In this report we take great pride in reflecting on the culmination of our hard work and efforts over the past few years. Together we have achieved significant accomplishments and worked towards excellence in patient care, research, technical innovation and education. We have emerged as leaders in the delivery of advanced technologically supported care for children, and are looked to by our colleagues outside the institution as experts in our field.

**INFRASTRUCTURE**

Our significant change has been in our infrastructure. Eighteen months ago, after many years of association with Diagnostic Imaging, Dr. Paul Babyn accepted a position in Saskatoon as University Director of Medical Imaging. Dr. Manohar Shroff served as acting Radiologist-in-Chief for a year before accepting the position on a permanent basis, following an extensive search. Maria Green, Manager of Nuclear Medicine, retired shortly after Dr. Babyn’s departure, and Guila BenDavid added the responsibilities of this position to her existing portfolio. Melanie Hill, Nursing Clinical Leader, took a position at University Health Network, and the responsibilities of her position were distributed to the various modality managers.

**MESSAGE**

We implemented a project-improvement initiative to address the need to increase accessibility and upgrade equipment to focus on the next 10 years of image-guided care. With its increasing utilization, we recognized that we needed to focus our efforts on access and combined cases with Surgical Services and innovative approaches to minimally invasive therapies.

We successfully applied for and were granted the status of a “centre.” The new Centre of Image-Guided Care will incorporate the best collaborative skills of Surgery and Radiology in order to lead the way in the treatment of the paediatric population. We will also collaborate with research CIGITI in order to ensure we translate research outcomes to clinical realities.

We are in the process of replacing all of the IGT suites.

**MR Improvements**

We concentrated our efforts on reducing wait times for patients requiring general anaesthesia, and have maintained a level below the Local Health Integration Network target.
Reducing Radiation Dose
We have successfully reduced radiation dosage to patients undergoing CT scans, and have become a resource centre for other institutions performing paediatric CT.

We have worked with Image Gently, a focus group dedicated to ensuring paediatric patients undergoing ionizing radiation are exposed to consistently low dose. The Digital Radiography Team, of which SickKids was a part, received a recognition award from the FDA.

We have worked diligently to capture and record patient exposure rates in a variety of modalities.

Awards
Turning our attention to academic pursuits, we have continued to advance our educational academic mission with in-house conferences, including our Paediatric Interventional Radiology Symposium, the Paediatric Radiology Resident Review, an Advanced Neuroimaging Symposium, and a Radiology Research Day.

We are grateful for the efforts and hard work of those who organized these symposiums.

Four radiologists recently received promotion from the University of Toronto, Department of Medical Imaging. Drs. Manohar Shroff and Susan Blaser were promoted to Full Professorships, and Drs. Joao Amaral and Elysa Widjaja were promoted to Associate Professor.

At the Society of Pediatric Radiology (SPR), we continued to receive recognition for the contribution to pediatric radiology with many posters and presentations which received awards.

Future Directions
The importance of the exploration of new ideas from all our staff is critical to our department fulfilling our mission and maintaining our goal of providing the utmost in imaging services to our patients. We need to continuously improve, innovate and educate in order to maintain our position as leaders in the field of paediatric medical imaging.

Accolades
We are fortunate to be working with such an exceptional team of dedicated and enthusiastic individuals, both within Diagnostic Imaging and outside the department. Although there is not enough space in these pages to thank everyone by name, we would like to acknowledge every radiologist, fellow, technologist, nurse, DI-IS staff and support staff for their tireless commitment to our patients.

Our sincere thanks must also go to those areas of the hospital that we work very closely with, including the departments of Anaesthesia, Surgery and Pediatrics.

Sincerely,
Dr. Manohar Shroff, Radiologist-in-Chief
Ellen Charkot, Director
Diagnostic Imaging and Vascular Access
SickKids has one of the largest pediatric cardiac programs in the world. The Cardiac Program boasts a unique collaboration amongst cardiologists, radiologists, anesthesiologists, radiology technologists, nurses and administrative staff. This collaboration dates back to the 1960s when the late Drs. Dick Rowe and Fred Moes worked very closely together.

The opening of the Cardiac Diagnostic and Intervention Unit (CDIU), an innovative complex of combined cardiac MRI and catheterization facilities, has further strengthened the tight bonds between cardiology and radiology. Dr. Shi-Joon Yoo leads the Section of Cardiac Imaging of the Department of Diagnostic Imaging, while Dr. Lars Grosse-Wortmann, a staff cardiologist for cardiac MRI, has boosted the unique multidisciplinary environment of the complex. In 2011, Dr. Mike Seed joined the program as a cardiologist and radiologist. He has established the fetal cardiac MRI program and developed innovative techniques with MRI physicist Dr. Christopher Macgowan and his associates.

The program is the largest cardiac radiology program in North America and boasts its unique collaboration among cardiologists, cardiac radiologists, and dedicated technologists. Annually, more than 1,100 diagnostic and interventional pediatric catheterization procedures and more than 450 cardiac MRIs are performed for children with cardiac problems. We also perform more than 50 fetal cardiac MRI studies, almost exclusively for research purposes.

The CDIU is fully committed to teaching trainees and visitors from all over the world and organizing national and international meetings to improve cardiac care. The MRI team has shown international leadership in the field by hosting multiple symposiums supported by the Society for Pediatric Radiology (SPR), including the Hands-On Symposium for Pediatric Cardiovascular MRI and the Advanced Course in Pediatric Cardiovascular MRI.

The Congenital Heart Program of the CDIU is world-renowned with its high standard care. In the CDIU, numerous catheter-based interventional procedures and some surgical operations are performed on a daily basis. Interventional procedures range from repair of a simple heart anomaly to understanding the most complex and rare cardiac malformations in neonates, infants, and children. Multidisciplinary teamwork has been the key element in producing outcomes that surpass international standards. The CDIU is equipped with highly specialized catheterization laboratories and a dedicated cardiac MRI unit. Each of the catheterization laboratories has state-of-the-art Siemens digital biplane systems, supported with flat detector technology. One of the labs has a built-in DYNAC CT system that is supported with high-technology 3D imaging reconstruction software. The other catheterization laboratory is fully designed and equipped to perform combined cardiac catheterization and open heart surgery on the same patient. The cardiac MRI suite is equipped with 1.5T Siemens AVANTO with Tim (Total imaging matrix) technology, for whole-body anatomical coverage.

The cardiac MRI suite and catheterization laboratory are fully integrated and have specially designed tables to transfer patients from one suite to the other without lifting the patients. This special integration allows performing combined catheterization/MRI exams for patients with complex cardiac disease under the same general anesthetic time. Also, it provides physicians and surgeons with vital information from both exams at the same time, and under the same physiologic status of the patient. In the near future, this unique set-up will facilitate image fusion of MRI and X-ray images for complex X-ray or MRI-guided interventional procedures. The group also produces plastic replica models of the hearts from the MRI or CT data using rapid prototyping technology for precise preoperative assessment of the surgical anatomy before the procedure in patients with complex congenital heart diseases. The collection of plastic replicas is also used for educational purposes.

The total number of examinations at the CDIU in 2011 was 1,770:

- Total catheterization procedures: 1,141
- Diagnostic procedures: 333
- Interventional procedures: 619
- Hybrid procedures: 6
- Myocardial biopsy: 107
- Electrophysiology studies: 176
- Echocardiographic procedures: 274
- Total MRI: 629
- Cardiac MRI: 474
- Combined Cath and MRI: 40
- Fetal cardiac MRI: 55
- Total procedures: 1,770
Computerized Tomography (CT) utilizes a rotating X-ray source, and a complex computer system to create cross-sectional images. The first CT scanner installed at Sick Kids was in 1976 and took several minutes to produce a single image. CT was the first modality that allowed for the non-invasive visualization of intracranial structures and remains one of the most widely-used cross-sectional technologies for brain and body imaging. Today’s computerized images are far more detailed, and may be reconstructed three-dimensionally allowing better differentiation of internal structures. With the speed of multislice scanners, we now have the ability to produce multiple images in a matter of seconds, which has allowed us the flexibility to scan more pediatric patients without sedation.

In January 2009 we installed a GE Discovery 750 HD CT. SickKids was the first hospital in Canada to install the HD 750 and the first pediatric centre in the world to use this technology. This scanner has the capability of delivering images 100 times faster with greater detail throughout the body. It uses state-of-the-art technology to deliver improved image quality without sacrificing the elements that SickKids demands most: radiation dose reduction. In addition to providing fine detail, allowing clinicians to see objects as small as a grain of sand. We have worked hard to ensure that all the protocols, radiation doses and images are standardized so that we can share our expertise with other healthcare institutions across the world. Demand for CT continues to grow, and we are committed to ensuring that future pediatric applications are explored. With the speed and accuracy of diagnosis the new scanners can provide, the return to CT from MR for some diagnoses is inevitable.

Our PET/CT scanner has allowed us to produce incredibly detailed images that precisely pin point the location of cancer within the body. This is a very valuable tool that helps our physicians make necessary treatment recommendations and/or alterations to their existing treatment plans. PET/CT is the fusion of two state-of-the-art technologies. The PET allows us to detect the metabolic signal of actively-growing cancer cells by monitoring glucose metabolism. The CT provides detailed anatomical information about the location, size and shape of various lesions, but cannot differentiate active cancerous lesions with the same precision as PET. Each technology has distinct benefits and limitations, but once combined, the collective images provide a comprehensive answer for our referring physicians. Every PET/CT scan at SickKids is reviewed and correlated by a Nuclear Medicine Physician and a Radiologist during a unified review session. This collaboration has not only fused technologies, but also our imaging modalities. Our PET/CT team consists of two Nuclear Medicine Technologists and two CT Technologists who work closely to ensure the patient is receiving the best care possible.

**Key Accomplishments/Initiatives**

- Completion of the CT renovation project
- A new injection room for PET/CT patients and a hot lab
- Optimization of patient flow, creating a patient and family-friendly department
- Ensuring efficient utilization of both scanners and staff
- Collaborative PET/CT team has ensured that our patients’ and families’ complex needs are better met
- A DI website with CT information is under development for families and referring physicians
- The CT team at SickKids has taken an active role in creating and promoting the use of low-dose protocols and functions as a resource to other institutions performing pediatric CT
- Collaborative research on the use of PET/CT in pediatrics
- Raise awareness of the implications of the CT radiation dose to the patient, compared to other studies
- Exploration of the latest dose reduction techniques
- Collaboration with CCO-using data from 1985 to 1991 to estimate the risk following radiation exposures from CT in childhood
GI/GU performs more than 4,200 studies per year in our two fluoroscopy rooms. We are a main referral centre for complex feeding studies in Southern Ontario, and provide an average of 10 studies per week in collaboration with occupational therapists. Gastrointestinal and Genitourinary X-ray uses fluoroscopy with barium and/or water-soluble contrast. These diagnostic tests enable our paediatric radiologists to accurately assess and diagnose illnesses or injuries that affect the GI and GU tract. Our team strives to keep dose as low as reasonably achievable while still maintaining a high level of image quality. We have two Precision 500D radiography and fluoroscopy rooms. This equipment incorporates dose-lowering capabilities and improves patient care and comfort. We have designed these rooms with our paediatric population in mind, creating a fun and welcoming space. We have a bright underwater scene in one room and an enchanted forest scene in the other; the rooms now feel inviting and less intimidating despite the presence of large equipment.

All of our exams are conducted by our expert staff, which consists of technologists, a nurse and a radiologist specially trained in paediatrics. Our staff retention rate is high, which is a benefit for the hospital and patients. Our staff conducts exams with minimum invasiveness, the lowest possible amount of radiation and with thoughtful protocols. Our team is continually reviewing and researching new ways of performing exams so we are always providing the highest level of patient care and service. We have a dedicated cysto team who perform all the routine voiding cystourethrography (VCUG) exams. This team was first introduced to reduce wait lists and allow the radiologist to focus on the more complex procedures; however, it has resulted in a higher level of patient satisfaction as the test is now performed efficiently and with less staff in the room (important for an invasive procedure).

GI/GU is involved in numerous research projects and is the main referral site for both complicated and routine procedures. The complexity of our exams continues to rise, which in turn directly affects the amount of time involved per procedure. We are often consulted by other institutions regarding the techniques and protocols we use that assist in the high success rate of our procedures. Continuing education is a high priority in our modality and we have introduced monthly Technologists’ Rounds so we can critique images. Interesting cases and pathologies are marked and reviewed. Lectures are provided by our radiologists, as well as guest speakers from other services and departments, to increase our knowledge and promote interprofessional collaboration.
X-ray is the foundation upon which our Diagnostic Imaging department has been built. We are leaders in paediatric radiography and positioning. We are also the primary centre for educating medical radiation technologist (MRT) students affiliated with the Michener Institute and University of Toronto in paediatric radiography, as well as national and international students. Fifty students rotate annually through our X-ray and GI/GU areas so they are better prepared for the paediatric population in community hospitals.

Atrium X-ray performs over 61,000 studies per year. To accommodate our patients, we have six radiographic rooms, six portable units, 3 C-arms and 3 mini C-arms, as well as a dedicated trauma unit in the Emergency Department.

We have been a filmless environment for many years and continually strive to upgrade our Computed Radiography (CR) and Picture Archiving and Communication System (PACS) equipment to keep up with evolving technology. We recently upgraded our (CR) Agfa system to NX technology. We installed the DX-G CR digitizer which supports both powder phosphor plates and needle-based detectors. We have two GE Definium 8000 digital X-ray rooms which increase patient throughput while providing higher quality imaging.

To better service our patients and their families, we have purchased advanced applications, such as Auto Image Paste, Dual Energy Subtraction and Volume RAD-Digital Tomosynthesis. VolumeRAD-Digital Tomosynthesis acquires a series of multiple low-dose image planes in a single sweep that provides volumetric data of the anatomy. We are completing applications with our recently installed Canon wireless detector which will be used for trauma radiography.

We have a Fuji CR system to accommodate imaging for scoliosis and long legs. The Fuji system is unique in that it provides the ability to perform supine and portable imaging. This is particularly useful as we need full spine imaging in the Operating Room.

We have a Biospace Med 2D/3D ultra low-dose X-ray imager, EOS. EOS acquires two low-dose planar AP/PA and LAT images simultaneously, which can cover the full body. Our main focus at this time is to use the system for scoliosis full spine and long leg imaging. A specialized workstation allows reconstruction of a 3D image of the spine and enables measurements within 3D space. This new technology will involve the expertise of the radiologist, orthopaedic surgeon, and Atrium X-ray staff, all of whom will benefit from thoroughly testing and researching this exciting new diagnostic tool.

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Our criterion for any new or upgraded technology is that radiation exposure is minimized and image quality is enhanced. Our in-house physicist and radiologists are committed to reviewing doses for each exam provided in the area to ensure we are performing dose conscious procedures. This allows us to provide an accurate, effective dose level to referring physicians, patients and their families.

All of our exams are conducted by our expert staff skilled in paediatric imaging to ensure that patients receive the lowest possible radiation dose and the highest level of diagnostic quality. We are a support site for the Coroner’s Office in Ontario and support all services, including referrals from SCAN.

In addition to staying on top of evolving technology, continuing education is also a high priority. Our clinical educator and advanced technologist supported a SickKids initiative by visiting Qatar to provide education and paediatric expertise to improve children’s health. We conduct Technologists’ Rounds to review and critique images, to increase staff awareness of quality imaging. Interesting cases and pathologies are reviewed and lectures are provided by our radiologists, as well as guest speakers from other services. We strive to promote interprofessional collaboration with the ultimate goal of providing the best patient care possible.
The Image Guided Therapy (IGT) has seen 6,500 patients’ visits during our past fiscal year. The clinical skills and role of the interventional radiologists have continued to expand in collaboration with a dedicated team of pediatricians. Twice daily clinical rounds ensure patients are followed on the ward before their discharge from hospital. Multidisciplinary meetings are also held regularly for complex patients to plan best treatment strategies.

New procedures such as embolization of lung arterio-venous malformation have been introduced in IGT since the last 2008 report. In the past 3 years, equipment replacement has been the focus of much planning activity in the unit. The acquisition of a robotic arm to replace the older fluoroscopic unit in room 1 was successfully implemented in the spring 2010. In 2011, selection of the equipment replacing the present technology in room 2 called for the acquisition of a single plane unit and an integrated CT scanner.

In 2011 an external review was done and IGT is now part of a wider umbrella including surgical services as well as research for the development of innovative image guided procedures. This new entity was coined a Center of Excellence for Sick Kids, joining the existing Oncology and Cardiology Centers. As a result, fund raising started for the room 3/4 project. Acquisition of an MRI will allow patients to undergo procedures using MRI guidance.

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Our IGT clinic has flourished as an essential part of our daily operations. Clinic activities have expanded last year in a dedicated physical location within the suite. Patients are being seen before booking procedures and their plan of care for treatment is carefully discussed with parents/patients as well as members of the interdisciplinary care team. Telephone follow-up takes place for outpatients after the procedure is performed in IGT.

Limited anesthesia coverage has resulted in a number of initiatives, enabling nurses and radiologists to use effective sedation drugs to enhance patient comfort during IGT procedures. Under the leadership of anesthesia and coordination from Dr. Temple and Darlene Murray; the introduction of Ketamine and nitrous Oxyde as sedative agents has enabled some of our patients to shift from the anesthesia list to the nurse sedation list.

The fourth Paediatric Interventional Radiology Conference took place in October 2012 attracting many international professionals from around the world. During this international conference, live cases were broadcasted to participants. Workshops and other lectures took place as well.

Our regular meetings have enhanced education opportunities for all staff in IGT:

- Monthly M & Ms sessions chaired by Dr. Bairbre Connolly with the input of other services invited to participate.
- The creation of an interventional journal club that meets weekly chaired by Dr. Joao Amaral.
- Numerous guest speakers have also been invited to IGT to deliver talks on various topics relevant to the area.

**KEY INITIATIVES**

- Currently, technologists and nurses in IGT are involved in the initiation of a PICC line insertion program. The program should allow technologists and nurses to place these lines in children requiring long-term IV therapies and frequent blood venous sampling.
- Technologists have also acquired the skills to check and change Gastrostomy tubes making it easier to book these patients.
- Dr. Dimitri Parra has recently become the education lead for interventional radiologists.
- Initiation of a combined adult/paediatric interventional fellowship in collaboration with adult acute academic hospitals in the GTA.
- Eric Lee, a clinical research assistant, joined the IGT team in 2011 and plays an instrumental role in enhancing research projects throughout the department.
MAGNETIC RESONANCE IMAGING

Magnetic Resonance Imaging produces images through the use of a strong magnetic field, radio frequency signals and varying gradient fields.

Upgraded MR systems with more advanced capabilities provide an environment more conducive to efficient workflow. One MR system was replaced with a 3T magnet. The 3T system has very high resolution capabilities to improve visualization of very small structures such as cochlea or abnormalities in the brain cortex. The increase in signal obtained from a higher field strength system improves data acquisition for use in diffusion and functional imaging to further enhance diagnostic capabilities.

Acquisition of MR images require patients to remain still from 30 minutes to more than two hours depending upon the underlying pathology and sequences necessary to obtain optimal diagnostic information. Children often require general anesthetic in an MRI setting. Staff at SickKids ensures that equipment, technology and procedures are tailored in order to meet the unique needs of our pediatric patients.

Key accomplishments
The demand for MRI continues to increase annually to a rate of 10-15%. The introduction of MR Enterography replacing some of the GI follow through has been very successful bringing a better diagnosis on patient suffering from Inflammatory Bowel Disease. SickKids has become a large referral center worldwide and the number of MRI performed for that reason is the biggest in the country for any pediatric institution.

Major steps were taken to improve access to the magnets for our patient population. Consistent strategies inspired of the LEAN methodology have successfully streamlined processes and have succeeded in dropping wait times for new referrals. Hours of operations have been expanded to include evenings until midnight and weekends while the magnet in CDIU is being used in the evenings for non-cardiac patients. In 2011, another magnet shared with Research has been providing another source of capacity to manage our increasing referral base.

In 2011, staff in MRI was educated in special techniques in order to lower the age for having an MRI under anesthesia from 6 years old to 5 introducing techniques. Some patients under 6 months of age are also scanned by a technique called “feed and sleep” without the need of anesthesia and of a ward bed overnight.

The introduction of the Anesthesia assistant role in MRI, has helped reduced the turnaround time between patients needing a general anesthetic.

These measures were put in place to manage the wait list for patients needing anesthesia sedation. Currently the weighted wait list for MRI at SickKids, is one of the best in the Toronto Central LHIN. Although increase referral will in the future present challenges to keep this status.

Key initiatives
In light of the opportunities presented by new magnets, image optimization and improved scan times will be a priority to take advantage of. The appointment of a Imaging Quality lead in MRI in 2011, will ensure that any image produced will be the best that it can be and contribute significantly to more accurate diagnosis.

Ongoing attention to waitlist reduction and staff recruitment and retention

The appointment of a new Safety Officer in MRI has made it possible to improve education, safety and operational policies in 2011. A recent successful inspection from the ministry of Labour has positioned the MRI department at SickKids as a model province wide in terms of safety.

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DIVISIONAL OVERVIEW

MRI images are used extensively to visualize internal anatomy, differentiate tissue types and demonstrate pathologies.

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Magnetoencephalography (MEG) maps the minute magnetic fields created by the brain’s electrical activity. MEG is superior in its temporal resolution and ability to localize eloquent brain function when compared to other functional imaging modalities. The data collected from MEG can be superimposed onto images from magnetic resonance imaging (MRI) to form magnetic source images (MSI). The MSI can be loaded onto to radiology PACS (picture archiving and communications system) as well as other modalities utilizing DICOM images.

Clinical work in Magnetoencephalography (MEG) has evolved significantly since its start at Sickkids in August 2000. As of May 2012, we have tested over 1000 patients. The group is comprised of a multidisciplinary team including; Neuroradiologists, Neurophysiologists, Neurodiagnostic and Medical Radiation Technologists. The work is further supported by nursing in Diagnostic Imaging and Anaesthesiology with regard to sedation and anaesthetic cases. The standard functional mapping paradigms available on the Sick Kids MEG include somatosensory, auditory and visual evoked fields, as well as receptive/expressive language mapping. Original research paradigms used to map cortical areas involving hand/foot motor function have evolved into regularly requested paradigms in clinical assessment. A memory task is being utilized for eloquent brain function mapping. Functional mapping is used primarily in the assessment of children with epilepsy, arterio-venous malformations and brain tumours. All clinical functional mapping is performed by Dr. Elizabeth Pang.

The mapping of interictal spike discharges in intractable epilepsy patients continues to be the primary role of MEG at Sickkids. Sleep deprived patients undergo simultaneous electroencephalography (EEG) and MEG mapping to localize epileptogenic brain activities. The final epilepsy data are assembled with the functional MEG testing and superimposed onto the MRI. The data are mapped back into DICOM and sent to PACS for reporting and display.

MEG contributes significantly to the treatment of epilepsy at Sickkids. Because its ability to show functional data along with epilepsy generating activity, MEG is playing an important role in determining surgical candidacy. The information also assists in the decision as to which surgical option would best suit each individual case. When intracranial video EEG monitoring is required, the MEG data is used to determine the measurements for the customized subdural grid electrodes.

Ongoing work of the clinical team has been the optimization of the MEG data with regard to surgical navigation (Brainlab) during epilepsy surgery. The MEG data can be loaded onto the workstation where it can then be fused with multiple MRI datasets. 3-Dimensional objects are created from the MEG spike and functional dipoles. All of the merged datasets can be then loaded and used in the surgical navigation system intra-operatively. There has been increasing demand from Neurosurgery for more eloquent brain function mapping...particularly of the Motor and visual cortex on patients with tumours and Arterial Venous Malformations (AVM). Dr. Elysa Widjaja is fusing and reconstructing MEG functional data DTI thus allowing for an accurate demonstration of the cortical spinal/visual tracts. The resultant data is then loaded onto the Surgical Navigation system. This combination of technology has allowed the Neurosurgeons to better plan a safe trajectory in their surgical resections.

ONGOING INITIATIVES FOR THE CLINICAL MEG TEAM

This year we have received funding to upgrade the current MEG system. We are hoping that the upgrade will take place during the next fiscal year.

Further optimize current brain mapping paradigms and to produce new clinical paradigms for cognitive brain functions. Optimization and fusion of MEG data to new imaging modalities. To continue to make such data accessible in surgical navigation.
NUCLEAR MEDICINE

Nuclear Medicine imaging records the physiological and biological function of an organ or system following administration of a specially designed radiopharmaceutical. Used in conjunction with gamma cameras, images can be taken as single static pictures, dynamically in a movie-mode, as a whole body pass or in a tomographic mode called Single Photon Emission Computed Tomography (SPECT) that allows a look inside an organ. Nuclear Medicine can identify abnormalities early in the progression of a disease long before some medical problems are apparent with other diagnostic tests.

Another valuable diagnostic tool available in Nuclear Medicine is Bone Mineral Densitometry, referred to as BMD or DXA. BMD is used for the assessment of osteopenia and osteoporosis. Since installation in 2000, both clinical and research studies have steadily increased over the years. In November 2009 the BMD program in the division of Nuclear Medicine received accreditation from the OAR (Ontario Association of Radiologists).

KEY ACCOMPLISHMENTS

One of our greatest current accomplishments is the continued growth of PET/CT imaging at Sick Kids. The expertise of Nuclear Medicine and CT technologies are combined to produce state-of-the-art diagnostic imaging which has dramatically improved patient care. Government regulatory restrictions and lack of funding for PET procedures and the radiopharmaceutical used, FDG (18F-FluoroDeoxyGlucose), continue to be a challenge.

The management of radioiodine therapy for thyroid carcinoma continues to be a success in the division of Nuclear Medicine. Since its implementation in November 2005, we have been able to successfully treat most of these patients on an outpatient basis, thus reducing the need for admission for up to 72 hours as previously required.

ONGOING INITIATIVES

Continual assessment of our patient’s needs have resulted in the implementation of the following new procedures and updated protocols:

- Sentinel node imaging & lymphoscintigraphy
- Mucociliary Clearance
- Bowel Transit Study
- FLT([18F]-3’-fluoro-3’-deoxy-L-thymidine) PET/CT Imaging
- FDG PET/CT Imaging for patients with PTLD (Post Transplant Lymphoproliferative Disorder)
- FDG PET/CT imaging to assess myocardial viability
- FDG PET/CT imaging to assess epilepsy
- Update to current dose calculation and administration in keeping with high standards of radiation safety as suggested by North American pediatric nuclear medicine guidelines

FUTURE INITIATIVES

The division of Nuclear Medicine continues to explore the use of new radiopharmaceuticals for use in PET/CT imaging including the use of 68Ga DotA-Tate in children being restaged for relapsed or refractory neuroblastoma.

Nuclear Medicine is also currently working closely with Haematology/Oncology to bring I131 MIBG (metaiodobenzylguanidine) therapy to Sick Kids. This therapy involves the administration of a radioactively labeled compound for use in patients with refractory neuroblastoma. This is a very large undertaking and will involve construction of a new suite on 8A to accommodate the administration of the therapy and patient admission for several days. Implementation of this initiative will allow Sick Kids to provide high quality patient care in a familiar environment with less disruption to the families involved.
First introduced to The Hospital for Sick Children in 1979, Ultrasonography uses high frequency sound waves to provide important anatomic, physiologic, and pathologic information on a broad range of clinical conditions. This modality is particularly important in Pediatrics as high quality diagnostic information is produced without the need for ionizing radiation. Ultrasound scans are performed daily throughout HSC to produce two dimensional images of the brain, abdominal organs, vasculature and musculoskeletal systems. Moreover, Ultrasound plays an important role in many research projects locally and internationally.

**Key accomplishments and highlights**

With a reputation of excellence for Neonatal and Pediatric Ultrasonography, the department of Ultrasound and its team continues to respond to an ever increasing number of referrals. The SickKids team of credentialed Medical Sonographers, Radiologists and support staff reported more than 24,000 examinations in 2010-2011.

Over the years the departments has introduced more advanced ultrasound practices like Trans cranial Doppler for sickle cell patients and Bowel perfusion studies for NEC patients. As the use of ultrasound and its applications expand, we continue to look for opportunities to grow and improve our services. One such area would be the use of Ultrasound in maintenance of Arteriole Venous Fistulas (AVF) for vascular access program like hemodialysis.

The Ultrasound Department continues to be very active in Research and Education and is a major contributor of educational papers and posters. We continuously improve our training programs to meet and exceed the most current practices for ultrasound for radiology fellows and students.

**Examples of research projects**

**Hemophilia Joint Study:** This study is designed to test the efficacy of ultrasound in detecting hemophilic joint arthropathy as well as comparing with MRI. Hopefully we can replace or reduce the need for MRI tests. This project is a joint venture with CMC, Vellore, India. This joint venture is unique as it is set to study reproducibility and reliability. This study has been extended to include Brazil and China to test the research methodology and for validation.

**CCSVI-Chronic Cerebral-Spinal Venous Insufficiency:** This multi-modality, multi institution study is conducted to see the role of venous obstruction as a cause of Multiple Sclerosis.

**PUSH Study:** Prediction by ultrasound of the risk of hepatic cirrhosis in cystic fibrosis: This is a multi-center study for serial ultrasounds of Cystic Fibrosis patients for early prediction for liver fibrosis.

**Basic Science study:** Doppler study of femoral head: To evaluate the normal blood flow pattern in normal and dysplastic neonatal hips. Cartilage measurement: To evaluate normal distribution of cartilage development in pediatric population using 2D and 3D ultrasound.

**Key initiatives for 2012-2013**

- Reduce wait times
- Continue to move ahead and formalize our Ultrasound Research program
- To be self-sustaining, and generate enough funds to provide dedicated Ultrasound Research Personnel and equipment
VASCULAR ACCESS

The Vascular Access Team are a diverse group of qualified nursing professionals who are experts at the insertion of intravenous catheters in an acute pediatric environment. Providing 24 hour coverage, the Vascular Access Team is available for peripheral intravenous insertions throughout the hospital, provide coverage for the Vascular Access Resource Nurse after regular business hours and phlebotomy services overnight. The Vascular Access Team advocate on behalf of the patients and families by providing consultation and assistance to the health care team in the delivery of vascular therapy, and device selection to meet complex patient vascular access needs. The Vascular Access Team collaborates with the interprofessional team to determine the appropriate venous access for the needs of patients based on a thorough assessment.

The Vascular Access Resource Nurses works collaboratively with interprofessionals from all services within the hospital as well as the Image Guided Therapy department to determine the need for Central Vascular Access Devices. The Vascular Access Resource Nurse consistently applies best practices to achieve quality patient care that improves outcomes related to vascular access. The team demonstrates advanced knowledge and expertise in the care and maintenance of central venous access devices (CVAD). Their responsibilities include but are not limited to; repairing broken lines, troubleshooting blocked lines, and assessing skin integrity of CVAD sites. There is a great deal of communication and collaboration between the Vascular Access Team (VAT) and the Vascular Access Resource Nurses (VARN) to ensure that all patients are appropriately prioritized and each receive intravenous access when needed.

The Vascular Access Team advocates and empowers patients and families by providing education surrounding standards of vascular access at the Hospital for Sick Children. Leadership from the team resulted in a hospital-wide continuing education program called Vascular Access Clinical Education Rounds (VACER). This initiative reinforced proper stabilization and care for Central Venous Access Devices as well as the assessment and maintenance of peripheral intravenous devices in accordance to hospital policy. Quantitative data taken from January to April of 2010 showed a decrease in breakages of CVADs by 33% as compared to January to April of 2009.

The initiative to train inpatient staff nurses and residents continues as an ongoing project for the clinical instructor. The responsibilities of the Vascular Access Clinical Instructor encompasses but is not limited to; training new learners, supporting previous learners to maximize their skills and confidence related to peripheral intravenous insertion, as well as developing tools to assess, document, and minimize interstitial peripheral intravenous devices throughout the hospital.

QUALITY IMPROVEMENT INITIATIVES

The acuity of the pediatric population at The Hospital for Sick Children requires a group of professionals with exceptional expertise. A program is currently being designed where a small group of vascular access nurses are being trained by Image Guided Therapy staff to insert peripheral intravenous catheters with the guidance from ultrasound to further improve success rates.

In June 2012, Pain Ease was implemented across the organization as an additional pain management strategy for children undergoing needle stick procedures such as PIV insertion, phlebotomy, and subcutaneous injections. Follow-up outcome evaluation planned for November 2012.

The Vascular Access Service is committed to ensuring that patients receive peripheral or central access in a timely fashion and that the pain associated with PIV insertions is minimized for the pediatric population. They will continue to pursue high standards as they gain new skills, sharpen current ones, and support others as they learn so that they can all provide excellent care to patients. The VAT is looking forward to another full and exciting year.

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Established in 2004 through grant funding from the Canadian Foundation for Innovation (CFI), the Research MRI Facility at the Hospital for Sick Children has been providing MRI capabilities (GE 1.5T) to Toronto investigators for the last 8 years. In spring 2010 another CFI grant was awarded, enabling the addition of a second, higher-field scanner to the Facility (Siemens 3T). At present, the GE system is a shared resource with the clinical MRI Department, while the 3T Siemens Trio is dedicated to research and development.

To date, the Research MRI facility has accommodated over 166 studies. At present there are 45 active studies on the 1.5T system and 30 active studies on the 3T. On average, one new study is added per month. Over 1200 research examinations were performed in 2011.

The Facility is currently staffed by a team of two full time and two casual Medical Radiation Technologists, a PhD Facility Manager and an Administrative Assistant. Hours of technologist-supported operation are from 08:00 to 16:00hrs Mondays and Fridays, 08:00 to 18:30hrs on Tuesdays, Wednesdays and Thursdays. Weekend scanning is available on an ad hoc basis.

Use of the facility is available for research projects involving phantoms, animals, and human participants - from preterm infants to adults. The scanner is also available for use by basic imaging science researchers developing new pulse sequences and refining techniques. In addition to this, support is available for acquisition of preliminary data to facilitate new grant submissions. Available applications range from conventional anatomic imaging to more advanced neuro and cardiovascular imaging methods including functional MRI, diffusion tensor imaging, tractography, phase-contrast flow imaging, delayed enhancement imaging, contrast-enhanced perfusion quantitation, arterial spin labeling and multinuclear spectroscopic imaging.
MAGNETOENCEPHALOGRAPHY (MEG) RESEARCH

Dr. Sam Doesburg is the newest recruit to DI and MEG, and is involved in MEG translational research. His studies focus on the role of communication in brain networks in cognitive and perceptual processes (Doesburg et al., 2012a, 2012b; Green et al., 2011), and how altered functional connectivity is related to developmental difficulties in clinical child populations. For example, patterns of brain network communication underlying cognitive tasks such as visual memory are mapped using MEG, and differences in children born very preterm are compared with neuropsychological assessments to better understand how atypical development of functional brain connectivity may contribute to academic difficulties in these children (Doesburg et al., 2011a, 2011b). Dr. Doesburg is also studying the role of altered communication among brain regions in childhood epilepsy using MEG and subdural electroencephalography (SEEG). The aims of this research are to better understand the basis of various behavioural and cognitive problems in children with epilepsy (Ibrahim et al., 2012), as well as to discover new methods of determining which brain regions must be removed to stop seizures in children with drug-resistant focal epilepsy. He is funded by Ontario Brain Institute for these studies.

In the last year, the emphasis of Dr. Margot Taylor’s work has been on the investigation of social and cognitive, frontal lobe tasks in typical development and in autism spectrum disorders. Her research is centered on executive functions, which show a protracted maturation over childhood and adolescence. Tasks involving emotional faces, eye gaze, inhibition, working memory and set shifting have been run and have resulted in publications (Vidal et al., 2012; Hung et al., 2012a,b; Nagata et al., 2012; Taylor et al., 2011a,b; 2012) or papers in progress. These slowly maturing cognitive functions provide an excellent opportunity to examine atypical development, and in the future will be invaluable for monitoring interventions. Ongoing work also includes children born very preterm, who show executive function difficulties, as well. Papers that demonstrate the reliability of MEG for detecting deep brain sources (hippocampus, amygdala) have been published (Quraan et al., 2011; Mills et al., 2012), and the tasks used in this work are being moved into the clinical domain.

Dr. Elizabeth Pang, appointed in Neurology and part of the Epilepsy Team, is also involved with translational work. An expressive language paradigm developed in conjunction with Dr. Mary Lou Smith’s team has been implemented and is now routinely run by the clinical technologists as part of the clinical mapping protocols. Dr. Pang and her team, with CIHR funding, have completed MEG data acquisition in 130 children who performed speech and language tasks of varying complexities. Acoustic analyses have characterised the developmental changes in speech skills and the impact of speech therapy on speech development. This culminated in a developmental paper (Yu, De Nil, et al., 2012, submitted) and 2 clinical papers (Yu, Kados, et al., 2012a; Namasivayam, et al., 2012). As well, the adult MEG data is under review (Nemarian, et al., 2012). The next phase of the grant involves testing children with autism. Several adjunct projects have been completed examining changes in cortical thickness with speech therapy (Kadis, et al., 2012, submitted), language connectivity in a verb generation task (Doesburg, et al., 2012), the spatiotemporal progression in bilingual verb generation (Pang & MacDonald, 2012), examining brain changes associated with learning words in a new language (MacDonald, et al., 2012).

Dr. Douglas Cheyne has been working on the following projects: 1) MASK Project. The development of an MEG compatible device for assessment of speech kinematics, funded by a 3 year CHRP grant. Natasha Alves, funded through a MITACS fellowship has been the lead engineer of the system; pilot studies are starting in speech motor control and facial motor control. 2) We have recently developed a Matlab toolkit (BrainWave) for MEG source analysis and made this available for download to the research community. Version 2 of the toolbox includes tools for data-preprocessing and for co-registering functional MEG source images with structural MRI. 3) NSERC funded research on cognitive aspects of human motor control is an ongoing series of MEG studies of response inhibition and cognitive control in healthy adult populations. We plan to extend our findings in adults to developmental populations in the next renewal of this project in 2013. Ontario Brain Institute funded Epilepsy Project (lead investigators Mac Buchan and Jorge Bruneto) is developing methods for improving localization of epileptic brain activity using MEG and structural MRI.

MEG is the only neuroimaging modality that can tell us both where and when processes occur in the brain.
Administrative Services, within Diagnostic Imaging, consists of a team of dedicated and multidimensional support staff. They provide administrative and office support to the medical and management staff, as well as academic/scientific support in the preparation of presentations, lectures, publications, book chapters and Research grants. Staffing consists of an administrative assistant who provides support to the radiologist-in-chief and the managing director, and senior secretaries who provide administrative support to Radiologists, Scientists, Fellows, Residents and Managers.

Administrative Services underwent a re-design to enhance services and to further streamline workflow processes:

- The Observership Program continues to attract over 60 applications per year. The coordinator processes the applications, ensuring all criteria are met.
- Our residency coordinator works with the Residency Program director to ensure that all criteria for the rotating residents coming to DI are met. From organizing their orientation and training to scheduling their daily shifts, she provides the residents with the administrative support they require to complete their rotation.
- Our Fellowship Program has evolved over the past year with a total of 70 applications for 10 funded and 10 self-funded fellowship positions. The administrative team processes all of the applications and coordinates all interviews for these candidates. Administration of the Pediatric Fellowship Program is focused on ensuring that each fellow’s program admission criteria and on-going regulatory criteria are met while maintaining our accreditation with the Royal College of Physicians and Surgeons of Canada.

We provided administrative support for the following conferences/courses:

- 9th SPR Symposium on Pediatric Cardiovascular MR, held on November 1-4, 2011
- 7th Advanced Course on Pediatric Cardiovascular Imaging held on November 4-6, 2011
- Introduction to Research and Radiology: Theory and Practice held on November 14-18, 2011
- Pediatric MRI Course held on September 30-October 1, 2011
- Pediatric Radiology Case-Based Resident Review Course 2012 held on March 2-4, 2012

We supported the conferences/courses by organizing all of the administrative aspects including cost management, pamphlet design, registration, organization of events, creation of symposium manuals and compilation of all evaluations post-conference.

In the next year, the focus of Administrative Services will be to continue to improve the already outstanding quantity and quality of services and administrative support provided throughout the department.
The Department of Diagnostic Imaging (DI) in the Hospital for Sick Children is proud to foster research excellence among our staff and trainees. By utilizing the rapidly emerging technologies in the field of radiology, it is our Department’s goal to be the leader in innovation in the broad field of pediatric radiology.

DI at SickKids encourages and supports all staff to participate and contribute to research related activities within the Department. The DI research group was initiated to take advantage of progressive new procedures in the field of diagnostics. Current research in DI covers the vast spectrum of case reports, retrospective chart reviews, clinical trials testing new contrast agents, clinical trials in collaboration with other services and sites (internally and externally), device research, studies in conjunction with animal lab services and much more. Through our research, we ultimately aim to increase the quality of care received by patients, both at SickKids and around the world.

It is our belief that by emphasizing research excellence and collaboration, we not only promote the translation of new knowledge and technology, but also contribute to SickKids’ status as one of the leading pediatric centres in the world.

The Department of Diagnostic Imaging is dedicated to improving and enhancing patient care and the health of children. Our mission is to be a benchmark pediatric radiology site by embracing new technologies and utilizing state-of-the-art equipment efficiently and effectively. We provide an environment that supports and promotes clinical, academic and research excellence, and builds departmental clinical research expertise focused on the strengths of the adjacent clinical and research community.

The Department of Diagnostic Imaging provides investigators at SickKids, the University of Toronto and other research institutions access to research imaging and image post-processing methods. We work with various researchers to develop new methods for clinical diagnosis and imaging using the multiple imaging modalities available within the department.

Our resources include:

- MRI (Magnetic Resonance Imaging)
- Functional MRI
- DEMRI (Dynamic Enhanced Magnetic Resonance Imaging), MRE (Magnetic Resonance Enterography)
- CT (Computed Tomography)
- PET/CT (Positron Emission Tomography)
- X-Rays and Fluoroscopy, EOS
- Ultrasound
- Image-guided Therapies and Procedures
- Scintigraphy and SPECT/CT
- DEXA and Quantitative CT for Bone Density
The Diagnostic Imaging Information Service was established when our department moved from analogue to digital technology. Our Information Management Centre is responsible for maintaining and enhancing all the major computer applications and all associated hardware and software within Diagnostic Imaging. These applications now include the Picture Archiving and Communication System (PACS), the departmental Radiology Information System (RIS) and our latest additions, the Laser Voice Recognition (VR) system and TeraRecon (advanced 3D imaging systems). This team currently supports over 150 dedicated PACS diagnostic and clinical workstations across SickKids, and all associated activities, including PACS web application. Remote access is provided through the Hospital’s virtual private network (VPN) connections. The team’s primary responsibilities include ongoing support and daily maintenance of PACS/RIS/VR, software upgrades and the integration of new technologies.

It has been almost 12 years since we introduced PACS to our department and to SickKids. It has been a very positive and worthwhile experience. PACS is accessible throughout the Hospital and the clinicians have immediate access to Diagnostic Imaging studies and reports, improving patient care. There are continual ongoing activities in order to keep abreast of new technology developments.

On the PACS side, a major accomplishment of PACS was the migration of images from a legacy archive that included three massive jukeboxes storing 14TB of data to Network Attached Storage (NAS); a new and much faster technology that can process data many times faster than a robotic library. We currently have 20TB in the Long Term Archive.

TeraRecon is a technology solutions provider of advanced 3D imaging system. TeraRecon enables real-time diagnostic review of 2D, 3D and 4D images for managing large thin-slice CT and MR scans. It offers a comprehensive suite of clinical application modules and has been carefully designed for streamlined workflow and ease-of-use.

Large thin-slice studies such as vascular run-offs or multi-phase cardiac studies with 3,000+ slices, can be rapidly loaded with segmentation, editing, analysis and region-growing tools to distinguish pathologies, blood vessels and bone. This product offers uncompromised performance, image quality and clinical functionality and it stands apart from other products because of its centrally-shared server/thin-client approach. Low cost PCs, sourced by the Hospital, are empowered by the Aquarius server to deliver interactive 3D anywhere. In a “thick-client” system, all of the DICOM slices are sent over the existing hospital network to each remote point of review which takes considerable time to transfer large files and can slow down other data traffic.

On June 16, 2008, the first modality went live with VR. The planning for VR was extensive and the project team included members from the DI Systems Administration personnel, Information Technology (IT), the Interface team, the VR vendor and the RIS vendor. After intense evaluation, a vendor was chosen and the project timeline and deliverables were established. Particular attention was paid to workflow and integration between VR, RIS and PACS and an extensive amount of testing was performed to ensure integration issues were addressed.

The VR system was implemented with high expectations for success. Many training sessions were held to ensure proper use of the system. With everyone’s willingness to use the system, we have had a gratifying immediate improvement to DI Report Turnaround Time.

The centre maintains and enhances all major computer applications and associated hardware and software within Diagnostic Imaging.
We continue to improve our services available to our internal and external stakeholders and to provide support for academic and research initiatives in Diagnostic Imaging. With the introduction of MyPACS, a web-based teaching file database, we are able to provide multi-department access to case review. Relevant information can be entered by different services and is available for review at rounds or teaching sessions.

Dentistry joined the digital imaging domain with the introduction of digital images for Panorex, cephalometric and intra oral images now being sent to PACS. A proposed acquisition of technology to enable bite-wing images to be digitally captured and stored is in process.

Disaster Recovery Project: This DI/IS initiative is now complete. We are fully replicated (Database and Images). This project went live May of 2009. This will enable the DI/IS department to function if conditions become hostile in the main Data Centre at SickKids. In case of a disaster, the site should still function because a redundant set of systems will take over right away, virtually eliminating downtime that could prove catastrophic to our facility.

Currently, the two Data Centres (one located at SickKids and the secondary one in a different power grid in the GTA) are connected over high-speed black fiber that will continue the normal operation of our PACS/RIS systems in case of emergency. Eleven servers located at the secondary Data Centre are ready to do their job if needed. The two main database servers are real-time synchronized and every single transaction on the primary site will be replicated on the secondary site. In regards to image replication, we are using a process called Image Shadowing that will have an identical copy of all our images at the secondary site as soon as an exam is being performed.

PACS 3.2 upgrade: The project went live February 12th, 2011. A major portion of this upgrade includes upgrading of our backend hardware. This upgrade also changed the software platform from Sun Solaris to Linux.

Outside CD tracking software: We are currently testing the software that will allow our department and others outside our department to more easily upload outside CD’s after filling out an electronic request form. This will improve patient care by allowing clinicians to make sure that all pertinent external images can be loaded and viewed at point of service and if necessary can be uploaded to PACS without fear of misplacing the original CD.

**ACHIEVEMENT**

**Bloorview/Sickkids Integration**

Our PACS expansion now includes Holland Bloorview and has many benefits for patients and as well for SickKids as an organization. This project went live December 15th, 2011.

Clinicians at Holland Bloorview and SickKids will have immediate, real-time access to the imaging done at either facility.

To the patient, the main benefit is the immediate access to the Patient’s Jacket as soon as an exam is being performed, no matter if it is done at Bloorview or at SickKids.

The report turn-around time is now much faster by enabling direct access to the radiology imaging, and long term is a more cost effective solution than having to courier various type of media between the two hospitals during patient transfer.

For SickKids as an organization, this expansion is in line with hospital’s strategic directions towards the excellence in patient care, enabling direct access for clinicians at both facilities and it also represents a prerequisite for the advance global integration by being one of the Participating Organization sites in the GTA/WEST DI-r, supporting a more global effort of Patient Care Services.

CCG – Centricity Clinical Gateway: CCG is the translator between our RIS and PACS providing Modality Worklist throughout DI. Go Live is scheduled for March 28th 2012. We are currently undergoing testing.

**GTA DI-r Project (LHIN 7)**: The project will collect all Radiology Exams, Images and Reports for all sites participating in the partnership. This DI-r when completed will include 21 organizations across 5 LHINS.

Together with William Osler Healthcare and St. Joseph’s we will be the first pilot sites to go live by end of June 2012.

**Centricity Mobile Device – Pilot Project**

Allows clinicians and radiologists to see images and reports anytime and anywhere within hospital premises via mobile devices including an app for iOS and AndroidOS.

- Allows clinicians to quickly find relevant images and reports through the AccessNOW app, which provides the ability to search Centricity PACS by patient name, MRN, accession #, modality and date range
- Helps improve clinician efficiency by saving time with immediate access to review images and reports in patient rooms
- Helps improve patient satisfaction by educating patients and families about treatment options
- Access to a broad range of advanced images technologies by providing 2D, 3D and MIP/MPR capabilities along with the ability to scroll, set W/L, zoom and pan

**Key Points**

- Allows clinicians to access relevant images and reports through the AccessNOW app, which provides the ability to search Centricity PACS by patient name, MRN, accession #, modality and date range.
- Helps improve clinician efficiency by saving time with immediate access to review images and reports in patient rooms.
- Helps improve patient satisfaction by educating patients and families about treatment options.
- Access to a broad range of advanced images technologies by providing 2D, 3D and MIP/MPR capabilities along with the ability to scroll, set W/L, zoom and pan.
The Department of Diagnostic Imaging relentlessly pursues innovative solutions to meet the needs of each and every patient and achieve operational excellence in the delivery and quality of our services. We are committed to the provision of exceptional services while recognizing and respecting the diversity of the patients and other customers we serve. The key drivers of the DI Quality and Risk Management program include the Quality Assessment and Improvement Committee, DI and Image Guided Therapy (IGT) Morbidity and Mortality Review Rounds, MR Safety Committee, Equipment Quality Control Committee, Radiation Safety Committee, dedicated Quality Management Leader, and various project teams, work groups and task forces. Quality and Risk Management system components are an integral part of the DI strategic framework that is directly aligned with the SickKids strategic direction – Lead in World-Class Quality and Service Excellence.

DI defines critical success factors that are being considered when developing strategic and tactical action plans to improve services, enhance patient safety and create value for patients and their families. These factors include:

- Patient and family-centered care
- Exceptional customer service
- Empowered, knowledgeable and committed staff
- Proactive provision of advanced technology and equipment
- Innovation
- Speed, agility and organizational learning
- Teamwork and effective communication
- Efficient and effective use of resources
- Process excellence
- Strong leadership

**We are committed to the provision of exceptional services while recognizing and respecting the diversity of the patients and other customers we serve.**

**KEY ACCOMPLISHMENTS**

**The Centre for Image Guided Care Project**

The Centre for Image Guided Care has been formally approved by the hospital Centre Review Committee as the 9th Centre at SickKids. The Centre will provide a leading edge, collaborative, image guided clinical care, research and education across services, disciplines, and departments. It will transcend the traditional physical boundaries and provide image guided care for patients wherever needed. The Centre will also enable the translation of innovative research from the Centre for Image Guided Innovation and Therapeutic Intervention (CIGITI) into clinical practice using the existing Image Guided Therapy (IGT) facilities. Some of the completed project milestones include but are not limited to:

- Identified key user needs and expectations, identified inputs, outputs and responsible person for each step in the process and developed Booking Process for Combined Cases in IGT/OR.
- Completed Lean diagnostic assessment of the booking process for routine cases in IGT in order to identify additional opportunities for improvement, gain better understanding of issues and sources of variation in current work processes, meet or exceed patient needs and expectations, engage staff in continuous improvement, and help create a culture of service excellence.
- Developed and implemented IGT user satisfaction survey tool and analyzed, compiled and communicated baseline results.
- Developed Surgical Combined Case information Sheet to facilitate face-to-face discussion between IGT and OR while gathering pertinent information.
- Implemented a checklist to prepare patients for routine IGT procedure, introduced the use of urgent slots within the daily schedule, and improved booking process for urgent cases.
- Submitted an RFI pertaining to medical imaging technologies, reviewed responses and facilitated presentations.
- Organized meetings with program directors from multiple divisions and disciplines to identify education needs, requirements and priorities.
- Identified teaching/educational opportunities for nurses and developed preliminary education and training implementation schedule.
• Developed capital project business case for IGT, identified currently available image guided technologies, and outlined key functionalities of IT systems presently used in IGT and OR.

Provincial MRI Process Improvement Project (MRI PIP)

MRI PIP uses an approach to process and performance improvement that focuses on optimizing the utilization of existing resources by improving the efficiency of MRI operations and engendering a commitment to continuous improvement among staff and clinicians working within MRI facilities. MRI PIP is based on Lean-Six Sigma methodology, which uses a collaborative, structured, and data driven approach to add value to the patient experience, empower staff and clinicians to affect change in their processes, and improve flow by eliminating process bottlenecks. Based on the average appointment wait times, SickKids was selected to participate only in the Best Practices component of MRI PIP, while a number of other Ontario hospitals were required to participate in the intensive on-site programs. Diagnostic Imaging and MRI staff at SickKids took a proactive approach and started their Lean journey and implementation of best practices even before the formal launch of the MRI PIP by the Ministry of Health and Long-Term Care. Implementation of MRI Best Practices at SickKids included the following:

• Performed formal review of the current booking process in MRI. The purpose of the review was to facilitate understanding of the existing booking process and identify key process deficiencies and risks. Information from the review was used to redesign and standardize booking workflow, reduce cycle time, maximize the use of resources, reduce process variations, and identify other opportunities for improvements. Booking process workflows were developed to clarify decision-making logic, simplify process steps, and outline roles and responsibilities. As a result, the wait time from the time an MRI requisition is received by the MRI staff to the point when an appointment is booked and the patient/referring clinician is notified of the appointment was reduced by 75%.

• Improved patient selection for an exam and optimized patient flow within the MRI suite by developing patient preparation checklists and introducing a flow coordinator role. As a result, MRI room utilization rate increased from 60% to 87%. Room turnover time for cases done under anesthesia is booked and the patient/referring clinician is notified of the appointment within recommended timeframe.

• Initiated internal quality audit process to ensure that actions to improve process efficiencies do not have any negative impact on patient safety. DI and CDU established a multi-disciplinary audit team and completed comprehensive internal quality audit of MRI safety practices. The total of 65 requirements related to MR safety was assessed against the ACR Guidance Document for Safe MR. Practices. The purpose of the audit was to facilitate a systematic internal review of current MR safety practices, and assist MR personnel in all areas of the hospital in their efforts to identify opportunities for improvement, reduce risks to patients, staff, and visitors, standardize best practices, and improve overall effectiveness of MR safety practices.

• Two task groups were established to develop and implement MRI safety improvement action plans across the hospital. Some of the actions included: Enhancing access control to MRI Zone III and IV; installation and application of standard warning signage, development of MRI safety online training modules, creating lists of departments and individuals who require access to Zone III and IV; and development of a master list of equipment used in MRI.

• Revised and updated Terms of Reference for the MR Safety Committee. Facilitated input from multidisciplinary staff and developed new MRI Emergency Procedures including: Code Blue – Resuscitation Event in MRI; Magnet Room; Quench in MRI Suite; Fire in MRI Suite; and Flood in MRI Suite.

• Completed MRI data analysis, prepared graphical progress indicators, and designed forecasting tool to estimate future MRI performance and resource needs.

• Prepared and distributed weekly and monthly performance indicator reports to provide clear and concise overview of MRI performance. Reports include both outcome metrics and process level metrics.

• Completed comprehensive departmental self-assessment based on the Ontario Best Practice Guidelines for Managing the Flow of Patients Requiring MRI Examination.

• Designed new MRI Screening of Patients form, facilitated major revision of the policy and incorporated the most up-to-date requirements related to MR safety was assessed against the ACR Guidance Document for Safe MR. Practices.

• Developed a new MRI screening form to improve completeness, accuracy, and timely access to key patient information as well as to simplify the requisition process for referring physicians and other clinicians.

• Facilitated input from multidisciplinary staff, revised the MRI Screening of Non-Patients form, and updated departmental policy MRI Screening of Non-Patients.

• Collaborated with the DI nursing staff and developed MR-specific GA vs. Sedation Decision Guide. The purpose of the guide and the associated algorithm is to guide the triage of patients that are referred to MRI.

• DI created process maps of several departmental processes to clearly outline and communicate process steps, risks and responsibilities, optimize the use of resources, remove constraints and redundancies, and improve overall process effectiveness and efficiencies.

A comprehensive analysis of departmental online safety reports was completed to identify trends and opportunities for improvement. Key issues were communicated and addressed through the appropriate modalities and departmental forums.

DI completed a major update of the DI Emergency Response Manual that includes DI Code Orange, DI Response in the Event of Power Failure, and Modality Staff Fan-Out List. The manual outlines process steps, roles and responsibilities in the event of external emergency, power or telephone system failure, “optimizes the use of resources, identifies emergency power sources by modality, and provides other information related to communication and equipment. The two DI Emergency Response Centre locations have been designated with appropriate resources including a binder with Materials Safety Data Sheets (MSDSs) and a binder with relevant Ontario Acts and Regulations.

Following review of applicable regulatory requirements and current practices in the hospital, Diagnostic Imaging developed an Employee Orientation and Education program for new employees. A number of stakeholders were consulted to identify specific needs in each modality. The primary purpose of the program is to ensure consistent, complete and timely orientation of new employees throughout the department. The program assists DI managers responsible for new hires not only in meeting regulatory requirements but also in planning and execution of the orientation within recommended timeframe. The tool kit includes four profession-specific orientation checklists including recurring mandatory education requirements.

Continuous initiatives

ON GOING INITIATIVES

Continually refined monthly quality indicators used to measure, evaluate, and improve effectiveness of our processes are at the core of DI Quality and Risk Management Program. Every effort is made to enable sound decision-making by creating selective, reliable, responsive, valid, and cost-effective measures of performance. Examples of DI and IGT quality indicators include: Report turnaround time, Appointment wait time, Number and type of exams, Number of consults, Room utilization, Percent of procedures starting on time, Average turnover times, Number of cancellations, Number of combined cases, IGT patient mix, and Number of patients by sedation type. DI will continue to focus on improving access to MRI and other DI services, quality of patient care, patient safety, utilization of equipment, and timely reporting for internal and external stakeholders.

The overall approach to the implementation of quality improvement projects will be characterized by:

• Appropriate application of the Project Management methodology, PDSSA (Plan-Do-Study-Act) quality improvement model, and Lean Six Sigma process improvement methodology;

• Use of quality tools and relevant data to support evidence-based decision making;

• Creation of multidisciplinary teams with clearly defined goals, roles and responsibilities;

• Inclusive, engaging, and empowering team environment;

• Focus on systems and processes rather than individuals;

• Open communication lines with patients, families, employees, and other health professionals; and

• Co-operation and information sharing rather than competition among modalities.

As part of our commitment to provide the best family-centered care, DI will continue to use patient and family satisfaction surveys to fully understand changing patient needs and initiate quality improvements of our services. In addition, the updated Accreditation Canada standards for DI services require the team to collect and review information about patient perspective on services.
Diagnostic Imaging is in the process of implementing several major information system and equipment upgrades designed to further enhance our clinical services and improve overall patient and family experience.

In continuous efforts to strengthen Diagnostic Radiology Residency Program at the University of Toronto, DI is in the process of expanding its quality assurance curriculum and providing opportunities for learning and active participation of radiology residents in internal audits, M&M case presentations and other quality assurance activities.

Continual efforts are being made to further reduce appointment wait times in CT and sustain achieved results. The average appointment wait time in CT has consistently been around 0.4 weeks. This is achieved through:

- Effective use of fast multi-slice technology
- Improved collaboration with the Anesthesia department
- Efficient coordination and good communication among IGT, MRI, and CT modalities
- Continual workflow optimization efforts
- Effective use of fast multi-slice technology
- Increased use of distraction techniques to minimize the need for sedation or GA
- Timely review and prioritization of CT requisitions by radiologists
- Effective equipment preventive maintenance program

KEY INITIATIVES FOR 2012-2013

Develop concise DI Strategic Plan to define strategic priorities and key initiatives in support of hospital strategic directions, designate a champion for each project or initiative, and outline timeframe for implementation. All employees within the department need to have a clear understanding of how they make meaningful contributions to the achievement of the departmental and hospital strategic goals.

DI Quality Assessment and Improvement Committee will review and analyze the updated Accreditation Standard for Diagnostic Imaging Services to ensure compliance with requirements and provision of safe and appropriate diagnostic services. Components of the Accreditation Preparation Action Plan will include:

- Establish interprofessional accreditation team
- Perform gap analysis
- Develop and implement corrective action plan
- Develop accreditation resources and guidelines for staff
- Develop and implement communication plan
- Initiate staff engagement campaign
- Administer required surveys and questionnaires
- Develop Quality Performance Roadmap
- Create and deliver education and information sessions
- Identify departmental leading practices
- Ensure compliance with Required Organizational Practices (ROPs)
- Perform practice tracers across modalities
- Update Policies and Procedures and consolidate documents and records
- Prepare for Accreditation on-site visit
- Ensure ongoing implementation and monitoring of the Quality Performance Roadmap
- Coordinate all preparation activities with other areas of the hospital

The Centre for Image Guided Care: Complete outstanding project objectives, define priorities, continue development of the strategic framework, create required infrastructure, develop business case for the introduction of new technologies and changes to physical space, and take other necessary steps towards achieving the Centre’s mission.

- To advance world-class paediatric image guided patient care in an integrated, collaborative, multidisciplinary model that develops innovative treatments and technologies.
- To maintain the highest quality, safety, and efficiency of care, focusing on continual improvement in outcomes while fostering a family-centered environment.
- To advance education in image-guided interventions throughout the institution and beyond, utilizing state of the art technology and delivery methods.
- To carry out leading transformative research in image-guided interventions, while supporting knowledge translation and the transfer of new innovations and concepts in technology.

IGT Equipment Replacement – Phase 2 Project: Minimally invasive image guided therapies are more cost effective than traditional methods, and result in reduced patient morbidity as well as reduced hospital stays. Replacing the interventional equipment in IGT with associated reconstruction of the interventional rooms is expected to significantly improve functionality, radiation safety, patient throughput, and provide new therapies and innovative collaborative methods. To ensure ongoing optimal interventional care for children at SickKids, the complete replacement of IGT equipment will require a phased approach over the longer period of time. Phase 2 of the project involves IGT equipment replacement and reconstruction of IGT room 2. Phase 1 of the project – IGT Equipment Replacement in room 1 was successfully completed on time and within budget.

The Centre for Image Guided Care: Complete outstanding project objectives, define priorities, continue development of the strategic framework, create required infrastructure, develop business case for the introduction of new technologies and changes to physical space, and take other necessary steps towards achieving the Centre’s mission.

- To advance world-class paediatric image guided patient care in an integrated, collaborative, multidisciplinary model that develops innovative treatments and technologies.
- To maintain the highest quality, safety, and efficiency of care, focusing on continual improvement in outcomes while fostering a family-centered environment.
- To advance education in image-guided interventions throughout the institution and beyond, utilizing state of the art technology and delivery methods.
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Redesign and expand the scope of the DI Quality and Safety Leadership Walkarounds. Results will be communicated to all relevant stakeholders and corrective/preventive actions initiated as required. This process is expected to bring the following benefits:

- Demonstrate commitment to building a culture of safety and continuous quality improvement
- Foster an environment of trust by engaging leaders and front-line staff in an informal, open dialogue concerning quality and patient safety
- Establish lines of communication about quality and patient safety across DI
- Directly inform the leaders about the quality and patient safety issues and existing organizational barriers
- Identify and implement opportunities for quality, patient safety, staff safety, and process improvements
- Reinforce the principle that everyone is responsible for quality and patient safety

Develop MRI performance management dashboard and other visual tools to communicate both outcome and process level measures on a regular basis. The dashboard will be displayed in a high traffic area that is easily visible by frontline staff. Information displayed on the dashboard will be used to drive preventive and corrective actions that will lead to sustainable quality improvements. Strategic focus for MRI process improvement initiatives will be provided by shaping a common vision, establishing clear priorities, building staff commitment, and aligning MRI goals with the hospital strategic directions.
Medical Radiation Technologists (MRTs) play a vital role in Diagnostic Imaging’s multi-disciplinary team that includes radiologists, nurses and anesthetists. Technologists produce images using specialized equipment, while ensuring that patient care and safety are a priority. MRTs are certified through the Canadian Association of Medical Radiation Technologists (CAMRT). MRTs are self-regulated under the Regulated Health Professionals Act (RHPA), and are members of the College of Medical Radiation Technologists of Ontario (CMRTO).

MRTs are involved in a broad variety of procedures and specialties including radiography, fluoroscopy, angiography and computerized tomography. Over the past 10 years most medical imaging departments have transitioned away from analogue film to embrace digital radiography (DR). In order to continue to produce high quality images, technologists have expanded their knowledge base to encompass the advantages offered by digital imaging.

In Nuclear Medicine, MRTs produce images by using radiopharmaceuticals that concentrate in specific areas of the body. Some of the main uses of Nuclear Medicine are studying how vital organs function, assessing the progression and/or treatment of disease and assessing the blood flow to the brain.

In 2006, we acquired PET/CT (positron-emission tomography), a combined imaging technology that allows more accurate detection and diagnosis, particularly in oncology patients. The Nuclear Medicine technologist and CT technologist work together to produce the combined PET/CT images.

In MRI, MRTs use non-ionizing electromagnetic radiation to produce diagnostic cross-sectional images in multi-planar directions. The unique nature of the technology allows demonstration of subtle differences of contrast between tissues and direct blood flow measurements in major vessels. SickKids is one of the few hospitals in the world where interventional technologists collaborate with MRI technologists in Cardiology to optimize imaging. This new development has opened many opportunities for improving outcomes to patients by imaging areas of the body that were not possible to reach before.

In Image Guided Therapy (IGT), the MRT imaging skills include cross expertise in specialized modalities such as CT scan, ultrasound and fluoroscopy. In the past year the scope of practice of the technologists working in IGT has been enhanced. They are now able to perform procedures such as insertion of PICC lines and changes of Gastrostomy tubes. This new acquired skills have led to better and faster patient access to the procedures they need to treat their medical condition.

Medical Sonographers use non-ionizing high frequency sound waves to produce predominantly 2D images that provide information on anatomical structures, physiological and pathological states. Recent advances have resulted in the increasing use of 3D and 4D imaging for enhanced visualization. Ultrasound exams are generally non-invasive and image infant brain and spine, abdominal and pelvic organs and vascular structures. The registering body governing sonographers is CARDUP (Canadian Association of Registered Diagnostic Ultrasound Professionals).

We continue to take the lead in radiation safety for pediatrics, particularly for CT. We also function as a global reference site with observers from Canada, the US and Europe visiting our department to acquire and share best practice parameters for pediatric imaging. With our commitment to excellence, we look forward to our continuing growth and advancements in the field of imaging technology.

The Michener offers a joint Degree/Diploma in Medical Radiation Sciences (MRS) but you must have a 1 yr University prerequisite. Therefore, they graduate with an Ontario College Advanced diploma and a Bachelor of Medical Radiation Sciences.
NURSING PRACTICE

Nursing staff in DI are experienced paediatric and neonatal nurses with specialized knowledge in the care of children undergoing imaging procedures. Under the leadership of the DI clinical manager and with the support of our advanced nursing practice educator, registered nurses in DI participate in patient care across all modalities as members of the interprofessional team. Many of the patients who come to DI have acute and complex care requirements and our nurses draw on their knowledge and experience to contribute to safe, quality care.

Recognized as expert procedural sedation providers, nurses in DI require advanced nursing skills and competencies in diverse areas including: paediatric health assessment, pharmacology, the peri-operative and peri-anesthesia nursing roles, and post-procedure recovery of patients. DI nurses engage in family-centred care as they provide patient/family education and emotional support in their efforts to promote patients’ sense of mastery and control in a technical environment.

Our clinical support nurses and the MRI clinic nurse play a pivotal role in the coordination and support of children undergoing imaging procedures. There is collaboration with family members, referring physicians, managers, radiologists, technologists, anesthetists, and a variety of nursing and allied health experts to develop plans of care for children and families with special needs for whom routine imaging procedures are challenging. In addition to clinical patient activities, DI nurses also support clinical research. Collectively, DI nurses represent considerable depth in pediatric nursing experience and are a resource for the entire department in the care of our diverse patient population.

DIVISIONAL OVERVIEW

DI is a quality, nursing practice environment which supports autonomy and independent decision-making within the scope of nursing practice. DI recognizes the importance of interprofessional care, provides visible and accessible nursing leadership, encourages nursing consultation around policy and practice, and supports nurses’ participation in the DI quality assurance and improvement program.

Nurses in DI can develop advanced clinical and leadership skills through specialized and/or expanded nursing roles, preceptorship, and participation in departmental and hospital committees including, but not limited to, SickKids RN Council and the DI Clinical Practice Committee. DI is a dynamic environment where nurses’ commitment to life-long learning is essential. DI continues to support our nurses’ participation in education at the undergraduate level and beyond, including their attendance at relevant national and international conferences. In addition to bi-annual training in Paediatric Advanced Life Support (PALS), nurses in DI are encouraged to take advantage of specialized courses within the hospital and also of external training.

ONGOING AND FUTURE INITIATIVES

DI Nursing is committed to continuous quality improvement, safety, and efficiency. As DI continues to seek opportunities for innovation in the way we provide patient care, the evolution such as the nursing role in the GI/GU department, focused on strategies to manage procedural pain, and anticipate our role in developing a new model of anaesthesia care in DI. Quality care, patient safety, and interprofessional collaboration will be priorities in 2009/10. Through active membership on hospital and departmental committees, DI nurses will provide practice leadership within DI and continue to enhance nursing integration at a broader organizational level.
Dr. Jennifer Stimec has been a staff radiologist at The Hospital for Sick Children since 2010. She is a member of the Body Imaging Division and is involved in multimodality musculoskeletal imaging including MRI and joint arthrography. Dr. Stimec has been working on developing new protocols for musculoskeletal imaging, particularly for sports-related injuries. Special interests include inflammatory bone and joint disorders, trauma, and sports medicine imaging. Dr. Stimec has been actively involved in diversifying both resident and fellowship education through developing a teaching program utilizing simulation to increase trainee confidence in performing procedures and responding to life-threatening emergencies.

Other educational activities include radiology resident rounds and clinical and teaching rounds with the Rheumatology Department. Research interests are within musculoskeletal imaging.

Dr. Sam Doesburg completed his PhD in Neuroscience at the University of British Columbia (UBC), which focused on the role of communication within distributed cortical networks in perceptual and cognitive processes. This was followed by a postdoctoral fellowship at UBC Pediatrics which employed magnetoencephalographic (MEG) brain imaging to investigate neurocognitive development in children born very prematurely. Doesburg joined The Hospital for Sick Children and is researching how functional connectivity among brain regions is altered in various clinical child populations.

Dr. Greer has been on staff as a pediatric radiologist in the general division since June 2011. She completed her undergraduate medical degree (MBBS) at the University of Queensland in 1989, and radiology training at the Princess Alexandra Hospital, both in Brisbane, Australia, becoming a Fellow of the Royal Australian and New Zealand College of Radiologists (FRANZCR) in 2000.

Dr. Greer’s association with the Hospital for Sick Children commenced in 1999 when she undertook Fellowships in Pediatric Body Imaging and Body Intervention. She returned to SickKids from 2009 to 2010 when she completed a Fellowship in Pediatric Cardiac MRI.

Mary-Louise has practiced as a pediatric radiologist in the public and private sector since 2000. She has served as Director of Radiology at the Royal Children’s Hospital in Brisbane from 2003 to 2006, during which time their dedicated pediatric MRI service was established, and President of the Australian and New Zealand Society for Paediatric Radiology from 2008 to 2009. She has a strong interest in all aspects of pediatric MRI, with a special interest in advanced MRI techniques, body MRI, and bowel imaging in particular. In addition to enjoying teaching fellows, residents and medical students within the hospital and University, Dr. Greer is actively involved in research both locally and internationally, collaborating with clinical colleagues in gastroenterology, orthopedics and oncology.

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Promotions

Dr. Paul Babyn has taken on a new position as Head of Medical Imaging at the Saskatoon Heath Region and the Department of Medical Imaging at the University of Saskatchewan, effective December 6, 2010.

Since 1998, Dr. Babyn has been Radiologist-in-Chief here at SickKids and a member of the Department of Medical Imaging, University of Toronto since 1988. He received his M.D.C.M. from McGill University in 1982, completed his residency training in the Department of Radiology at Pennsylvania Hospital in 1986 and then did two years’ of fellowship training here in the Department of Diagnostic Imaging 1986-1988.

We thank Dr. Babyn for his enormous contribution to the Department of Diagnostic Imaging and to wish him success in his new position.

Dr. Manohar Shroff received his medical degree from the University of Bombay in 1985 and completed two Fellowships in Neuroradiology at the University of Toronto prior to being appointed Staff Neuroradiologist at the Hospital for Sick Children and the Department of Medical Imaging, University of Toronto in 2002. Since 2004, he has been the Director of the Department’s Fellowship Program and the Director of the Neuroradiology Fellowship Training Program since 2008. For the past year, he has also acted as Interim Chief of the Department of Diagnostic Imaging at the Hospital for Sick Children.

In all these assignments, Dr. Shroff has done an amazing job.

It is with great pleasure that I announce that Dr. Shroff has accepted the position of Radiologist-in-Chief at the Hospital for Sick Children. As Chief, he will also be the Chair holder of the Ontasian Chair in Paediatric Imaging.

Manu has the leadership qualities and administrative skills necessary to take on this demanding new role. Please join me in congratulating him.

Service Recognition

The following were honored for their 10, 20, 35 years of service to The Hospital for Sick Children:

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<thead>
<tr>
<th>NAME</th>
<th>TITLE</th>
<th>SERVICE YEAR</th>
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<tr>
<td>Sean Saingas</td>
<td>Patient Information Coordinator</td>
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<tr>
<td>Sara Kibakos</td>
<td>MRT II</td>
<td>10</td>
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<tr>
<td>Rosie Lye</td>
<td>MRT II</td>
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<tr>
<td>Michelle Cote</td>
<td>RN</td>
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<tr>
<td>Kimberly Evanoff</td>
<td>RN</td>
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<tr>
<td>Fatima Lima-Simao</td>
<td>Manager, Di/IB</td>
<td>10</td>
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<tr>
<td>Melanie Hill</td>
<td>Clinical Manager</td>
<td>10</td>
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<tr>
<td>Robin Mercado</td>
<td>MRT I</td>
<td>10</td>
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<tr>
<td>Nalini Lall</td>
<td>Electronic Imaging Clerk</td>
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<tr>
<td>Andrea Mann</td>
<td>Sonographer</td>
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<td>Dr. Andrea Dorla</td>
<td>Radiologist</td>
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<td>Dr. Michael Temple</td>
<td>Radiologist</td>
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<tr>
<td>Dr. Christopher MacGowan</td>
<td>Scientist</td>
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<td>Francine Faubert</td>
<td>RN</td>
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<tr>
<td>Guila BenDavid</td>
<td>Manager</td>
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<td>Dawn-Ant LeBlanc</td>
<td>Manager</td>
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<tr>
<td>Marilyn Clark</td>
<td>RN</td>
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<td>Marcilla Thompson</td>
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<td>Martin Thomas</td>
<td>Electronic Imaging Clerk</td>
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<tr>
<td>Jessica Fillinghay</td>
<td>Electronic Imaging Clerk</td>
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<tr>
<td>Dr. Cathy MacDonald</td>
<td>Radiologist</td>
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<tr>
<td>Hiroki Otsudo</td>
<td>Research Assistant</td>
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<tr>
<td>Dr. Susan Blaser</td>
<td>Radiologist</td>
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<tr>
<td>Josephine Lazzaro-Castano</td>
<td>RN</td>
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<tr>
<td>Ellen Charkot</td>
<td>Director</td>
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<tr>
<td>Constance Krajewski</td>
<td>MRT II</td>
<td>35</td>
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<tr>
<td>Maria Green</td>
<td>Manager</td>
<td>35</td>
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DI STAFF

Professional development opportunities for the staff in DI are numerous. All staff have the opportunity to participate in learning activities such as “Interesting Case Rounds”, “MkM Rounds” and guest lectures which are offered to all staff on a regular basis to develop new knowledge, and ultimately to further enhance patient care. In addition to departmental education, staff is encouraged to attend interprofessional educational activities throughout SickKids. Several staff proudly represented SickKids at numerous national and international conferences and seminars where they contributed presentations, papers and posters.

General Technology rounds are offered to staff technologists on a monthly basis on topics of interest or for enhanced practice. They take the form of lectures given by radiologists, film critiques, and instructional sessions.

The staff in-service education program during the last year was interesting and comprehensive. The multi-modality approach helped attendees to understand the integration of disciplines in achieving diagnostic information. Some topics covered were PNG, radiography, ultrasound, interventional procedures, CT, Radiation Dose Reduction, DI Nursing roles, sedation, MRI, and hands-on workshops. A great deal of education and preparation went into this successful endeavour, and staff should be commended for their participation.

STUDENTS

Radiological Technology

The Radiological Technology program has been redesigned to meet the challenges of today’s healthcare system. Over 4 years, graduates achieve both a degree in Radiation Sciences from the University of Toronto, and a diploma in Medical Radiation Technology from the Michener Institute. There are research components, as well as elective opportunities for clinical placements abroad. Medical Radiation Technology students at SickKids enjoy a unique, diverse pediatric imaging experience. We have base radiology students in Diagnostic Imaging that complete an eight month rotation, as well as Pediatric rotations available to students that have limited pediatric exposure at their own base hospitals. We also have students from the Mohawk-McMaster Medical Radiation Sciences Program that complete a 15 week rotation. Opportunities exist to learn about advanced computerized imaging capabilities, diverse pathologies, and unique imaging strategies, in an environment of some of the leading, state-of-the-art technology.

Ultrasound

The Ultrasound Department has been accredited as a clinical site for pediatric rotation. Under the guidance of our experienced staff, students have the opportunity to learn pediatric scanning techniques and to extend their knowledge of pediatric pathology.

To become a Medical Sonographer one must have acquired a 1 Year Radiation Science Degree and an Advanced Diploma in Ultrasound or have obtained a Degree/Diploma in a medical discipline (3 years), and be a graduated of a recognized Ultrasound program (20 months).

MRI

SickKids has been accredited as a clinical site for full clinical placement for MRI students and currently accepts students for training from British Columbia Institute of Technology (BCIT), The Michener Institute (TMI) and Red River College (Winnipeg) and the Northern Alberta Institute of Technology (NAIT). MRI Technology students at SickKids complete a 14 week clinical rotation to train in a wide variety of MRI imaging techniques with the emphasis on the pediatric patient ranging in age from newborn to 18 years. Working with the experienced MRI team, students are given the opportunity to develop their knowledge and skills that will carry them throughout their careers.

Nuclear Medicine

This division is also associated with the Michener Institute of Applied Health Sciences and the University of Toronto Radiation Sciences program. The Nuclear Medicine program is also being redesigned to meet the challenges of today’s healthcare system. Upon graduation, Nuclear Medicine students receive a degree and diploma from the University of Toronto and the Michener Institute, respectively. Student Nuclear Medicine technologists complete a four week rotation at SickKids to train in paediatric imaging techniques and to enrich their patient care skills. Working under the direction of the experienced Nuclear Medicine team, students are given a unique opportunity to augment their knowledge, skills and techniques that will enhance their future careers. Students receive exposure to all aspects of paediatric Nuclear Medicine including paediatric bone densitometry and PET/CT. In addition, pediatric bone densitometry training is provided for our radiological technology students.
DEPARTMENT CHAIRS/COURSES


The goal of the Earl Glenwood Coulson Chair in Interventional Radiology (IR) in broad terms is to foster research in image guided therapies. The research undertaken in the division of Image Guided Therapy (IGT) is largely clinically based, and covers a diverse range of topics. The ultimate aim of such research is to improve the quality of patient care (through new knowledge, innovation, outcomes assessment, quality improvements etc). The current Chair holder is Dr. Bairbre Connolly, in her 3rd year, 2011-2012.

Clinical Research Associate
The majority of the funds from the Earl Glenwood Coulson Chair go towards salary support for a Clinical Research Associate. The role of the CRA is invaluable in providing the infrastructure and organizational support for all research related activities in IGT. The CRA gives direct input and provides advice regarding REB applications and compliance, grant applications and management, summer student support (from selection through project development, to manuscript publication) and ensuring all involved in IR research are audit ready. This role has been a catalyst for major development, significant change and consistent improvement in how research is conducted within IGT.

IGT Coulson Research Day
The IGT Coulson Research Day celebrates the numerous academic achievements of the IGT Team, provides a forum for the team members to learn about the various projects underway which are relevant to IGT and encourages future research undertakings. This annual research day took place in August, with a day set aside with presentations by different IGT members (nurses, technologists, fellows, students, radiologists, and multidisciplinary collaborators e.g. pediatricians). The guest lecture was jointly delivered by Colin McArthur and Gwen Burrows of the Research Institute.

IGT Coulson Research Newsletter
This biannual newsletter is produced by the CRA and Coulson Chair. It provides an update on research achievements, new grants, recent publications and projects underway. It introduces to the IGT team any new students who have joined the group so the team knows of their project and their role.

Grants & Awards
The number and scope of research grants and awards has increased this year to 9, with IGT team members as PI on many. This includes SPR grants, GE CHAR award, CREMS, WSIB, and SIR. Members of the IGT team are collaborators with both surgical disciplines on grants under the umbrella of CIGITI, and with pediatric disciplines e.g. CIHR.

Projects
Numerous projects are underway in IGT (approximately 38 active REB approved). These include prospective clinical studies (e.g. randomized control trials), original laboratory projects (e.g. animal lab, medical radiation science), many retrospective clinical studies as well quality improvement studies. Many are multidisciplinary in nature through collaboration with the IGT Pediatric liaison and with different surgical divisions.

Publications
There were over 22 publications in this academic year involving IGT team authorship, in addition to book chapters, and scientific lectures and presentations at both national and international meetings.

DEREK HARWOOD-NASH (DHN) CHAIR IN MEDICAL IMAGING – DR. CHARLES RAYBAUD - 2011 REPORT

The Derek Harwood-Nash Chair in Medical Imaging is an endowed Chair. Its goal is to support every effort to develop teaching and research activities in Pediatric Neuroimaging. To achieve this it helps funding a Research Assistant salary; it finances the organization of an annual Research Symposium (the Derek Harwood-Nash Research Day), and it contributes to financing the cost of participation in Scientific Meetings in Pediatric Neurosciences.
THE 7TH ADVANCED COURSE ON PEDIATRIC CARDIOVASCULAR IMAGING

The Society for Pediatric Radiology (SPR) and The Hospital for Sick Children in Toronto co-sponsored this course. Organized by the Departments of Diagnostic Imaging at The Hospital for Sick Children and the Children’s Hospital & Research Center Oakland, the Symposium was held at The Hospital for Sick Children, November 4–6, 2011.

This two-day course reviewed advanced utilization of MR for heart diseases in children. The major topics of this year included: repaired TOF, pulmonary circulation, pulmonary perfusion, myocardial diffusion tensor imaging, flow imaging, and fetal cardiac MR. There were discussions on latest non-invasive imaging, advanced applications and debates on controversies. The course was highly regarded not only for its up-to-date contents but also for seamless interactive discussions among the speakers and audience.

THE 9TH SPR HANDS-ON SYMPOSIUM ON PEDIATRIC CARDIOVASCULAR MR SYMPOSIUM

The Society for Pediatric Radiology (SPR) and The Hospital for Sick Children and the Hospital for Sick Children co-sponsored the 9th SPR Hands-on Symposium on Pediatric Cardiovascular MR Symposium. Organized by the Departments of Diagnostic Imaging at The Hospital for Sick Children and the Children’s Hospital & Research Center Oakland, the Symposium was also held at The Hospital for Sick Children in Toronto on November 1–4, 2011. This was a three-day intensive course that reviewed the necessary basic knowledge in heart disease in children and the practical use of MR for morphologic, functional and hemodynamic evaluation.

The symposium consisted of didactic lectures, free-form discussion sessions and hands-on MR scanning and post-processing sessions. At the completion of the course, the attendees should feel confident in initiating a cardiovascular MR program at their respective institutions to support the increasing demands for cardiovascular MR imaging in recent years. In addition, through this symposium, the organizers hoped to create a communication and support network for radiologists and cardiologists pertaining to issues in the clinical practice of cardiovascular imaging. A high speakers–attendees ratio allowed teaching tailored to each individual attendee.

PEDIATRIC RADIOLOGY CASE-BASED RESIDENT REVIEW COURSE 2012

The “Pediatric Radiology Case-Based Resident Review Course 2012”, took place March 2–4, 2012. This course was targeted at residents preparing for Board although may also have been of benefit to pediatric radiology fellows and general radiologists. The lectures were ‘case-based’ with practical tips on how to discuss the case, work up a differential diagnosis and manage the patient further.

Course Directors
Oscar Navarro, M.D., Manohar Shroff, M.D., Govind Charhan, M.D.

PEDIATRIC MRI COURSE

The first one was titled “Pediatric MRI Course” and took place September 30 to October 1, 2011. This course was designed to offer routine as well as advanced applications in neuroradiology and body MR imaging in children. The emphasis was on “how we do it”. Common as well as advanced studies and their optimization in children was discussed. The aim was to share our experiences about unique aspects of pediatric MRI imaging that will help to enhance day-to-day practice.

Course Directors
Govind Charhan, M.D., Manohar Shroff, M.D.

INTRODUCTION TO RESEARCH AND RADIOLOGY: THEORY AND PRACTICE

There has been an acknowledged lack of productive clinician researchers in radiology. Currently shortfalls in the quality of research studies produced by the radiology community stand in sharp contrast to emerging technologies and the need for new knowledge to address several issues in the radiological sciences. Only five per cent of radiology research articles are published by residents and fellows as first authors. It has been shown that residents and fellows are interested in conducting research, and there is a need to foster a research culture. This can best be done in the radiology training program. The short-term objective of this course is to develop a model for teaching research in radiology that could be incorporated by other academic institutions in North America and across the world.

Through the development of a research development workshop for radiology residents we plan to elevate the standards for research training required in the Residency Program of Radiology of the University of Toronto, making the first draft of a manuscript a requirements for successful completion of the Residency Program.

This research workshop has been part of the curriculum of Residency of Radiology at the University of Toronto since 2008 and became accredited by the Continuing Education and Professional Development program of our university in 2010. In 2012 Dr. Andrea Doria (radiologist and epidemiologist) in collaboration with Drs. George Tomlinson, Rahim Moineddin and Joseph Beyene (statisticians) who have been the coordinators of the course since its gestation signed a contract off with Thieme publisher to have this workshop converted into a book format. It will contain a summary of patterns of research design that can be used for conducting high quality research in radiology and will have exercises at the end of the chapter to improve the understanding of trainees of radiology on the methodology. With these new available educational tools in imaging research we hope to increase the standards of research of our specialty and to motivate and inspire students who have learned and will learn from these tools to become leaders in different subspecialties of radiology by conducting high quality research.
PEER REVIEWED PUBLICATIONS


Loai Y, Sabik N, Janik R, Foltz WD, Cheng HL. “Human aortic endothelial cell labeling with positive contrast Gadolinium oxide nanoparticles for cellular magnetic resonance imaging at 7 Tesla,” Molecular Imaging 2011 Sep 30 (Epub)


Sunumosi, Kerry, Lee, Kwok-Choy, Jen, Ho, Wardshawksi, Robert; Mattzing, Mary-Ann; Shenouda, Nazih; Charnon, Martin; Cobleitzen, Craig; Dubois, Jason; Kloiber, Reinhard; Nadel, Helen; O’Brien, Cathy; Reed, Martin; Martin, Keith; Webber, Colin; Levent, Brian; Ward, Leanne. Anatomical Distribution of Vertebral Fractures: Comparison of Pediatric and Adult Spines. Osteoporos Int. 2011 Nov 23. [Epub ahead of print]


Taylor, M.J., Mills, T., Pang, E.W. The development of face recognition; hippocampal and frontal lobe contributions determined with MEG. Brain Topography, 2011 Oct (3-4); 261-70.


John P. Vascular Anomalies, Pediatric Interventional Rounds, The Hospital for Sick Children, Toronto, Ontario, April 2011

John P. Vascular Malformations, Department of Plastic Surgery, The Hospital for Sick Children, Toronto, Ontario, October 2011


John P. Vascular Malformations, Department of Paediatric Medicine, The Hospital for Sick Children, Toronto, Ontario, September 2011


Kasner A. Cerebrovascular reactivity imaging using BOLD and ASL. Technical University Munich, Germany, October 2011.


Kassner A. Standardized MRI techniques for pediatric patients with cerebrovascular disease. University Medical Center, Utrecht, NL, March 2012.


Laughlin S. Pediatric Brain Tumour Imaging: Review. ARRS. Chicago, Illinois, May 2, 2011


Greer ML. How we do it: MRU and Renal Imaging. Pediatric Body MRI Course, The Hospital for Sick Children, Department of Diagnostic Imaging, Toronto, Ontario, October 1, 2011.
Manson D. Celebration of Pediatric Pulmonology 2011: “High resolution CT in pediatric chest disease”; “From video fluoroscopy to virtual bronchoscopy: a primer on imaging technologies”; “Fibins in chest radiograph interpretation”.


Navarro OM. Role of US in rhabdomyoma - compared to MRI and MR. 13th World Congress of the World Federation for Ultrasound in medicine and Biology.Vienna,Austria, August 27, 2011.

Navarro OM. Role of US in pediatric oncology - compared to CT, PET & MRI. 13th World Congress of the World Federation for Ultrasound in medicine and Biology.Vienna,Austria, August 27, 2011.


Oudhahan K. Radiology Grand Rounds: Osteomyelitis in Children-Imaging Update and Strategies, Fletcher Allen Health Care, University of Vermont, Burlington, VT, USA, April 1, 2011.


Oudhahan K. - Imagerie et traumatismes non accidentels de l’enfant,11emes Journées Algoer-Francaises de Radiologie et d’Imagerie Medecale (JAFRIM); Algiers. Algeria. June 3-5, 2011

Oudhahan K. Case Review sessions to residents - Abdominal manifestations of Cystic Fibrosis in children, University of Vermont, Fletcher Allen Health Care, Burlington, VT, USA, April 1, 2011.

Oudhahan K. M R Enterography and Imaging of Inflammatory Bowel Disease: How I do it. 1st Pediatric MRI course, Hospital for Sick Children, Toronto, ON, Sept 30-Oct 1, 2011


Ranson M. Imaging of the Ankle and Foot”. Rheumatology Lecture, Hospital for Sick Children, Toronto, Ontario, June 14, 2011.


Raybaud C. Hydrocephalus 2011 (International Society for Hydrocephalus and Cerebellar Fluid Disorders). Steady State sequences (CISS, FIESTA) in the evaluation of arachnoid membranes in hydrocephalus, Copenhagen Denmark; September 4-7, 2011.

Raybaud C. Hydrocephalus 2011 (International Society for Hydrocephalus and Cerebellar Fluid Disorders) Particularities of the CSF dynamics in the fetus and in the premature infant Copenhagen Denmark; September 4-7, 2011.


Raybaud C. Congenital Brain Malformations. Pediatric MRI Course Toronto ON. September 30-October 1, 2011.

Yoo SJ. Imaging the functionally Univentricular Circulation. Symposium, Pre-symposium, Toronto. June 2-4, 2011


Yoo SJ. CMR in Patients with Functionally Single-Ventricle. Visiting Professor to the Centre Hospitalier Universitaire de Quebec, Centre Mère-Enfant du CHUL. September 23, 2011


Yoo SJ. MR, and CT In Pediatric Cardiac Patients. National Hospital of Pediatrics, Hanoi,Vietnam, February 9, 2012


Yoo SJ. How to Utilize MR. in Pediatric Cardiac Patients. Visiting Professor to Children's National Medical Center, Washington DC, USA. April 27, 2011


Yoo SJ Venous Connections and a Trial Arrangement. Toronto Symposium, Pre-symposium, Toronto. June 2-4, 2011

Yoo SJ. Imaging the functionally Univentricular Circulation. What can we do with MR? Toronto Symposium, Pre-symposium, Toronto June 5-7, 2011

Yoo SJ. Chest Radiographic Findings That You Don't Want to miss in Pediatric Cardiac Patients. Visiting Professor to Children's National Medical Center, Washington DC, USA. June 26-27, 2011

Yoo SJ. CMR in Patients with Functionally Single-Ventricle. Visiting Professor to the Institute Universitaire de Cardiologie et De Pneumologie de Quebec. Quebec, Quebec. September 22, 2011

Yoo SJ. Number Game in MR Assessment of Cardiovascular Function and Hemodynamics. Visiting Professor to the Centre Hospitalier Universitaire de Quebec, Centre Mère-Enfant du CHUL. September 23, 2011

Yoo SJ. Chest Radiographic Findings That You Don't Want to miss in Pediatric Cardiac Patients Visiting Professor to the Centre Hospitalier Universitaire de Quebec, Centre Mère-Enfant du CHUL. September 23, 2011


Yoo SJ. Segmental Approach to Congenital Heart Disease and Terminology. 9th SPR Symposium on Pediatric Cardiovascular MR, Toronto, Ontario. November 1-4, 2011

Yoo SJ. Numbers Game with MR. Data. 9th SPR Symposium on Pediatric Cardiovascular MR, Toronto, Ontario. November 1-4, 2011

Yoo SJ. Integrated Approach to Pulmonary Venous Pathologies. 7th Advanced Course in Pediatric Cardiovascular MR, Toronto, Ontario. November 4-6, 2011

Yoo SJ. Works-in-Progress, Hospital For Sick Children in Toronto, 7th Advanced Course in Pediatric Cardiovascular MR, Toronto, Ontario. November 4-6, 2011

Yoo SJ. Many Faces of Scimitar Syndrome. Dr. Kenneth Fellows Lectureship, Philadelphia, PA. November 9-10, 2011

Yoo SJ. MR, and CT In Pediatric Cardiac Patients. Visiting Professor to Children's Hospital of Alabama, Birmingham. December 7-8, 2011

Yoo SJ. MR. Assessment After BCPC and Fontan Operation. Visiting Professor to Children’s Hospital of Alabama, Birmingham. December 7-8, 2011

Yoo SJ. Vascular Rings, Slings and Other Things Visiting Professor to Children’s Hospital of Alabama, Birmingham. December 7-8, 2011

Yoo SJ. Abnormalities of a Trioventricular Junction. New Frontiers in Fetal Cardiac Imaging, Tel Aviv, January 11-12, 2012

Yoo SJ. Assessment of Fetal Heart and Circulation With MR. New Frontiers in Fetal Cardiac Imaging, Tel Aviv. January 11-12, 2012

Yoo SJ. Aortic Arch Anomalies. New Frontiers in Fetal Cardiac Imaging, Tel Aviv. January 11-12, 2012

POSTERS


Yoo SJ. MR. Evaluation of Pulmonary Circulation After BCPC and Fontan Operation, Dr. Kenneth Fellows Lectureship, Philadelphia, PA. November 9-10, 2011

Yoo SJ. Chest Radiographic Findings You Don’t Want to miss in Pediatric Cardiac Patients. Dr. Kenneth Fellows Lectureship, Philadelphia, PA. November 9-10, 2011


POSTERS


SCIEntific PapErS


inTernatiOnal reSeArCh AwArEds

Sam Doesburg - Excellence in MEG Research in Developmental Disabilities – Down Syndrome Research Foundation, Jo Mills Award (2011) for research on: “Brain dynamics and cognitive development in very preterm children”

sciEnCiFic poStErS

John Caffey Award for Best Scientific Poster, SPR Mann Erika. Dual Phase Intravenous Contrast Injection in Pediatric Body CT.

Radiological Society of North America, Chicago, Illinois, November 2011
Dr. Govind Chavan - Certificate of Merit, Primary author, (Distinction, Specialty: MRI). Received for educational exhibit on MRE.

Dr. Govind Chavan - Cum Laude, Primary Author, (Distinction, Specialty: MRI). Cum Laude for exhibit on optimization of abdominal MRI in children.

University of California San Francisco, Dr. Charles Raybaud - T. Hans Newton Honorary Lectureship

Royal Society of Edinburgh, Dr. Margot Taylor, International Exchange Scholar

Ontario Association of Medical Radiation Technologists – Special Recognition Award – Ellen Charkot

AWARDS

Excellence in Teaching Award (Fellowship Program), The Department of Medical Imaging Awards –Faculty of Medicine, University of Toronto, July 2010 – June 2011

Dr. Govind Chavan, Dr. Alan Daneman, Dr. Erika Mann, Dr. David Manson, Dr. Oscar Navarro, Dr. Manohar Shroff

International Society for Magnetic Resonance in Medicine, 19th Annual Meeting, Montreal, Quebec, May 7-13, 2011

Dr. Charles Raybaud – Outstanding Teacher award

Dr. Hai-Ling Cheng - Distinguished reviewer Dr. Hai-Ling Cheng - Distinguished reviewer for Journal of Magnetic Resonance Imaging

Society of Nuclear Medicine

Shamans Amer Top ten finalists for the poster presentation. Pilot study of FDG PET/CT for hemophilic arthropathy in a rabbit model.

PEdiATriC rAdiologY FELLOwSHiP

The clinical fellowship program provides training for those radiologists who are interested in pursuing a career in Pediatric Radiology and have already completed four years of training in a General Radiology residency training program and/or are board-certified as radiologists in their country of origin. The program is within one of the largest and busiest pediatric radiology departments in the world, performing approximately 140,000 studies per year.

There are presently 10 Clinical Fellowship positions in the Department of Diagnostic Imaging funded by The Hospital for Sick Children. These include fellowships in General Radiology, Neuroradiology, Cardiac Imaging and Interventional Radiology. Additional existing fellowship positions are funded either by international grants or by institutions in the home countries of these additional clinical fellows. For 2011-2012, we have had fellows from Canada, Brazil, United Kingdom, Turkey, Lebanon, Jordan, Saudi Arabia, Qatar, India, Bangladesh, Malaysia, Singapore, China and Australia.

The fellowship is designed to be flexible enough to suit the needs of the individual fellow. Both one- and two-year programs are offered.

Fellows in the one-year program or in the first year of a two-year program rotate through the following areas:

• plain radiographs, including in-patient studies in the pediatric and surgical wards and in the neonatal and pediatric intensive care units, as well as outpatient and emergency room examinations
• fluoroscopy in the GI/GU suite
• ultrasound, including musculoskeletal
• body CT
• neuroradiology, including CT and MR
• body MR
• Second-year rotations may include:
• neuroradiology, including CT, MR, myelography and neuroradiography
• angiography and non-angiographic interventional work
• cardiac imaging

• repetition of rotations performed in the first year
• Fellowships for those individuals wishing to enter directly to specific subspecialty areas within Pediatric Radiology are also available (Interventional Radiology, Neuroradiology, Cardiac Imaging and Nuclear Medicine). These are usually one-year fellowships; however, length and availability may vary depending on individual requirements and funding.

Our program has an “Accredited with Examination” status by the Royal College of Physicians and Surgeons of Canada, the first pediatric radiology training program in Canada to receive such recognition. Fellows beginning in 2011 who have completed one year of training in general Pediatric Radiology and are radiologists certified by the Royal College of Physicians and Surgeons of Canada will be eligible to sit for the first sub-specialty examination in pediatric radiology to be held in the fall of 2012.

Fellowship Program Director
Dr. Oscar Navarro

Fellowship Coordinator
Helene Dubois

Fellowship Committee
Dr. Ruth Cytryn-Kasit
Dr. Philip John
Dr. David Manson
Dr. Charles Raybaud
Dr. Manohar Shroff
Dr. Shi-joon Yoo

Administrative Assistant
Katherine McLaren

THE RESIDENCY PROGRAM

The four-month resident paediatric radiology rotation at The Hospital for Sick Children is an introduction to paediatric imaging. This residency rotation covers a broad scope of imaging exams with the ultimate goal of ensuring expertise and comfort in interpreting paediatric studies, and in performing basic fluoroscopic and ultrasound examinations of more common and emergent disease processes unique to the paediatric population. During the rotation, the resident will work with the paediatric radiologist during procedures or when reading imaging studies on infants, children and adolescents. Residents will develop a basic level of knowledge and a systematic approach. They should gain confidence in...
making decisions on what studies are needed to clarify common and emergent clinical problems. Residents will be expected to demonstrate effective communication skills with other members of the care team, conduct timely and appropriate follow-up of abnormalities and produce accurate, comprehensive, and timely reports. In addition to supervised clinical rotations, learning will be conducted through a series of didactic and case-involved teaching sessions as well as assigned presentations.

The resident paediatric radiology rotation is comprised of system or modality-based weekly rotations. In the general division, the resident will participate in interpretation of plain images, ultrasound, CT and MRI including the neonatal and paediatric intensive care unit, paediatric in-patient, and out-patient exams. There are sub-specialized rotations in Cardiac Imaging as well as in the Division of Neuroanatomy and Nuclear Medicine. Additional elective time may be used to gain experience in interventional radiology.

There is a comprehensive, formal teaching program with two hours of daily rounds specifically directed to resident learning, covering both organ systems and modality-based imaging. The resident will be involved in preparing presentations including an interesting case, quality assurance and an MR-related topic at a paediatric radiology session. In addition, there are numerous weekly clinical and clinical-pathology rounds as well as a monthly departmental quality assurance morbidity and mortality round that the residents are able to attend. There is a great opportunity for teaching at the workstation with a number of medical and elective students as well as observers from outside radiology institutes present during rotation. The resident, is encouraged to provide consultations to clinicians and house staff. The on-call experience provides the radiology resident with an opportunity to assimilate clinical information and make appropriate patient management decisions.

Residency Program Director
Dr. Cathy MacDonald

Residency Program Site-Secretary
Linda Halpert

OBSERVERSHIP PROGRAM
As a leading academic and research facility, it is the practice of The Hospital for Sick Children to share knowledge throughout the world and to encourage, support and develop educational opportunities for health and other professionals. Observer education initiatives and exchange of information with our colleagues and community partners significantly enrich research, patient care activities and community service. Observers are individuals, including health professionals and medical students, who have been granted permission to observe specific procedures and/or processes on site in Diagnostic Imaging in order to gain knowledge. From January 1, 2004 to March 31, 2012, we have had 152 observers in Diagnostic Imaging. For 2008-2012, our observers came from the following countries: Australia, Belarus, Brazil, Bulgaria, Canada, Chile, China, Egypt, Germany, India, Iran, Ireland, Korea, Malaysia, Portugal, Saudi Arabia, Spain, Thailand, Turkey, and United States.

Observeorship Coordinator
Caroline Robertson

VISITING PROFESSORS – DIAGNOSTIC IMAGING

2011
Dr. Stephanie Wilson, Foothills Medical Centre, Calgary. Sonography of IBD: A Safer Imaging Choice for IBD Diagnosis and Management. Contrast Enhanced Ultrasound of the Liver.

Dr. Alan Ostreich, Cincinnati Children’s Hospital Medical Centre, Cincinnati. Metabolic Bone Disease. An Approach to Bone Dysplasia. Watch out What You Swallow.

Dr. Kieran McHugh, Great Ormond Street Hospital, London, UK. Interesting Pediatric Radiology Cases.

Dr. Gal Moonis, Beth Israel Deaconess Medical Centre, Boston MA. New Insights into Cochlear Malformations. Post-Op Temporal Bone Imaging Temporal Bone Trauma Skull Base Imaging.

Dr. Ricardo Faigold, Montreal Children’s Hospital, Montreal, QC. Neonatal Hypoxic-Ischemic Injury. Cerebral and Intestinal Perfusion Measurements using Ultrasound and Dynamic Color Doppler Sonography in Neonates with Moderate and Severe Hyptic Ischemic Injury Treated with Therapeutic Hypothermia.

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Apollo Fraser

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Research Technologist
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Research Technologist
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Research Technologist
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Research Technologist
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Research Technologist
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Research Technologist
Dr. Adam Oates

Research Technologist
Dr. Barbara Albert

Research Technologist
Dr. Victor Wycoco

2012

Fellows

Dr. Tahiya Ahmed
Dr. Juan Cruz
Dr. Victor Wycoco

2011

Fellows

Dr. Tahiya Ahmed
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Dr. Mohammad El-Zein
Dr. Heba Takrouni
Dr. Luke Tsh
Dr. Mutaz Al-Nassar
Dr. Amir Al-Zahra
Dr. Adam Oates
Dr. Barbara Albert
Dr. Tahiya Ahmed
Dr. Victor Wycoco

2010

Fellows

Dr. Tahiya Ahmed
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Dr. Mohammad El-Zein
Dr. Heba Takrouni
Dr. Luke Tsh
Dr. Mutaz Al-Nassar
Dr. Amir Al-Zahra
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