are routinely taken out of the ultrasound suite to perform examinations in the PICU, operating rooms or other hospital wards. Ultrasound at CHM is ACR accredited.
- Nuclear Medicine: The nuclear medicine suite contains 2 gamma cameras connected via a common network. The cameras include an ADAC Forte dual-detector gamma camera and a Siemens ZLC single detector gamma camera. Nuclear medicine studies are reviewed on dedicated workstations and on PACS.
- Computerized Tomography (CT) and Magnetic Resonance Imaging (MRI): The CT/MRI suite contains a General Electric Lightspeed VCT 64 slice CT scanner, as well as two MRI scanners (1.5 Tesla General Electric MRI scanner with Excite software and a 3.0 Tesla General Electric MRI Scanner). All CT and MRI examinations are transferred to the PACS. The CT/MRI Center has two reading rooms with a total of 4 PACS stations in addition to 2 AW-Rad workstations for imaging reprocessing.
- Angiography/Interventional Suite: The angiography/interventional suite includes two Philips Allura - a bi-plane and single plane interventional radiology rooms, an Acuson XP ultrasound-scanning unit, and access to PACS.
- Positron Emission Tomography (PET): The original PET Center (1993) encompassed a 6,800 square foot facility housing a scanning room, cyclotron vault and supporting mechanical equipment space, radiochemistry and biochemistry laboratories and computing facilities. In 2006, a GE DSTE 16-slice PET/CT scanner was acquired along with an additional 2,300 square feet of data analysis and office space. In 2013, a new 18 MeV cyclotron, GE PETrace 800, was installed as a replacement for the original obsolete RDS-112 cyclotron. Along with this new cyclotron, a fully equipped CGMP compliant laboratory for the preparation of clinical PET radiopharmaceuticals according to FDA standards was also constructed. The new cyclotron vault, laboratory and supporting space consists of an additional 2,000 square feet.

Language Translation Services: Language translation services are coordinated through the CHM Dept. of Social Work and available 24 hours/day, 7 days/week. An on-site Spanish interpreter is available 40 hours/week. For other languages, in-person interpreters and Blue Phone interpreters are available via CyraCom Services. CHM also has MARTTI units available

through Language Access Services. Sign language is provided through in-person interpreters and the MARTTI units. Every family is asked about the language they prefer to use for healthcare communication at the time of their child's admission, and CHM is responsible to communicate in the preferred language. *These language services contribute to the potential success of CPCCRN research activities at WSU by making research participation available to non-English speakers.*

Sibling Short-Stop Day Care: A free day care center for siblings of patients is maintained on the first floor of CHM. The Department of Volunteer Services operates the day care center from 9 AM to 5 PM, Monday through Friday. The day care center is available to families of patients that are returning to the hospital for clinical and research appointments. *These day care facilities contribute to the potential success of CPCCRN research activities at WSU by assuring that parents participating in CPCCRN research will have day care available for other children when returning for follow-up appointments or other research-related activities.*