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What Halifax neurosurgery means to me was brought home recently in the outpatient clinic. I saw a patient who had suffered a life-threatening traumatic head injury several months previously: he had emergency surgery and spent a prolonged period on our neurosurgery service. He had missed his first scheduled follow-up appointment but was eager to see me because he wanted me to see what a spectacular recovery he had made – and indeed it was a spectacular recovery! When the visit ended, I shook his hand, said good-bye and turned to leave the clinic room. He said “Doc…” I turned around to hear him say, hesitatingly and with tears of appreciation in his eyes... “You have... a great team!”

A great team indeed! Where it is known by nursing students that 7.3 is the best place to train and practice acute-care nursing; where our OR team of dedicated neurosurgical nurses and neuroanesthetists is the envy of the country; where the best of the best neurosurgery residents come to be trained; and where our research and educational efforts are recognized on the national and international stages. And all that we do is possible because, whatever our task, each does her or his part to contribute to make a great team – and for that we are proud.

Welcome to the Division of Neurosurgery’s 2015 Annual Report. It is my pleasure to update you on the year’s events and accomplishments.

A bittersweet event in 2015 was saying farewell to Dr. Rob Brownstone after an academically impressive fifteen years with the Division. Bitter because we will miss him; sweet because we know he will continue to do great things in his new position in London, England.

We were delighted to welcome our newest neurosurgeon, Dr. Jacob Alant, to our neurosurgical team. He and his family moved to Nova Scotia from Calgary over the summer – it has been great having Dr. Alant with us. Welcome to all new members of the Neurosurgery family – we are glad to have you.

Our multi-million dollar QEII Academic Neuroscience Program fundraising is now complete, thanks to the generosity of donors, the work of the QEII Foundation and strong administrative support within the hospital and Nova Scotia Health Authority, including our 7.3 manager Fran Kelloway, our Director, Randi Monroe, and Nova Scotia Health Authority Vice Presidents Paula Bond and Allan Horsburgh. This project is several years in the making and I am delighted to be able to say that we expect to see this project materialize in 2016. Renovations will get underway on 7.3/7.4 starting in the New Year. Teams of people are already working on the transition process: this time next year we will have a neuroscience clinical unit that will house neurology, spine and neurosurgery in-patients; a unit that will have a brand new Intermediate Care Unit and a brand new Epilepsy Monitoring Unit. It will be an exciting year ahead!

I am also proud of the family of regional neurosurgical services – including St. John’s, Moncton, Saint John, the IWK Health Centre and the QEII Health Sciences Centre. We work closely together to provide the best possible neurosurgical care to the people of Atlantic Canada.

We have much to be proud of again this year: I think you will agree as you enjoy the read!
Neurosurgery Faculty

DAVID B. CLARKE  MD, PhD, FRCSC, FACS
• Head, Division of Neurosurgery
• Professor, Departments of Surgery, Medical Neuroscience, Medicine (Endocrinology) and Ophthalmology & Visual Sciences
Areas of Interest:
• Transsphenoidal Surgery, Neuro-oncology
• Epilepsy Surgery
• Neurotrauma and Injury Prevention
• Neurosurgery Simulation/Education

SEAN CHRISTIE  MD, FRCS
• Vice-Chair, Division of Neurosurgery
• Director, Neurosurgery Spine Program
• Director of Research, Division of Neurosurgery
• Associate Professor, Department of Surgery
Areas of Interest:
• Minimally Invasive Spinal Surgery
• Complex Spinal Surgery
• Neurotrauma
• Spinal Oncology
• Sport-Related Neurological Injuries

ROBERT BROWNSTONE  MD, PhD, FRCS
• Professor, Division of Neurosurgery and Medical Neuroscience
Areas of Interest:
• Neural Circuit Function
• Functional Neurosurgery
• Epilepsy Surgery
• Movement Disorders
• Complex Pain
• Spasticity

SEAN BARRY  MD, FRCS
• Treasurer, Division of Neurosurgery
• Assistant Professor, Department of Surgery
Areas of Interest:
• Minimally Invasive Spinal Surgery
• Complex Spinal Surgery
• Spinal Oncology
• Neurotrauma

SIMON WALLING  MBChB, FRCS
• Assistant Professor, Department of Surgery
Areas of Interest:
• Neurotrauma
• Injury Prevention
• Neuro-Oncology
• Pediatric Neurosurgery
• Surgical Education

GWYNEDD PICKETT  MD, FRCS
• Assistant Professor, Department of Surgery
Areas of Interest:
• Cerebrovascular Surgery
• Endovascular Treatment of Aneurysms

ADRIENNE WEEKS  MD, PhD, FRCS
• Assistant Professor, Department of Surgery
Areas of Interest:
• Cerebrovascular Diseases
• Endovascular Treatment of Aneurysms
• Neuro-Oncology

JACOB ALANT  MBChB, MSc, MMed, FRCS
• Assistant Professor, Department of Surgery
Areas of Interest:
• Minimally Invasive Spinal Surgery
• Peripheral Nerve Surgery

DANIEL MCNEELY  MD, FRCS
• Chief, Pediatric Neurosurgery, IWK Health Centre
• Program Director, Neurosurgery Residency Program
• Assistant Professor, Department of Surgery
Areas of Interest:
• Pediatric Neurosurgery
• Pediatric Epilepsy Surgery
• Spinal Dysraphism
• Hydrocephalus
• Intraventricular Neuroendoscopy

ROBERT BROWNSTONE  MD, PhD, FRCS
• Professor, Division of Neurosurgery and Medical Neuroscience
Areas of Interest:
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• Program Director, Neurosurgery Residency Program
• Assistant Professor, Department of Surgery
Areas of Interest:
• Pediatric Neurosurgery
• Pediatric Epilepsy Surgery
• Spinal Dysraphism
• Hydrocephalus
• Intraventricular Neuroendoscopy
Neurosurgery Residents

PHILIPPE MAGOWN MD
Postgraduate Year 6
MDCM McGill University
Quebec, Canada
Dr. Philippe Magown obtained his medical degree at McGill University in Montreal, Quebec in 2005. Dr. Magown is doing PhD research in Dr. Brownstone's laboratory, focusing on embryonic stem cell research. Dr. Magown is expected to complete his residency training with Dalhousie University this year.

JULIA RADIC MD
Postgraduate Year 6
MD Queens University
Ontario, Canada
Prior to obtaining her medical degree, Dr. Radic attended the University of Miami where she earned her Bachelor of Science in Physics and Marine Science. Her elective training in neurosurgery at Dalhousie University and the Hospital for Sick Children in Toronto influenced her decision to pursue Neurosurgery training. Dr. Radic completed her Master's in Public Health at Harvard University in 2013. She is expected to complete her residency training with Dalhousie University this year.

DAVID BRANDMAN MD
Postgraduate Year 4
MD University of Calgary
Alberta, Canada
Dr. David Brandman obtained his medical degree at the University of Calgary in 2010. Prior to studying medicine, he pursued a degree in biophysics at the University of British Columbia. Dr. Brandman is currently in PhD studies at Brown University studying brain-machine interface.

GREG JENKINS MD
Postgraduate Year 5
MD Memorial University
Newfoundland, Canada
Dr. Jenkins obtained his medical degree at Memorial University in 2011. He also earned an honors degree in biochemistry at Memorial University in 2007. Dr. Jenkins is expected to complete his residency training with Dalhousie University in 2017.

AARON ROBICHAUD MD
Postgraduate Year 4
MD Dalhousie University
Nova Scotia, Canada
Dr. Robichaud obtained his medical degree from Dalhousie University in 2012. Prior to studying medicine, Dr. Robichaud obtained a Bachelor of Science degree in biology at Mount Allison University. He is pursuing a Master’s degree in Neuro-oncology in Dr. Weeks’ laboratory. Dr. Robichaud is expected to complete his residency training with Dalhousie University in 2018.

AYOUB DAKSON MD
Postgraduate Year 4
MD University of Manchester
Manchester, England
Dr. Ayoub Dakson obtained his MBChB from the University of Manchester, England in 2011 with a Masters in Medical Research (Merit). Prior to this, he completed a BSc (honors) in Medical Sciences in St. Andrews University. Dr. Dakson is expected to complete his training in 2018.

JOHN ADAMS MD
Postgraduate Year 3
MD Memorial University
Newfoundland, Canada
Dr. Adams obtained his medical degree at Memorial University in 2013. Prior to studying medicine, Dr. Adams obtained a Bachelor of Science Degree in Neuroscience. Dr. Adams is expected to complete his training with Dalhousie University in 2019.

HEIDI GODBOUT MD
Postgraduate Year 1
Université de Sherbrooke
Quebec, Canada
Dr. Godbout obtained her medical degree at the Université de Sherbrooke in 2015. Prior to studying medicine, Dr. Godbout obtained her undergraduate degree in Health Sciences. Dr. Godbout is expected to complete her residency training with Dalhousie University in 2021.

OMAR ALSHARIF MD
Postgraduate Year 1
MD King Saud University
Riyadh, Saudi Arabia
Dr. Alsharif obtained his medical degree at King Abdulaziz University in 2011. He joined the department of Neurosurgery at King Abdulaziz University as a teaching assistant in September 2012. In 2013 he began working as a research fellow at the University of Toronto on a scholarship. He is expected to complete his residency training with Dalhousie University in 2021.

DWAINE COOKE MD
International Clinical Trainee
Kingston, Jamaica
Dr. Cooke is a neurosurgery resident from the University of West Indies Neurosurgery Training Program in Kingston, Jamaica. Dr. Cooke is spending 18 months with Neurosurgery at Dalhousie to complete his required out of program training. He will return to Jamaica once his training at Dalhousie is complete.
Clinical Activities

Neurosurgical Procedures

- Cranial Procedures: 21%
- Functional: 9%
- Pediatric: 9%
- Cerebrovascular: 7%
- Other: 23%

Spine: 31%

Ambulatory Care Visits

Admissions

- Cerebrovascular: 7%
- Other: 23%
- Spine: 31%
- Functional: 9%
- Pediatric: 9%

Cranial Procedures

Neurosurgical Procedures

- Y2013: 1200
- Y2014: 1300
- Y2015: 1400
The year has been spent planning the expansion to our Neurosciences Alliance with our Neurology and Orthopedic-Spine partners. This expansion includes an increase in our IMCU capacity from four beds to six, expanding and moving our Epilepsy Monitoring Unit (EMU) from two beds to four beds and amalgamating our Neuro-Ortho Spine (NOS) patients onto our Neurosurgery inpatient unit with an increased capacity from twelve to seventeen beds. These planned renovations have been made possible by funds generously donated through our QEII Foundation. In concert with the planning for the construction changes required, we have been working with Professional Practice to look at our staffing and our models of care for our new Neurosciences Alliance teams who will staff Neurosurgery, NOS, and Neurology.

In 2015, the Neurosurgery Inpatient Unit continued to experience some changeover in nursing staff related to relocations/new positions within Neurosurgery, personal leaves and maternity leaves. In total, we’ve hired nineteen new nursing staff this year: twelve new RNs (five permanent, five in assignments and two casual) and seven LPNs (two permanent, one in an assignment and four casual). In addition to this turnover in staff, we have welcomed two floor nurses into the charge role, Shelley Nikolaev and Dayna El-Hassan. Nicky Ayles has taken a new position in Neurosciences as a clinic nurse and Jill (Northrup) Howarth has stepped in as Resource Nurse. Misay Brinson is our new Brain Neurosciences Alliance with our Neurology and Orthopedic-Spine partners. This expansion includes an increase in our IMCU capacity from four beds to six, expanding and moving our Epilepsy Monitoring Unit (EMU) from two beds to four beds and amalgamating our Neuro-Ortho Spine (NOS) patients onto our Neurosurgery inpatient unit with an increased capacity from twelve to seventeen beds. These planned renovations have been made possible by funds generously donated through our QEII Foundation. In concert with the planning for the construction changes required, we have been working with Professional Practice to look at our staffing and our models of care for our new Neurosciences Alliance teams who will staff Neurosurgery, NOS, and Neurology.

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Planning for the Care
The Academic Neurosciences will create a different bed configuration. We are committed to having the right skill mix to ensure we are able to deliver excellent patient care. Professional Practice, led by Paola Booker and Cathy Ann Casault, have assisted us in looking at our many programs’ services and a complement review for nursing, occupational therapy, physiotherapy, social work, and recreation therapy. Two town halls were organized in November 2015 to review specifics of the project as well as provide an opportunity for staff to ask questions.

Design, Construction and Move
An architectural firm, Stantec, has designed the new 4 bed EMU and a 6 bed IMCU. These plans have been approved by our executive and Department of Health & Wellness. The plans have been put out to tender and various construction companies will bid on the job. Joe Beck, an industrial engineer in Central Zone is working with the leadership team and working groups to best organize all required moves during renovations.

Fundraising
For many years, this has been a dream and in 2013, The QEII Foundation launched a fundraising campaign to support the new Academic Neuroscience Program. In 2015 the QEII Foundation completed its fundraising in the amount of 2.5 million dollars to help us achieve our dream.

We would like to thank the QE II Foundation and the Nova Scotia Health Authority leadership for their support in this endeavor.
Clinical/Research Staff

NICKY AYLES  
RN  
Neurosurgery Clinic

MISSY BRINSON  
RN  
Brain Tumour Liaison Nurse

CORALEA CAREY  
Neurosurgery Clinic Aide & Research Assistant

LYNNE FENERTY  
RN, BN, DD(MP)  
Program Manager: Neuro-Trauma/Injury Prevention

ANDREA L.O. HEBB  
MSc., PhD, RN  
Clinical/Research Coordinator: Brain Tumour Program/Maritime Lateral Skull Base Program/Halifax Neuropituitary Program

RON HILL  
Program Coordinator: Technology/Robotics

JUDITH JARRETT  
RN, CCRP  
Program Coordinator: Cerebrovascular

MURRAY HONG  
PhD  
Imaging Specialist

CAROLYN KELLY  
OT(Reg)  
Program Coordinator: Neuromodulation

LORRAINE JARVIE  
RN  
Research Coordinator: Spine

MURRAY HONG  
PhD  
Imaging Specialist
Clinical/Research Staff (cont’d)

NELOFAR KURESHI MD, MHI
Research Associate: Neurotrauma/Simulation/Spine

LISA MARTIN RN
Research Coordinator: Spine

ANITA MCPHEE RN
Research Coordinator: Spine

ANGELA MEAGHER RN, NP
Neurosurgery Spine Program

CAROL-ANN MILLER RN, NP
Cerebrovascular Program

PHIL NICKERSON PhD
Research Associate: Neurosurgery Spine

SARANYAN PILLAI PhD
Research Associate: Neurosurgery Spine

LESLIE PERRIN RN
Neurosurgery Clinic

SUSAN RAHEY BSc, RET, RT(EMG)
Program Coordinator: Epilepsy

KARINA RANKKA
Health Services Manager: Neurosurgery Clinic

GINETTE THIBAULT-HALMAN RN, CNN(c), MSc
Program Coordinator: Neuro-Trauma/Injury Prevention/Neurosurgery Spine

JACKIE SEAGERS
Neurosurgery Clinic Aide

KAREN VICKERS RN
Brain Tumour Liaison Nurse

CHRISTINE POTVIN RN
Program RN: Neuromodulation

RYAN MITCHELL RN
Neurosurgery Clinic

TIFFANY WEBBER
Spine Referral Triage
The Neurosurgery Spine Program provides comprehensive care to patients with spinal disorders and spinal cord injuries.

**Accomplishments**
- This year, we welcomed Dr. Jacob Alant to the Spine Program. Dr. Alant completed his residency training at the University of Pretoria, and then pursued his spine fellowship at the University of Calgary. Dr. Alant has also completed a Peripheral Nerve Fellowship as well as a Masters in Neuroscience at the University of Calgary. We are extremely pleased that he has joined the team.
- We would also like to welcome our new spine research coordinator, Lorraine Jarvie to the team. Lorraine brings many years of clinical and research experience, in both pediatric and adult settings, to the program.
- We would like to thank best wishes to Phil Nickerson. After four years of research with the Brain Repair Centre and Atlantic Mobility Action Project, focused on secondary spinal cord injury, Phil has accepted a position as a Senior Postdoctoral Research Associate with the University Health Network in Toronto.
- Saranyan Pillai has joined the Brain Repair Centre. Saranyan completed his PhD studies at the University of New Brunswick, Fredericton, and brings experience in physiology, biochemistry, and molecular biology research to the team.
- The Atlantic Canada Spine meeting was held for the seventh consecutive year as a regional CME spine-focused event. The topic of focus was Spinal Deformities. Dr. Stefan Parent of Université de Montréal was this year’s invited guest speaker.
- The Skills Centre for Health Sciences continues to provide learning opportunities in spine procedures for residents and surgeons.
- Monthly Spine Lunch and Learn sessions were provided for the clinical staff of 7.3. These sessions will be expanded to include all neurosurgical programs in 2016.
- In conjunction with the Orthopedic Spine Program, a synoptic template for operative reports has been developed and implemented. This template provides a structured electronic operative report which provides quality clinical data and replaces traditional dictated operative reports.
- In collaboration with the Orthopedic Spine Program, planning and development of an in-house Spine Database is underway. This integrated database will substantially increase the ability to track clinical outcomes, improve patient care, and reduce healthcare costs.

**Research**
Spine program research projects include investigator-initiated studies, as well as multi-centre national and international studies.

- **Accelerometric Gait Analysis of Cervical Myelopathy:** The prospective study analyzed the gait of patients with a diagnosis of cervical myelopathy before and after decompressive surgery using a gait monitor. Enrollment and follow-up are complete, and the study is in the manuscript preparation phase.
- **Incidence and Prevalence of Spinal Cord Injury (SCI) in Nova Scotia:** Data are being analyzed for a retrospective review of traumatic SCI in Nova Scotia spanning nearly three decades. In addition, a detailed retrospective review of aspects of SCI care over a six-year period, including timing of care, adverse events, and adherence to clinical guidelines has been completed. The manuscript for this study is in the submission process.
- **National Spine Surgeon Survey:** We are assessing the national spine surgeon workforce, using data from the Canadian Institute for Health Information (CIHI) to complement a completed national survey of orthopedic surgeons and neurosurgeons.
- **Modic changes in Chronic Lower Back Pain Patients:** Modic changes are specific changes seen in the spine on MRI, and have been associated with infectious processes. The changes are more commonly observed in patients who have low back pain than in the general population. A retrospective chart and radiological review is being conducted to determine whether patients with modic changes have poorer surgical outcomes than those without these imaging features.
- **Titanium Ion Concentrations Following Metal-on-Metal Cervical Arthroplasty:** This prospective study will assess serum titanium levels in patients receiving titanium Medtronic Atlantis Vision Elite Plate or a Titanium Medtronic Cervical Arthroplasty. This prospective study will assess serum titanium levels in patients receiving titanium Medtronic Atlantis Vision Elite Plate or a Titanium Medtronic Prestige LP implant. If titanium is wearing off then it will be detected in the blood, and if titanium levels in the blood are high, then there may be health concerns. These concerns will require further evaluation and may lead to the discontinuation of the surgical procedure in the future.
- **Utility of the Spinal Instability Neoplastic Score (SINS) System in Surgical Practice:** A retrospective chart review of patients with spinal metastatic cancer, to assess the Spinal Instability Neoplastic Score System (SINS) and its clinical utility in predicting surgical treatment decision is underway.
- **Canadian Multicenter Cerebrospinal Fluid Pressure Monitoring and Biomarker (CAMPER) study:** - a national multi-centre clinical trial examining spinal cord perfusion pressure (SCPP) in patients with acute SCI, as well as the effect of different vasopressor agents on SCPP. The study involves spinal fluid samples collected as part of this study will be used to validate a series of biochemical markers correlating with injury severity and predicting neurologic outcome.

We are pleased to be participants in the Biomarkers for Crossing the Translational Divide in Acute Spinal Cord Injury project, led by Dr. Brian Kwon’s team in Vancouver, which was awarded $3 million dollars through the Brain Canada MIIRI competition.
- **The Minocycline in Acute Spinal Cord Injury (MASS) study:** is a Phase III trial investigating the efficacy of IV minocycline in improving neurological and functional outcome after spinal cord injury.
- **This year marks our 8th year of enrollment in the Rick Hansen Spinal Cord Injury Registry (RHSCIR), a national registry of patients with traumatic spinal cord injury (SCI).**
- Using data collected nationally by RHSCIR and previously published inclusion/exclusion criteria for spinal cord injury (SCI) trials, we have examined the feasibility of recruiting subjects for acute SCI clinical trials in Canada. The manuscript for this study is being prepared for submission.
- **The Canadian Spine Society (CSS) Registry** is a national health data registry that tracks outcome measures of the surgical and non-surgical treatments of specific spinal conditions. O/EI Spine Neurosurgeons have chosen to submit information on their patient population who will have a Cervical Arthroplasty procedure, patients with lumbar spondylolisthesis who will be treated with a Transforaminal Lumbar Interbody Fusion and patients who suffer from Cervical Myelopathy and Myeloradiculopathy. We are currently in our 2nd year of enrollment for this registry.
Presentations

Invited Lectures

Funding/Grants

Publications


Team Members:
• Dr. S. Christie, Neurosurgeon, Director, Neurosurgery Spine Program
• Dr. J. Alant, Neurosurgeon
• Dr. S. Barry, Neurosurgeon
• Dr. D. McNeely, Neurosurgeon
• Dr. G. Pickett, Neurosurgeon
• Dr. S. Walling, Neurosurgeon
• Nelofar Kureshi, Research Associate
• Dr. P. Nickerson, Research Associate
• Dr. S. Pillai, Research Associate
• Lorraine Jarvie, Research Coordinator
• Lisa Martin, Research Coordinator
• Anita McPhee, Research Coordinator
• Debbie Amisault, Administrative Support
• Melissa Cook, Administrative Support
• Maureen Kay, Administrative Support

Team Collaborators:
• Dr. W. Oxner, Orthopedic Surgery
• Dr. A. Glennie, Orthopedic Surgery
• Dr. D. Alexander, Orthopedic Surgery
• Dr. Cynthia Dunnig Zwicker, Research Manager, Orthopedic Spine Service
• Dr. C. Short, NS Rehabilitation Centre
• Dr. S. McVeigh, NS Rehabilitation Centre
• Dr. M. Lynch, Pain Management Unit
• Dr. I. Beauport, Pain Management Unit
• Dr. M. Schmidt, Anesthesia
• Dr. S. Morris, Neurophysiology
Neuromodulation Program

Carolyn Kelly – Program Coordinator
Christine Potvin – Program RN

Our neuromodulation program provides neuromodulation care to the people of Atlantic Canada (population ~2.3M). The program focuses on improvements to quality of life primarily for people suffering from movement disorders, complex pain syndromes, and spasticity. The patient population includes patients with implantable neurostimulators for deep brain (DBS), cortical, spinal cord (SCS), and peripheral stimulation, as well as adults with pumps implanted for intrathecal baclofen therapy. We currently follow 218 people with stimulators for movement disorders, and 225 with stimulators for pain.

In addition to regular movement disorder rounds and complex pain rounds, in which patients are seen and evaluated by both a neurosurgeon and a complex pain anesthesiologist, and a treatment plan decided upon.

With their consent, patient information including quality of life surveys and intraoperative microelectrode recording data are kept on a database for analysis.

Various research activities are in progress, including, an analysis of the electrophysiological properties of subthalamic neurons in people with Parkinson’s Disease.

In July 2015 the program bid a fond farewell to neurosurgeon Dr. Rob Brownstone who was with the program for 15 years. In September 2015 the program welcomed spine surgeon Dr. Sean Christie to the SCS program.

Team Members:
• Dr. S. Christie, Neurosurgeon
• Dr. I. Beausprie, Anesthesiologist/Pain Specialist
• Carolyn Kelly, OT, Program Coordinator
• Christine Potvin, Program RN
• Dr. C. Short, Physiatrist
• Ron Hill, Neurosurgery Technology Coordinator
• Murray Hong, Neurosurgery OR/Technical Specialist
• Dr. J. Fisk, PhD, Neuropsychologist
• Dr. D. King, Neurologist (movement disorders)
• Dr. K. Schoffer, Neurologist (movement disorders)
• Dr. R. McKeivin, Neurologist (movement disorders)
• Dr. H. Rigby, Neurologist (movement disorders)

Epilepsy Program

Program Coordinator: Susan Rahey

The Epilepsy Program is a collaborative service supported by the Divisions of Neurology and Neurosurgery. Epilepsy patients referred from Nova Scotia, Prince Edward Island, New Brunswick and Newfoundland have access to:

• specialty outpatient clinics with support from Neuropsychology and Social Work
• a two-bed inpatient Epilepsy Monitoring Unit (Phase I and Phase II studies)
• access to state-of-the-art imaging techniques (3T MRI, fMRI, PET and MEG)
• a variety of surgical options including cortical resection, lesionectomy, corpus callosotomy and vagus nerve stimulator implantation

Program Goals
• To offer people in Nova Scotia, Prince Edward Island, New Brunswick and selected patients from Newfoundland access to a comprehensive epilepsy program including access to investigational drugs and surgical techniques, in a timely fashion. We await with great anticipation the expansion of the EMU along with increased allocation of physician resources to the unit.
• To search for innovative ways to continue to improve all aspects of service, given the resources currently available.

Accomplishments
• There were 46 admissions to the Epilepsy Monitoring Unit (EMU). Included in that total were 4 admissions for invasive recording with subdural strips/grids, depth electrodes or a combination of the two. Epilepsy surgical procedures were performed on 16 patients and more than 1400 patients were assessed in the various outpatient epilepsy clinics.
• The two students enrolled in our EEG Technology Training Program, along with a third student (graduate of La Cité collégiale, Ottawa, Ontario) continued studies to prepare them for the C.B.R.E.T., Inc examinations, with an expected date of completion in May 2016.
• Funding for the Neurosciences Project, “Brain-Spine-Spirit: The Neuroscience Alliance” has concluded. The project will begin in early 2016 and includes expansion of our EMU from 2 to 4 beds.
• Weekly epilepsy case conferences continue to be widely attended by team members along with colleagues from the IWK Health Centre and the MEG laboratory. Discussions of outpatient and EMU cases are augmented by a monthly journal club.
• We continue to benefit from access to fMRI, PET, MEG and 3T MRI scanning for pre-surgical assessment.
• Educational opportunities were made available to community groups, nursing, technical and medical students and staff and to colleagues attending various local, national and international meetings. The results of research projects were presented at national and international professional meetings.
• Celebration of Purple Day for Epilepsy Awareness on March 26 continues to be a high point of the year, with many staff and patients volunteering or attending our booth for purple cupcakes and education.
• We continue to benefit from the enthusiasm and commitment brought to the program by Residents assigned to the Epilepsy Program.
Research
Team members are engaged in clinical and bench research, including drug trials, neuropsychological profile development, brain stimulation and imaging techniques/modalities.

Challenges
The loss of Dr. Robert Brownstone to Queens Square in London England was mitigated solely through the efforts of our remaining surgeon, Dr. David Clarke. Our surgical numbers remained stable. Efforts to identify an additional epileptologist to support Dr. Sadler have remained fruitless. Difficulties continue with scheduling OR time, a nationwide shortage of trained EEG Technologists and intermittent antiepileptic drug shortages in Canada.

Future Directions
Program Members continue their commitment to the betterment of epilepsy care in our region and beyond. Technical advances within the epilepsy surgery program continue.

Team Members:
- Dr. D. Clarke, Neurosurgeon
- Dr. D. McNeely, Neurosurgeon
- Dr. R. Mark Sadler, Neurologist
- Dr. B. Pohlmann-Eden, Neurologist
- Susan Rahey, Neurology, Program Coordinator
- Dr. A. Omsaade, Neuropsychologist
- Dawnette Benedict-Thomas, Psychometrist
- Karen Legg, Neurology, Nurse Practitioner
- EEG Technologists
- Heather Smith, Social Worker
- Rachel Millet, Social Worker

Team Collaborators:
- Divisions of Neurology, CDHA and IWKHC
- Neuropsychologists
- Neuroscience and Perioperative Nursing Staff
- Biomedical Translational Imaging Centre Staff
- Maritime Medical Genetics Service
- Health Services Managers
- Biomedical Engineering
- Sterile Processing

Neurosurgery Simulation Program

Neurosurgical simulation training has the potential to become an important educational tool for residents, surgeons, and perioperative clinicians. Postgraduate medical education governing bodies including the Accreditation Council for Graduate Medical Education and the Royal College of Physicians and Surgeons of Canada mandate residency programs to teach and assess trainees in core competencies that encompass cognitive, psychomotor and affective domains. Simulation-based training and assessment is a valuable platform for teaching and evaluating procedural skill competence in many clinical disciplines. The Neurosurgery Simulation Program is led by Dr. David Clarke and supports the advancement of innovative simulation-based learning for health professionals. The program is facilitating opportunities for commercialization of simulation technologies in Atlantic Canada.

Vision
To enhance education and skills across clinical disciplines and healthcare professions through simulation-based training and assessment.

Mission
- To create a comprehensive surgical simulation program serving a variety of disciplines
- To define and measure knowledge and skill competencies of all learners
- To foster research and commercialization of simulation-based education

Accomplishments
- Dr. David Clarke was invited to Chair the Royal College of Canada’s Innovation and Technology Task Force
- HD quality video-recording equipment and lighting has been installed in the neurosurgical suite of the QEII, which will facilitate development of a simulation platform.
- PeriopSim™, an iPad app for clinicians who need to learn about new surgical devices, instruments and techniques is being developed by Conquer Mobile in collaboration with Dr. David Clarke, Dr. Ryan D’Arcy (Simon Fraser University), Dr. James Bond (Surrey Memorial Hospital), and Denise Lalanne (BIOTEC). PeriopSim™ is available as a free preview version on the App Store.

Research
PeriopSim™ is currently under evaluation for its training utility in surgical teaching programs at Dalhousie University and the QEII HSC.

- Simulation Training for Neurosurgery Residents: The PeriopSim™ platform was tested in a pilot study on neurosurgery residents at the Canadian Neurosurgery Rookie Camp in 2014 and 2015.
- Simulation Training for Perioperative Nurses: The PeriopSim™ platform is being evaluated in the “100 Nurses” research study to assess the effectiveness of surgical simulation training for perioperative nurses. The study measures the effectiveness of simulation training to increase novice perioperative nurses’ ability and confidence in identifying surgical instruments. It will also identify the aspects of simulation that nurses find most useful for learning.
Cerebrovascular Program

Director: Dr. Gwynedd Pickett
Coordinator: Judith Jarrett

The Cerebrovascular Program is a multidisciplinary program involving neurosurgeons, neuroradiologists, stroke neurologists, nurses and trainees in each of these disciplines. Halifax is the referral centre for the treatment of cerebrovascular disorders in Atlantic Canada with extensive experience in surgical and endovascular management of aneurysms and arteriovenous malformations (AVM), and the only centre with a stereotactic radiosurgery program for the treatment of patients with AVMs. The cerebrovascular team meets weekly to review clinical cases and discuss recommendations for a multidisciplinary evidence-based approach to patient care.

Program Goals

• To treat patients with cerebrovascular disorders using the latest technology.
• To advance the knowledge and techniques for the treatment of cerebrovascular disorders through education and research.
• To translate research into evidence-based practice.

Research

We have had an active year in research, participating in several multi-center studies and local investigator driven studies as listed below. We maintain a number of databases that provide valuable information for local research endeavours.

Accomplishments

• HEAT – Multicenter randomized controlled trial of new generation Hydrogel coils versus bare platinum coils in the endovascular treatment of intracranial aneurysms. Currently enrolling, 22 subjects enrolled.
• ESCAPE – Endovascular Treatment for Small Core and Anterior Circulation Proximal Occlusion with Emphasis on minimizing CT to recanalization times. Five subjects enrolled.
• NAVIGATE ESUS – Secondary Prevention of Stroke in Patients with ESUS. Currently enrolling, one subject enrolled.

Ongoing Local Studies

Evaluation of the Unruptured Intracranial Aneurysm Treatment Score: how does it compare with treatment decisions made by a multidisciplinary team? Principal Investigator: Dr. GE Pickett.

Management of Ruptured Intracranial Aneurysms in a Canadian Tertiary Care Centre: clinical outcomes for coiling and clipping over a ten-year period post-ISAT. Principal Investigator: Dr. GE Pickett.

Intracranial Aneurysm Measurement with Magnetic Resonance Angiography: what is the smallest change that signifies growth? Principal Investigator: Dr. M Schmidt.

TCT Perfusion Imaging to Predict Vasospasm in Subarachnoid Hemorrhage. Principal Investigator: Dr. GE Pickett. Funding from the Capital Health Research Fund

Intracranial Aneurysm Measurement with Magnetic Resonance Angiography: what is the smallest change that signifies growth? Principal Investigator: Dr. M Schmidt.

Cerebrovascular Program

Team Members:
• Dr. D. Clarke, Neurosurgeon
• Murray Hong, Neurosurgery OR/Technical Specialist
• Ron Hill, Neurosurgery Technology Coordinator
• Lynne Fenerty, Program Manager
• Ginette Thibault-Halman, Program Coordinator
• Nelofar Kureshi, Research Associate

Team Collaborators:
• Dr. Ryan D’Arcy, Department of Computing Science, Simon Fraser University
• Denise Lalanne, BIOTEC

Funding and Grants

$30,000- Brain Repair Centre- Knowledge Translation Grant. Virtual Reality Neurosurgical Simulation Education and Training, Principle Investigator: David Clarke
Co-Investigators: N. Kureshi, M. Hong

$370,000- ACOA’s Business Development Program, Government of Canada. Supporting the development and commercialization of neuro-based technologies intended to effect meaningful change in the treatment of brain disorders and disease as well as train the next generation of neurosurgeons and nurses via neurosurgical teaching simulation, Principal Investigator: David Clarke
Co-Investigators: Steven Beyea, Lauren Petley, Tim Bardouille, Denise Lalanne

presentations/workshop
clarke db, kureshi n, hong m (brien s, quasty m, kirkpatrick, a)
integrating simulation training into medical education and assessment. royal college simulation summit, 2015.

funding and grants
$30,000- brain repair centre- knowledge translation grant. virtual reality neurosurgical simulation education and training, principle investigator: david clarke
co-investigators: n. kureshi, m. hong

$370,000- acoa’s business development program, government of canada. supporting the development and commercialization of neuro-based technologies intended to effect meaningful change in the treatment of brain disorders and disease as well as train the next generation of neurosurgeons and nurses via neurosurgical teaching simulation, principal investigator: david clarke
co-investigators: steven beyea, lauren petley, tim bardouille, denise lalanne
Future Directions
Program members continue to work together to improve the care of patients with cerebrovascular disorders in Nova Scotia and the Atlantic Provinces. We anticipate that 2016 will see expansion of local research endeavours, and improvements in our stereotactic radiosurgery program.

Publications


Invited Presentations

Team Members & Collaborators:
- Dr. G. Pickett, Director, Neurosurgeon
- Judith Jarrett, Program Coordinator
- Carole-Ann Miller, Specialty Nurse Practitioner
- Dr. A. Weeks, Neurosurgeon
- Dr. G. Gubitz, Neurologist
- Dr. S. Phillips, Neurologist
- Dr. L. Green Neurologist
- Dr. W. Maloney, Neuroradiologist
- Dr. R. Vandorpe, Neuroradiologist
- Dr. M. Schmidt, Neuroradiologist
- Dr. J. Shankar, Neuroradiologist
- Dr. J. Heidenreich, Neuroradiologist
- Dr. A. Al-Habbi, Neuroradiologist
- Dr. A. Quateen, Neurointerventional Fellow
- Dr. A. Quateen, Neurointerventional Fellow
**Brain Tumour Program**

*Program Co-Chairs: Drs. Simon Walling and Adrienne Weeks*

*Research Coordinator: Andrea Hebb*

*Brain Tumour Liaison Nurse: Karen Vickers/Missy Brinson*

The Brain Tumour Program is a multidisciplinary program involving neurosurgeons, medical oncologists, radiation oncologists, neuropathologists, neuroradiologists, and nurses, and trainees of each of these disciplines. Weekly meetings of the Neuro-oncology/Cancer Site Team provide evidence-based recommendations for patient management. This team organizes visiting speakers and rounds and is responsible for the development of provincial guidelines for the management of patients with brain tumours.

The Halifax Brain Tumour Support Group holds meetings every 2nd Tuesday of each month at:

The Lodge That Gives,
5836 South Street
Halifax, NS

Brain Tumour Support Groups help survivors, family and caregivers through their journey with a brain tumour in a number of ways:

- Providing connections with others who have faced life with a brain tumour thereby offering reassurance, reducing feelings of isolation and reinforcing a positive, hopeful attitude.
- Sharing practical information to:
  - help make informed decisions about brain tumour treatment options;
  - learn about relevant community resources;
  - enhance coping skills in order to reduce anxiety, feelings of loss of control and fear of the unknown, changes in family roles and financial strain as a result of a brain tumour diagnosis;

See more at: http://www.brain tumour.ca/280/halifax nova scotia/thishash.TvDLP/Lw.png

Our prospective epidemiology Brain Tumour Database continues - with over 3500 patients currently entered.

*Research Update*

Dr. Simon Walling (PI) in collaboration with Dr. Conrad Fernandez (PI) at the IWK, Dr. Adrienne Weeks (Associate Investigator), Dr. Dan McNeely (Associate Investigator) and Andrea L.D. Hebb, (Associate Investigator) in collaboration with Dr. Nada Jabado at McGill University/McGill University Health Center, have received Genome Canada funding of $50,000.00 for “Biobanks for Pediatric and Adult High Grade Astrocytoma through Genomics and Epigenomics” a Canada wide study for adult patients under the age of 50 and children, and their families surveying their thoughts surrounding receiving genetic research results.

A sub-study under this grant involves collecting tumour samples in patients with high grade astrocytoma, with the formation of human tumour cell lines in the basic science laboratory of Dr. Adrienne Weeks (PI) and Dr. Simon Walling (PI) and co-investigators Dr. David B. Clarke, Dr. Dan McNeely and Andrea L.D. Hebb, MSc, PhD, RN in collaboration with Dr. Sid Croul, Pathology & Laboratory Medicine.

*Team Members:*

- Dr. S. Walling, Neurosurgeon, Co-Chair
- Dr. A. Weeks, Neurosurgeon, Co-Chair
- Dr. S. Kirby, Neurologist, Co-Chair
- Dr. D. Mcneely, Neurosurgeon
- Dr. D. Clarke, Neurosurgeon
- Dr. G. Pickett, Neurosurgeon
- Missy Brinson, Neurosurgery Brain Tumour Liaison Nurse
- Andrea Hebb, Neurosurgery Research Coordinator
- Dr. S. Croul, Neuropathologist
- Dr. A. Easton, Neuroradiologist
- Dr. D. Rheume, Radiation Oncologist
- Dr. L. Mulroy, Radiation Oncologist
- Dr. M. Neill, Medical Oncologist
- Dr. M. Schmidt, Neuroradiologist
- Dr. J. Shankar, Neuroradiologist
- Heather MacKenzie, Coordinator, Cancer Care Nova Scotia
- Marlene Sellon, Pharmacist
- Erin Little, Research Coordinator

**Neurotrauma and Injury Prevention Programs**

*Program Co-Leads: Drs. Simon Walling and David Clarke*

*Program Coordinators: Lyne Feneryt/Ginette Thibault-Halman/Nelofar Kureshi*

Neurotrauma continues to be a leading cause of death and disability in Nova Scotia. The number of major trauma cases provincially continues to increase annually. Nova Scotians suffer major trauma at an annual rate of 1 per 1000 people; among those, 40% are afflicted with a serious traumatic brain injury (TBI). The most common mechanisms of injury are falls (44%) and motor vehicle crashes (27%). Ongoing surveillance demonstrates that there are significant regional variations in the prevalence of major TBI in the province.

The annual economic burden of traumatic injury in Canada and Nova Scotia is estimated at $26.8 billion and $770 million respectively. The human cost for patients and families suffering TBI is tremendous, and is particularly tragic given that up to 95% of injuries have a preventable component.

The Neurotrauma and Injury Prevention programs are dedicated to improving traumatic brain injury (TBI) care for patients and families across the spectrum of injury, with an emphasis on knowledge translation. The programs collaborate across multiple sectors to deliver targeted, evidence-based injury prevention and clinical programming for TBI care.

**Mission**

- Promote leadership in injury prevention and neurotrauma research, advocacy, education and knowledge translation.
- Collaborate with partners to design and deliver targeted injury prevention strategies and trauma system improvements.

**Goals**

- Develop evidence-based care pathways to accelerate access to neurosurgical care, reduce lengths of stay and optimize patient outcomes.
- Provide excellence in injury prevention programming and education through an evidence-based approach.
- Support advocacy efforts and enhancement of service provision throughout the spectrum of injury, across the continuum of care from prevention to the community.

**Accomplishments**

- In partnership with the Nova Scotia Rehabilitation Centre, a telephone follow-up program has been implemented for TBI patients discharged from the neurosurgical unit. A phone interview shortly after discharge provides assessment and support for TBI patients in the community.

- In collaboration with the Neurosurgery Quality Committee, an evidence-based clinical care pathway for TBI patients is under development.
- We are working closely with Case Costing (NSHA-Central Zone) to capture neurotrauma-related surgical costs.
- The Government of Nova Scotia is developing the province’s first acquired brain injury (ABI) Strategy. Along with the Department of Health and Wellness, multidisciplinary service providers, and brain injury survivors, we are members of the working group for the development of this strategy.
- In a partnership with the Division of Physical Medicine and Rehabilitation, Department of Family Medicine, and the Department of Emergency Medicine, we are working to develop a multi disciplinary concussion clinic.
- We have partnered with medical students at Dalhouse University for the implementation of “Concussion U”, a concussion interest and education group founded by medical students.
- A Concussion Nova Scotia resource website is being launched. The website will provide a clinical toolkit for concussion management as well as resources for patients and families.

**Research**

*Ongoing Projects:*

- All TBI cases admitted to the QEII are reviewed at weekly TBI teaching rounds, chaired by Dr. Clarke. Over 2000 cases have been reviewed to date for inclusion in the TBI database, as well as for quality improvement purposes.
- A retrospective chart review comparing outcomes for different treatment modalities in the management of chronic subdural hematomas has been completed and is in the manuscript preparation phase.
- A multivariate regression analysis has been completed examining the influence of multiple factors on expeditious access to tertiary care. A manuscript is currently in preparation.
- We are members of the Canadian Traumatic Brain Injury Research and Clinical Network, a partnership of Canadian basic and clinician scientists focused on TBI research. Within this group, we are members of the Network’s Health Care Utilization Task Force, which will use national administrative datasets to examine TBI patients’ usage of health care resources.
- Data from the Quantitative Analysis of Ski and Snowboard Helmet use in Nova Scotia study have resulted in the implementation of the first all-ages Snowsport helmet legislation in the world, resulting in a 100% legislation compliance rate across all ages and ski hills in NS.
- In partnership with the Department of Health and Wellness and the Nova Scotia Trauma Program, we have undertaken an investigation of the incidence and economic burden of alcohol-related traumatic brain injury in Nova Scotia.


Hammonds Plains, NS, June 2015.

Cord Injury Prevention Program, Kingwood Elementary School, Christie S, Thibault-Halman G.


Conference Presentations


Community Presentations


Fenerty L. Dalhousie University Environmental Health and Safety Expo, October 2015.


Conference Presentations


HALIFAX NEUROSURGERY 2015 ANNUAL REPORT

| BACK ROW: Dr. S. Walling, Dr. D. Clarke | FRONT ROW: M. Moores, N. Kureshi, G. Thibault-Halman, L. Fenerty |

HALIFAX NEUROSURGERY 2015 ANNUAL REPORT

HALIFAX NEUROSURGERY 2015 ANNUAL REPORT

| BACK ROW: Dr. S. Walling, Dr. D. Clarke | FRONT ROW: M. Moores, N. Kureshi, G. Thibault-Halman, L. Fenerty |

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HALIFAX NEUROSURGERY 2015 ANNUAL REPORT
Research/Program Development

We held our HNP Retreat at White Point Beach Lodge on June 25, 2015.

In collaboration with the IGNITE team of researchers (http://igniteproject.ca/team/view/11) we are continuing to collect sellar/parasellar tumor tissue intra-operatively under the protocol “Functional and Genetic Analysis and Banking of Neuro-Oncological Disease Tissues”. We hope to develop a better understanding of the genetic and functional pathways that confer an increased risk of developing and perpetuating neuro-oncological diseases (NODs), including neuroepithelial tumors.

Health Canada Phase III clinical trial “Assessment of the Efficacy of Stereotactic intracavitary instillation of 90yttrium colloid for treatment of cystic lesions of the pituitary and surrounding areas (sellar/parasellar region)” has recruited six patients. In collaboration with Dr. Steve Burrell and Dr. George Mawko, we are the first group to use PET to visualize 90yttrium colloid within the cyst. An initial manuscript (see below) has been accepted for publication.

Capital Health Research Fund “Non-functioning pituitary adenomas biomarkers” was approved for funding in 2014 and we are actively recruiting patients.

Team Members:
- Dr. D. Clarke, Neurosurgeon
- Dr. A. Imran, Endocrinologist
- Dr. E. Massoud, Otolaryngologist
- Dr. A. Mishra, Ophthalmologist
- Dr. C. Yip, Endocrinologist
- Dr. D. Zwicker, Endocrinologist- Sydney, NS
- Dr. A. McGibbon, Endocrinologist- Fredericton, NB
- Lisa Tramble, Endocrinology Clinic Nurse
- Andrea Hebb, Research Coordinator
- Raven Glasgow, Program Clinic Coordinator
- Dr. S. Croul, Neuropathologist
- Dr. S. Burrell, Diagnostic Radiologist
- Dr. G. Mawko, Diagnostic Radiologist

The Stereotactic Radiosurgery Group:
- Dr. L. Mulroy, Radiation Oncology
- Dr. D. Rheaume, Radiation Oncology

Team Collaborators:
- Diagnostic Imaging
- Nova Scotia Eye Centre

Maritime Lateral Skull Base Program

Program Co-Directors: Drs. Manohar Bance, David Morris and Simon Walling
Andrea Hebb: Research Coordinator
Clinic Coordinator: Jackie Seagers

The Maritime Lateral Skull Base Clinic provides coordinated care through Otolaryngology, Neurosurgery and the Stereotactic Radiotherapy Group to patients with unilateral or bilateral vestibular schwannomas, acoustic neuromas and a range of other lateral skull base tumours.

The program provides coordinated care to over 650 patients with a range of lateral skull base tumours including vestibular schwannomas, other cerebellopontine angle tumours, lesions of the petrous apex and jugular foramen. Patients are carefully assessed and appropriate plans formulated. When treatment is required, the experts on our team provide a full range of treatment options including surgery, stereotactic radiation therapy (SRT), and balance and hearing rehabilitation. This program is unique in Canada in allowing members from all disciplines to formulate management decisions in the same clinic.

NF2 Clinics continue to be held once every 2nd month. This clinic is dedicated to patients with Neurofibromatosis Type 2 and includes collaboration with Medical Genetics, Radiology, Nova Scotia Hearing and Speech as well as Ophthalmology.

Our program referrals have increased tremendously, with 59 new Maritime Lateral SBC referrals, to include 14 from New Brunswick and 4 from PEI, representing a substantial increase in the number of patients seen in 2014 from previous years. Three hundred and fifty clinic visits occurred in 2015.

Program Goals
- To offer a single centre, multidisciplinary approach
- To be an internationally recognized centre for lateral skull base lesions
- To be at the forefront of clinical research in lateral skull base lesions
- To maintain a detailed database allowing critical appraisal of current treatment strategies
- To be sensitive to new developments in our specialty allowing us to be critical of our practice and outcomes
- To change our practice in light of evidence based research
Research
We have developed several research fronts in this program. Some are listed below:
• What is useful hearing? Speech in noise comprehension with asymmetric hearing in acoustic neuroma subjects, when does the tumor ear stop contributing to binaural hearing? • Database of tumor growth and outcomes. One of the largest series in the world with the “wait and scan” policy • Patient expectations and attitudes to acoustic neuroma – questionnaire for all patients in our database • Subjective hearing handicaps measured with standardized instruments • Tinnitus and quality of life questionnaires added to each clinic visit.

Publication

Team Members:
• Dr. Simon Walling, Neurosurgeon
• Dr. Manohar Bance, Otolaryngologist
• Dr. David P. Morris, Otolaryngologist
• Andrea Hebb, Research Coordinator
• Jackie Seagers, Clinic Coordinator

The Stereotactic Radiosurgery Team
• Dr. L. Mulroy, Radiation Oncology
• Dr. D. Rheaume, Radiation Oncology
• Mark Gulliver, Audiologist
• Dr. Marie Earl, Dalhousie University School of Physiotherapy
• Maritime Medical Genetics, IWK Health Centre

Pediatric Neurosurgery
This was another busy year for Neurosurgery at the IWK Health Centre. Our goal is to offer the highest quality clinical service to pediatric patients of the region, in collaboration with our colleagues at referring sites. We also strive to offer high quality teaching, and to contribute to the advancement of knowledge through our participation in research.

Team Members and Collaborators:
• Dr. P. Daniel McNeely, Chief, Pediatric Neurosurgery
• Dr. Simon A. Walling, Neurosurgery
• Marie MacNeil, Neurosurgery Clinic Nurse
• Kelly Boileau, Brain Tumour Clinic Nurse
• Sheila Coutts, Craniofacial Clinic Nurse
• Janet Woods, Neurosurgery OR Nursing Team Lead
• Dr. Susan Morris, Neurophysiologist
• Cathy Caron, Administrative Assistant
• Chrissy Shay, Administrative Assistant
• Steve Van-Iderstine, Research Associate
• Pediatric Neurology
• Pediatric Anesthesia
• Pediatric Neuroradiology
• Pediatric Critical Care
• Neonatology
• Neuropsychology
• Pediatric Hematology Oncology
• Radiation Oncology
• Neuropathology
• Pediatric Orthopedics
• Pediatric General Surgery
• Pediatric Urology
• Plastic and Reconstructive Surgery
Intraoperative neurophysiological monitoring (IONM) uses electrophysiological techniques to provide ongoing feedback about brain and spinal cord function during higher risk neurosurgeries. IONM acts as an early warning signal, enabling timely intraoperative intervention and avoidance of post-operative deficits such as paralysis. Neurosurgeries that most benefit from IONM include brain and spinal cord tumour resections and complex spinal deformity corrections. In addition to providing critical warnings about nervous system status, IONM can be used as an intraoperative mapping and guidance tool to complement imaging studies such as MRI.

Publications
Neurosurgey Basic Science Labs
Life Sciences Research Institute (LSRI)
Brain Repair Centre (BRC)

Spinal Cord Injury Laboratory

Dr. Sean Christie

Dr. Christie's lab has a number of research initiatives aimed at elucidating our understanding of CNS injury, from both cellular and genetic perspectives. This year marks a continuation of exciting partnership projects with local private industry and the development of modernized protocols for whole tissue imaging of spine and brain tissue. We have also secured Department of Surgery seed funding for our collaborative pig model of spinal cord injury. Our current research projects are as follows:

• Adaptation of methodologies for whole tissue analysis of animal and cell line models, including pig, transgenic, mouse and human cell lines.

• Characterization of blood flow autoregulation in pigs. Although blood flow autoregulation and reperfusion kinetics have been well characterized in the brain, less is known about this process in the human spinal cord. The pig spinal cord exhibits a remarkably similar size and genetic composition to that seen in humans. This year, we have secured funds to generate a detailed view of autoregulatory responses in the pig spinal cord, following augmentation of blood pressure. This analysis will use multi-spectral fluorescent microspheres, flow cytometry, and laser scanning confocal microscopy techniques.

• Development of a novel model of spinal cord injury in pigs. Our collaboration with Dr. Michael Schmidt (Anesthesia) and Dr. Susan Morris is entering its fourth year. This procedure uses neurophysiological monitoring, total intravenous anesthesia and nephrological techniques in order to perform a precisely graded compression injury. Tissue procured from spinalized pigs is then used for a number of follow-up analyses (lipid peroxidation and microRNA screening) and serves as a proxy to the genetic and anatomical landscape seen in humans.

• Development of methodologies for identifying and analyzing spinal cells that are sensitive to secondary spinal injury progression. Following an initial mechanical trauma to the spinal cord, there is a progressive cascade of cell death that involves changes in the biochemical and genetic climate of cells in proximity to the injury site. This "secondary spinal cord injury" mechanism is a central theme of our lab. To date, we have been characterizing a novel class of lipid peroxidation sensor for use in screening injured animal spinal tissue for early secondary injury events. The ability to isolate and enrich cells that exhibit sensitivity to secondary spinal cord injury allows us to screen for changes in gene regulation that may be central to the progression of this disease. In order to generate a more complete view of gene regulation across a number of cellular contexts, we perform this research in a variety of animal and cell line models, including pig, transgenic mouse, rat and human cells.

Motor Control Laboratory

Dr. Robert Brownstone
http://www.medicine.dal.ca/research/motorcontrol.html

Dr. Robert Brownstone established the Motor Control Laboratory in 2000, after joining Dalhousie Medical School from the University of Manitoba. In 2012, he and his research team relocated the lab from the medical school's original research tower to the new Life Sciences Research Institute. Dr. Brownstone and his colleagues have established a state-of-the-art neuroscience research facility.

The primary goal of the lab is to identify and characterize neural circuits that control movement. Understanding these circuits is critical for the development of strategies that will lead to improvements in quality of life in people with peripheral nerve or spinal cord injuries or other diseases of their nervous system that impair their ability to move. Diverse techniques are used to study central nervous system circuits, including electrophysiology, multiphoton microscopy, molecular biology, immunohistochemistry and computer modelling.

We work in close collaboration with research teams in adjacent labs that are also pursuing solutions to mobility problems as part of the Atlantic Mobility Action Project (www.amap.ca). This proximity enables the active sharing of resources and cross-pollination of ideas to create a vibrant atmosphere of discovery.

Neuron Survival & Regeneration Laboratory

Dr. David Clarke

The Neuron Survival and Regeneration Laboratory focuses on understanding the neuronal response and developing strategies aimed at enhancing the survival and regeneration of injured neurons. We are currently examining the role of cell surface molecules on survival of injured neurons and using genetic knockout models to examine functions of specific molecules.

Brain Tumour Laboratory

Dr. Adrienne Weeks

Dr. Weeks is establishing a basic science laboratory to investigate molecular mechanisms underlying treatment-resistant brain tumour growth.
Neurosurgery Funding

(PI = Principal Investigator)

Dr. Rob Brownstone (PI)
2014-2019
Canadian Institutes of Health Research
Control of Movement: Reticulospinal Circuits
$780,611

Dr. Rob Brownstone (PI)
2014-2019
Canadian Institutes of Health Research
Control of Movement: Spinal Cord Motor Circuits
$961,325

Dr. Rob Brownstone (PI)
2012-2019
Canada Research Chair in Spinal Cord Circuits
$1,400,000

Dr. Sean Christie (PI)
2014-2015
Medtronic of Canada, Ltd.
Unrestricted research grant
$40,000

Dr. David Clarke
(Co-Investigator and several others)
PI: Jamie Hutchison
2015-2018
Brain Canada Platform Support Grant (Matching contributions provided by the Division of Neurosurgery, the Department of Surgery and Capital Health)
A National Biobank and Database for Patients with Traumatic Brain Injury
$3,000,000

Dr. David Clarke
(Co-Investigator and several others)
Pt's: Jamie Hutchison, Alexis Turgeon
(co-leads)
2015-2019
Canadian Traumatic Brain Injury Research Consortium (CTRIC) Grant
$1,824,513

Dr. David Clarke
2015
Nova Scotia Health Research Foundation REDI Catalyst Award
Acquiring Imaging Post-processing Software for CT and MR Perfusion and MR Diffusion Research Studies at QEII Health Sciences Centre
$20,000

Dr. Gwynedd Pickett (Co-Investigator and several others)
2014-2015
CURES - The Canadian Unruptured Endovascular Coiling versus Surgical Clipping Trial
$50,000

Dr. Adrienne Weeks (PI)
2014-2015
Beatrice Hunter Cancer Institute Research Seed Grant
$50,000

Dr. Adrienne Weeks (PI)
2015
Dalhousie Medical Research Foundation (DMRF) Equipment Grant
$15,000


**Presentations**

**Invited Lectures**


**Christie, S.** Pragmatic best evidence that you need to know for your practice. 10th Annual Canadian Contemporary Spinal Techniques. Toronto, ON, 2015.


**Clarke, DB.** GE Foundation Academic Neurosciences Program Reception. Halifax, NS, 2015.


**Clarke, DB.** OR Nursing Simulation. Halifax, NS, 2015.

**Clarke, DB.** Initial Diagnosis and Management of Traumatic Brain Injury. Emergency Health Services, Paramedic Performance and Development Division. Dartmouth, NS, 2015.

**Clarke, DB.** Failures in Epilepsy Surgery. Canadian Neurological Sciences Federation 2015 Congress. Toronto, ON, 2015.

**Clarke, DB.** Epilepsy Surgery, A Surgeon’s Perspective. St. John’s Neurosurgery/Neurology Rounds, General Hospital Health Sciences Centre. St. John’s, NL, 2015.

**Clarke, DB.** Initial Diagnosis and Management of Traumatic Brain Injury. Traumatic Brain Injury Trauma Webinar, Nova Scotia Health Authority. Halifax, NS, 2015.


**Clarke, DB.** Epilepsy and Surgical Management. 3rd Annual Ottawa Neurosurgery Review Course. Ottawa, ON, 2015.

**Clarke, S.** Transeptal Puncture for your practice. 10th Annual Canadian Contemporary Spinal Techniques. Toronto, ON, 2015.

**Christie, S.** Pragmatic best evidence that you need to know for your practice. 10th Annual Canadian Contemporary Spinal Techniques. Toronto, ON, 2015.

**Christie, S.** Pragmatic best evidence that you need to know for your practice. 10th Annual Canadian Contemporary Spinal Techniques. Toronto, ON, 2015.


**McNeely, D.** Hydrocephalus and the Emergency Department. IWK Health Centre Emergency Department Rounds, June 24, 2015.


**McNeely, D.** Neurosurgery Essentials for the Pediatric Resident. Pediatrics academic half-day, IWK Health Centre, April 7, 2015.

Neurosurgey Residency Training Program

Dr. Dan McNeely – Director
Tiffany Webber – Program Coordinator

The major objective of the Neurosurgery Residency Training Program at Dalhousie is the development of neurosurgeons who will excel in clinical care and possess all of the skills required to pursue an academic career or community practice. This is achieved by exposure to a broad range of technical problem solving and decision making aspects of neurosurgery over a six-year period. Residents begin training with graduated levels of responsibility in the care of neurosurgical patients, assuming greater responsibility of technical procedures and inpatient care as their training progresses. At the Senior Resident level, independent clinical and operative decision making is promoted and final year Residents achieve confidence in neurosurgical decision making and performance of operative procedures.

We strive to provide an academic environment in which residents are continually challenged to perfect their decision-making skills. Regular teaching rounds and seminars promote resident involvement in discussion of current issues with interaction between residents and attending staff. The emphasis on academic components in the program prepares residents for success in the Royal College Examinations and for laying down the foundation for those who want to develop an academic career.

The Neurosurgery Residency Training Program at Dalhousie includes clinical rotations at the QEII Health Sciences Centre and the IWK Health Centre in Halifax, Nova Scotia, and the Saint John Regional Hospital in Saint John, New Brunswick. This provides residents with exposure to a wide variety of neurological problems, management approaches and excellent academic and clinical education experiences.

The Division of Neurosurgery promotes the role of research in residency training through research programs involving basic research and clinical investigation. There is a commitment to develop a multidisciplinary approach to research involving clinicians and basic scientists. We encourage residents who wish to pursue graduate studies to enrol in the Clinician Investigator Program. Currently there are eight neurosurgery trainees in this program.

Finally, since 2011, we have welcomed visiting neurosurgery residents from the University of West Indies, Kingston, Jamaica. We have been enriched by this experience, and are pleased to have them in our midst.

Neurosurgery Rookie Camp

Camp Director: Dr. David Clarke
The Canadian Neurosurgery Rookie Camp: Training the next generation of Canada’s Neurosurgeons

After three years of hosting the Annual Canadian Neurosurgery Rookie Camp in Halifax, Dr. David Clarke, Founder and Camp Director, was excited to receive feedback that other academic centres across Canada demonstrated an interest in hosting the event. The Division of Neurosurgery, University of Alberta, was chosen to host the 4th Annual Canadian Neurosurgery Rookie Camp with Dr. Cian O’Kelly as Camp Host. On July 10 and 11, 2015, the Camp was held at the Surgical Medical Research Institute, University of Alberta, in Edmonton.

The Rookie Camp is a uniquely Canadian program that provides a learning-intensive environment and successful initiation for neurosurgery residents from across Canada who are beginning their six-year training program. Based on real patient scenarios, they are introduced to the technical, cognitive and behavioural skills needed in neurosurgery, a field that often involves high-stakes and life-and-death situations where efficient decision making is crucial.

Camp material is developed collaboratively by experts from across the country, with top-notch teaching faculty attending the event from various institutions. Dr. Sean Barry spearheaded updating the Rookie Camp Website. Faculty and residents representing virtually every training program across Canada were in attendance. Teaching Faculty from Halifax Neurosurgery at the 2015 Rookie Camp included Dr. Sean Barry, Dr. David Clarke and Murray Hong. Our PGY 1 residents Drs. Heidi Goodbout and Omar AlSharif, participated.

The Canadian Neurosurgery Rookie Camp is endorsed by the Royal College of Physicians and Surgeons of Canada’s Specialty Committee in Neurosurgery and the Canadian Neurosurgical Society. A special thank you to this year’s sponsors: Medtronic, J&J Codman, KLS Martin, Storz, Integra Canada and the Canadian Neurosurgical Society. We are also appreciative of the simulation technology provided by Conquer Mobile Inc.

Visit www.neurosurgeryrookie.ca
Guest Speakers

Dr. Jeff Wilson
Department of Surgery, Neurosurgery
University of Toronto, Ontario
Presentation: Traumatic Spinal Cord Injury: Acute Surgical Management and Predicting the Future

Dr. Nir Lipsman
Department of Surgery, Neurosurgery
University of Toronto, Ontario
Presentation: Brain Circuitry and Human Behaviour: What can go wrong and what can we do about it?

Dr. Alasdair Coles
Department of Medicine, Neurology (Neuroimmunology)
University of Cambridge, UK
Presentation: The development of alemtuzumab as a treatment for multiple sclerosis. The inside story

Dr. David Grimes
Department of Medicine, Neurology (Chief)
University of Ottawa, Ottawa
Presentation: Differential Diagnosis of Hypokinetic Movement Disorders

Dr. Falah Maroun
Department of Surgery, Neurosurgery
Memorial University of Newfoundland
Presentation: A vanishing breed and the changing face of neurosurgery

Dr. Mark Freedman
Department of Medicine, Neurology
University of Ottawa, Ottawa
Presentation: Stem cell therapy in multiple sclerosis

Dr. Nathan Rowland
Department of Surgery, Neurosurgery (Fellowship)
Toronto Western Hospital, Ontario
Presentation: The future Parkinson’s disease patient: Cortical Physiology and the Landscape of Next Generation Therapies

Dr. Giridhar Kalamangalam
Department of Medicine, Neurology
The University of Texas, Houston
Presentation: The relevance of new imaging and EEG techniques in epilepsy

Dr. Lutz Weise
Department of Surgery, Neurosurgery
Goethe University, Frankfurt, Germany
Presentation: The role of Tractography in Deep Brain Stimulation

Dr. Tejas Sankar
Department of Surgery, Neurosurgery
University Edmonton, Alberta
Presentation: Deep Brain Stimulation: where are we now and where are we headed?

Awards and Recognitions

Dr. Phillipe Magown, Resident
Neurosurgery Research and Education Foundation (NREF) Research Grant Fellowship Award
The NREF award is an American not-for-profit organization created by the American Association of Neurological Surgeons (AANS) to support research and education in neurological surgery.

Department of Surgery Best Work in Fundamental Science
This award is presented by the Dalhousie Medical Alumni Association at the Faculty of Medicine, Resident Research Awards.

W.D Stevenson Award Recipient
This award is presented annually to a Neurosurgery Resident for outstanding contributions in basic and clinical research in Neurosurgery.

Dr. David Brandman, Resident
Dalhousie Medical Research Foundation (DMRF) Harold and Ruth Babcock Award
This award is presented to Dalhousie surgical residents.

Dalhousie University Clinical Investigators Program Award
The Dalhousie University Clinician Investigator Program (CIP) is an accredited postgraduate medical education training program of the Royal College of Physicians and Surgeons of Canada.

Canadian Institute of Health Research (CHIR) Award

Neurotrauma and Injury Prevention Programs
Provincial Acquired Brain Injury Strategy
The Government of Nova Scotia, in its work to develop an Acquired Brain Injury (ABI) Strategy, has chosen to work with Neurosurgery as well as the Department of Health and Wellness, multidisciplinary service providers, and brain injury survivors.

Neurosurgery Simulation Program – Dr. David Clarke
ACOA’s Business Development Program, Government of Canada Award
Supporting the development and commercialization of simulation technologies that will be used to train the next generation of neurosurgeons and nurses.

Dr. Gwynedd Pickett, Neurosurgeon
President and Chair of the 46th Atlantic Clinical Neurosciences Society Conference and Annual General Meeting
Halifax, Nova Scotia, May 8-9, 2015

Karina Rankka, Health Service Manager,
Ambulatory Clinics (Neurosurgery Clinic)
1st Place in the STARLIGHT Challenge, Canadian Forces
Karina is member of the Canadian Forces serving with “33 Field Ambulance” in Halifax. Karina was the team captain in this competition, a medical skills and military skills competition that involved 15 teams across Canada. First place earned Karina’s team an opportunity to represent Canada in a competition in England.

Neurosurgery OR Dragon Boat Team – Brain Power
1st Place Healthcare Division - Annual Manulife Dragon Boat Race
The team consists of a multidisciplinary neurosurgery operating room staff.
The Department of Neurosurgery, South East Regional Health Authority Saint John Regional Hospital, Saint John, NB

The Division of Neurosurgery at the Saint John Regional Hospital consists of 4 neurosurgeons with Dr. George Kolyvas as Department Head. Other department members include:

- Dr. Al-Shayji, with an interest in skull base and vascular surgery
- Dr. N. Attabib, residency program director, with special interest in complex spine surgery
- Dr. le Roux, with a special interest in skull base and vascular surgery

All department members have current faculty appointments with Dalhousie.

This year the division celebrated the happy retirement of Dr. Brian Wheelock after decades for positive contribution to Neurosurgery locally and nationally.

The bulk of our practice is in general adult neurosurgery with special areas of expertise and interest as noted in this report. The department collaborates with the Moncton neurosurgical group: our new SRS program supplies this service and Moncton provides complex neuroendovascular service to the province. Our new SRS program supplies this service and Moncton provides complex neuroendovascular service to the province.

The division is strengthened substantially by dedicated neuroscience nurses. Janice Kenney is the neurosurgical case manager and aides in the care of our patients with special responsibility for patient and family relationships. Patti Gallagher is our Clinical Nurse Specialist and unit manager. Carolyn Crawford coordinates our intrathecal spasticity program. Derek Gaudet is our research coordinator.

Affiliated Unit

The SRS program treated its first patient in November, 2012. This is a LINAC based program delivered by a Varian Trilogy using BrainLab software at the Saint John Regional Hospital. We treated close to 60 cases of different pathology brain lesions.

The team is multidisciplinary. Dr. Naz and Dr. Mohiuddin from Radiation Oncology, and Dr. Attabib and Dr. Le Roux from Neurosurgery collaborate with the physicists, technologists and nurses of the Horizon Oncology team to deliver this service. Patients are referred from all New Brunswick and discussed at a regular SRS round. We continue to collaborate with the Halifax SRS program.

Undergraduate

Our neurosurgery group is actively involved with the New Brunswick Dalhouse Medical School program, participating in the Neuroscience teaching, professional competencies, and elective rotation for all four years of undergraduate study.

Residents and Medical students are actively involved in neurosurgery research. The Research in Medicine (RIM) program is an example of research collaboration between the department and the faculty of Medicine.

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These patients have had single or multiple metastases or acoustic schwannomas. We intend to expand our indications for SRS as we gain more experience.

Postgraduate

Saint John neurosurgery is the major affiliate with the Dalhousie neurosurgery residency program; the rotation in Saint John is a mandatory rotation and part of the core training.

During this rotation the residents are exposed to variety of clinical cases including operative experience in complex and minimally invasive spine, skull base and cerebrovascular surgery. There is exposure to a variety of trauma, neuro-oncology and radiology cases. The residents are required to actively participate in a variety of academic activities and teaching rounds during their rotation.

The Dalhousie Neurosurgery residents do this rotation at the Saint John Regional hospital, which is the largest tertiary and general hospital in the province. It is the level 1 trauma center for the province.

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Cross-Appointed Faculty

**Department of Anaesthesia**
Dr. Ian Beauprie, MD, FRCP C
Dr. Adam Law, MD, FRCP C
Dr. Kirk MacQuarrie, MD, FRCP C
Dr. Thomas Coonan, MD, FRCP C
Dr. Orlando Hung, MD, FRCP C
Dr. Michael Schmidt, MD, FRCP C
Dr. Carlo Mariotti, MD, FRCP C
Dr. Karim Mukhida, MD, FRCP C

**Department of Diagnostic Radiology (Neuroradiology)**
Dr. William Maloney, MD, FRCP C
Dr. Robert Vandorpe, MD, FRCP C
Dr. Matthias Schmidt, MD, FRCP C
Dr. Jai Shankar, MD, DM, MSc

**Department of Medicine (Physical Medicine & Rehabilitation)**
Dr. Michael Schmidt, MD, FRCP C
Dr. Robert Vandorpe, MD, FRCP C

**Department of Pathology**
Dr. Alex Easton, MD FRCP C

**Department of Radiation Oncology**
Dr. Liam Mulroy, MD, FRCP C
Dr. Dorianne Rheume, MD, FRCP C

**Department of Surgery (Orthopaedics)**
Dr. Bill Oxner, MD, FRCS C
Dr. Ron El-Hawary, MD, FRCS C

**Department of Surgery (Otolaryngology)**
Dr. Emaid Massoud, MD, FRCS C
Dr. David Morris, MD, FRCS (ORL-HNS)
Dr. Manohar Bance, MB, BSc., FRCS C
Dr. Robert Hart, MD FRCS (C)
Dr. Jonathan Trites, MD, FRCS C

Neurosurgey Administration Staff

D. Amirault  D. Jardine  L. Smith
C. Caron  M. Kay  T. Smith
M. Cook  K. Martin  T. Webber
P. Doucette  C. Roberts  E. Young
M. Duke-Munden  C. Shay

Neurosurgery OR Nurses

J. Barnes Smith  A. George  R. Mann
B. Brake  J. Hoyt  S. Oivanen
J. Derengoski  A. Jurcina  A. Woods
S. Dobbin  D. MacQueen

Neurosurgery OR Attendants

J. Gallant  P. Parsons  T. Thomas
S. Gibson  J. Redmond  J. Tufts
D. Hall  T. Ruggles  R. Williams
L. MacIsaac  G. Sherwood  M. Wilson
N. Murphy  D. Splane