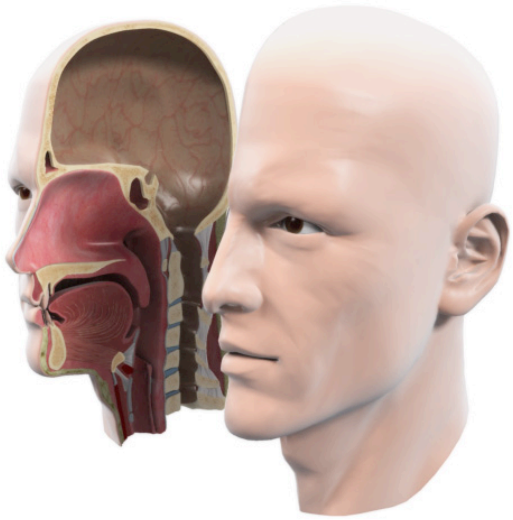
Otolaryngology - Head & Neck Surgery
UNIVERSITY OF TORONTO

The 28th Annual PERCY IRELAND ACADEMIC DAY



Friday May 10, 2019

Hart House, University of Toronto
Music Room, 2nd floor
7 Hart House Circle, Toronto

Percy Ireland Oration

by

Professor Michael J. Cunningham, MD

Juvenile Nasopharyngeal Angiofibroma:
Etiologic Conundrum, Surgical Challenge and Recidivism Risk

THE DEPARTMENT OF OTOLARYNGOLOGY-HEAD & NECK SURGERY

FACULTY OF MEDICINE, UNIVERSITY OF TORONTO

WELCOMES

PROFESSOR MICHAEL J. CUNNINGHAM, MD
HARVARD MEDICAL SCHOOL

THE

PERCY IRELAND VISITING PROFESSOR

MAY 9-10, 2019

Professor Michael J. Cunningham, MD

Michael J. Cunningham, MD is a graduate of Princeton University (1977) and the Rochester University School of Medicine (1981). He completed Pediatrics training at the Massachusetts General Hospital and Otolaryngology training at the University of Pittsburgh. He has practiced as a pediatric otolaryngologist in Boston since 1989.

He is currently Otolaryngologist-in-Chief of the Department of Otolaryngology and Communication Enhancement at Boston Children's Hospital, and Professor of Otolaryngology at the Harvard Medical School. He is the previous Director of the Harvard Residency Program in Otolaryngology, and recently completed a six year term as vice chair of the Accreditation Council of Graduate Medical Education Residency Review Committee responsible for overseeing otolaryngology residency and fellowship training in the United States.

He has played an active role in many professional societies, most notably as a past president of the American Society of Pediatric Otolaryngology, and a past chair of both the American Academy of Pediatrics (AAP) Section on Otolaryngology – Head and Neck Surgery and AAP Surgery Advisory Panel.

His clinical interests include head & neck masses and pediatric sinus disease. He has published approximately 135 manuscripts, 45 chapters, two section editorships and one textbook on these and other educational topics.

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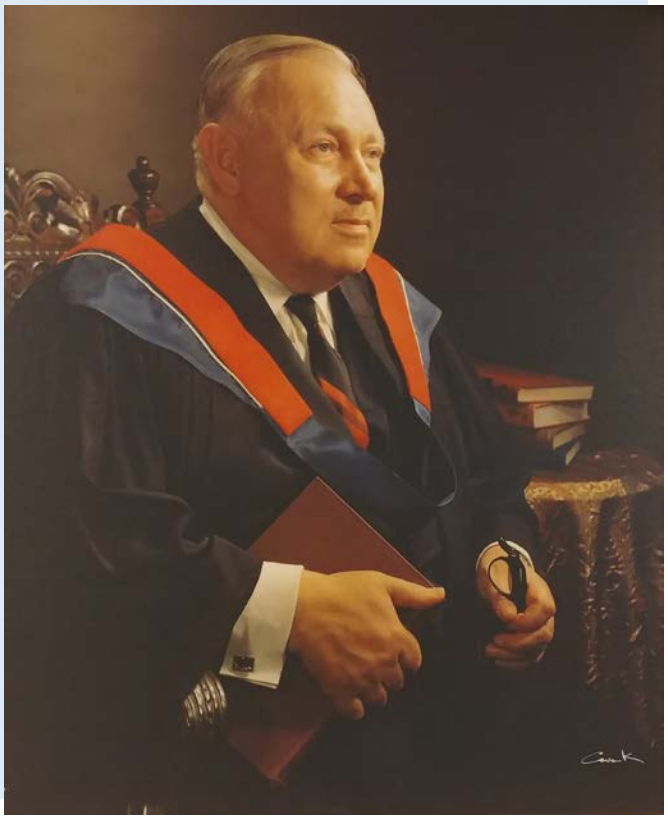


Chair 1946 - 1966

Dr. Ireland was the first full time Professor of Otolaryngology at the University of Toronto. A medical graduate of the University of Toronto, he trained in Otolaryngology with Harris P. Mosher at Harvard. After a distinguished war career, much of it in the Western Desert, he returned to Toronto and was appointed Professor and Chairman in 1946, a position he held, along with that of Otolaryngologist-in-Chief at Toronto General Hospital until 1966. He finished his University career at Sunnybrook Hospital by helping the change over from a Veterans' to a University Hospital. He retired in 1969, leaving as his legacy a strong academic staff, many of whom held high positions in the University.

He was a tough but a self-effacing man, who started the residency-training program in Otolaryngology. He was extremely active in the educational field and it is fitting that his name be remembered in an academic event for trainees.

Visiting Professors

1992	1st	Dr. Robert Ruben	New York
1993	2nd	Dr. Noel Cohen	New York
1994	3rd	Dr. Howard Lampe	London, ON
1995	4th	Dr. Lauren Holinger	Chicago, IL
1996	5th	Dr. Derald Oldring	Edmonton, AB
1997	6th	Dr. Clarence Sasaki	New Haven, CT
1998	7th	Dr. Murray Morrison	Vancouver, BC
1999	8th	Dr. Stephen Harner	Rochester, MN
2000	9th	Dr. Dominique Dorion	Sherbrooke, QC
2001	10th	Dr. Richard Mabry	Duncanville, TX
2002	11th	Dr. Melvin Schloss	Montreal, QC
2003	12th	Dr. Jonas T. Johnson	Pittsburgh, PA
2004	13th	Dr. Phillip Wackym	Milwaukee, WI
2005	14th	Dr. Lanny Garth Close	New York, NY
2006	15th	Dr. Richard Chole	St. Louis, MO
2007	16th	Dr. David W. Eisele	San Francisco, CA
2008	17th	Dr. Robin Cotton	Cincinnati, OH
2009	18th	Dr. Douglas Mattox	Atlanta, GA
2010	19th	Dr. Robert Ferris	Pittsburgh, PA
2011	20th	Dr. Ehab Y. Hanna	Houston, TX
2012	21st	Dr. Carol Bradford	Ann Arbor, MI
2013	22nd	Dr. Michael G. Stewart	New York, NY
2014	23rd	Dr. Jonathan Sykes	Sacramento, CA
2015	24th	Dr. Bradley Welling	Boston, MA
2016	25th	Dr. Mark Wax	Portland, OR
2017	26th	Dr. Dan Fliss	Tel Aviv, Israel
2018	27th	Rodney J. Schlosser	Charleston, SC

Our Residents

PGY2

Justin Cottrell

Terence Fu

Daniel Lee

Shireen Samargandy

Neil Verma

PGY3

Neil Arnstead

Christopher Hong

Florence Mok

Christopher Noel

PGY4

Joel Davies

Mirko Manojlovic Kolarski

Frédérick Laliberté

Sunita Rai

Josie Xu

Graduate Degree Students Presenting

Peter Dixon

Jennifer Siu

Claire McSweeny

Ayesha Noman

Research Fellows Presenting

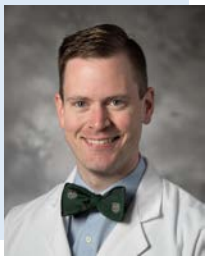
Catriona Douglas

Head & Neck Surgical Oncology
University Health Network
(Dr. Jonathan Irish)

Fatemeh Hassan Nia

Medical & Surgical Otology/Neurotology
University Health Network
(Dr. John Rutka)

Clinical Fellows Presenting



Matthew Crowson

Otology – Skull Base Surgery Fellowship
Sunnybrook
(Drs. Joseph Chen/Vincent Lin)

Paul Douglas-Jones

Medical & Surgical Otology/Neurotology
University Health Network
(Dr. John Rutka)

Patricia Purcell

Paediatric Otolaryngology Fellowship
Hospital for Sick Children
(Dr. Evan Propst)

Sunil Sharma

Paediatric Otolaryngology Fellowship
Hospital for Sick Children
(Dr. Evan Propst)

Program

8:30 Breakfast & Registration
9:00 Introduction by Dr. Ian J. Witterick, Chair
9:05 Opening Remarks

Each speaker has 7 minutes to make their presentation followed by 3 minutes for discussion

Category 1 - Work undertaken by post-residency research fellows/graduate degree students
Session Chaired by Dr. Robert V. Harrison
(7 minutes presentation each, 3 minutes Q&A each)

9:10 **Dr. Jennifer Siu**
The Effect of Energy-based Devices Compared to Conventional Hemostasis on Post-operative Neck Hematoma after Thyroid Operations
Mentors: Drs. Antoine Eskander, Ian Witterick, Gregory Randolph, Regan Bergmark

9:20 **Ms. Claire McSweeny**
Working Memory and Academic Performance Impairments in Children with Hearing Loss
Mentors: Drs. Jennifer Campos, Sharon Cushing, Karen Gordon, Blake Papsin

9.30 **Dr. Peter Dixon**
Improving Hearing State Discrimination Of the Health Utilities Index, Mark 3
Mentors: Drs. Joseph Chen, Sharon Cushing, David Feeny, Murray Krahn, George Tomlinson

9.40 **Ms. Ayesha Noman**
Manipulating the Blood Labyrinth Barrier to Treat Cisplatin-Induced Hearing Loss
Mentor: Dr. Trung Le

9:50 **Dr. Catriona Douglas**
Nanoparticle Mediated Photodynamic Therapy Enables Tumor Specific Ablation in Preclinical Models of Differentiated Thyroid Cancer
Mentor: Dr. Jonathan Irish

10:00 **Dr. Fatemeh Hassan Nia**
Contralesional High-Acceleration Vestibulo-Ocular Reflex Function in Vestibular Schwannoma
Mentor: Dr. John Rutka

Category 2 - Work undertaken by PGY2 residents during clinical rotation
Session Chaired by Dr. Yvonne Chan
(7 minutes presentation each, 3 minutes Q&A each)

10:10 **Dr. Justin Cottrell**
Measuring Quality: Development of Quality Indicators for Chronic Rhinosinusitis
Mentor: Dr. Eric Monteiro

10:20 **Dr. Shireen Samargandy**
Parathyroid Hormone Driven Algorithms After Thyroid Surgery: Not one size fits all
Mentor: Dr. Antoine Eskander

10:30-10:50 C O F F E E B R E A K

10:50 **Dr. Neil Verma**
Evaluation of the Peri-Tumoral Inflammatory Microenvironment in Patients with Oral Cavity Squamous Cell Carcinoma
Mentor: Dr. Douglas Chepeha

11:00 **Dr. Daniel Lee**
Full-house Sinus Surgery versus Limited Sinus Surgery for Chronic Rhinosinusitis in Patients with Cystic Fibrosis
Mentor: Dr. John Lee

11:10 **Dr. Terence Fu**
Surgical Tray Optimization as a Simple Means of Reducing Perioperative Costs
Mentors: Drs. Antoine Eskander, Eric Monteiro, Al Chiodo, William El Masri, Brad Hubbard, Kevin Higgins, Danny Enepekides

Category 3 - Work undertaken by PGY3 residents during clinical rotation

Session Chaired by Dr. Danny Enepekides

(7 minutes presentation each, 3 minutes Q&A each)

11:20 **Dr. Christopher Hong**
Surgical Margins and Outcomes in Oral Tongue Squamous Cell Carcinoma (OTSCC): A Retrospective Chart Review
Mentor: Dr. David Goldstein

11:30 **Dr. Neil Arnstead**
Surgical Safety Culture Among Toronto Otolaryngology Residents
Mentor: Dr. Eric Monteiro

11:40 **Dr. Christopher Noel**
Deriving Health Utility Scores from Head and Neck Cancer Quality of Life Instruments: Mapping UWQoL and EORTC QLQ-C30 & HN-35 onto EQ-5D and HUI-3 Indices
Mentor: Dr. John de Almeida

11:50 **Dr. Florence Mok**
The Impact of Esterified Hyaluronic Acid on Mucosal Scarring and Recurrence Rates After Intact Canal Wall Surgery for Cholesteatoma
Mentor: Dr. Adrian James

12:00-12:50 L U N C H

12:50 Introduction of Visiting Professor

12:55 PERCY IRELAND ORATION

Dr. Michael J. Cunningham
Juvenile Nasopharyngeal Angiofibroma: Etiologic Conundrum, Surgical Challenge and Recidivism Risk

1:40-1:50 Q&A

Category 4 - Work undertaken by PGY4 residents during clinical rotation

Session Chaired by Dr. Jun Lin

(7 minutes presentation each, 3 minutes Q&A each)

1:50 **Dr. Frédérick Laliberté**
Volumetric Comparison of Bone Resorption in Fibula Versus Scapula Tip Free Flap in Mandibular Reconstruction
Mentor: Dr. David Goldstein

2:00 **Dr. Sunita Rai**
Variation in Tracheostomy Pathway of Care in a Level 1 Trauma Centre
Mentor: Dr. Jennifer Anderson

2:10- 2:30 C O F F E E B R E A K

2.30 **Dr. Joel Davies**
Evaluation of Hardware Complications Following Oromandibular Reconstruction Using Three-Dimensional Analysis
Mentors: Drs. John de Almeida, Jonathan Irish

2:40 **Dr. Josie Xu**
Characteristics of Surgeons Disciplined by Professional Colleges in Canada
Mentor: Dr. Eric Monteiro

2:50 **Dr. Mirko Manojlovic Kolarski**
Cost Effectiveness of Salvage Laryngectomy Closure Technique
Mentor: Dr. John de Almeida

<u>Category 5 - Work undertaken by post-residency clinical fellows</u>

Session Chaired by Dr. Jonathan Irish

(7 minutes presentation each, 3 minutes Q&A each)

3:00 **Dr. Sunil Sharma**
Vestibular and Balance Dysfunction Occurs in Childhood Cancer Survivors who have Received Ototoxic Therapies
Mentor: Dr. Sharon Cushing

3:10 **Dr. Paul Douglas-Jones**
Gentamicin Vestibulotoxicity: Further Insights from a Large Clinical Series
Mentor: Dr. John Rutka

3:20 **Dr. Patricia Purcell**
Hearing and Developmental Outcomes Among Children with Asymptomatic Congenital Cytomegalovirus
Mentors: Drs. Sharon Cushing, Blake Papsin

3:30 **Dr. Matthew Crowson**
Active Bone Conduction Implants Improve Patient Reported Outcome Measures: A 12-Month Prospective Study
Mentors: Drs. Joseph Chen, Vincent Lin, Trung Le

3:40- 4:00 C O F F E E B R E A K

4:00 **PRESENTATION OF AWARDS AND PARTICIPATION CERTIFICATES**

Best Paper Category 1
Best Paper Category 2
Best Paper Category 3
Best Paper Category 4
Best Paper Category 5
Best Overall Presented Paper

Plus

The Judy Chauvin Otolaryngology Resident Award

Kris Conrad Merit Award in Facial Plastic Surgery

Freda Noyek Otolaryngology Merit Award

The Shiley E.O. Pelausa Award

The Wharton Head & Neck Research Award

Abstracts

Category 1 – Work undertaken by Post-residency research fellows/graduate degree students

Presenter:	**Dr. Jennifer Siu**
Mentors:	Drs. Antoine Eskander, Ian Witterick, Gregory Randolph, Regan Bergmark
Presenter Status:	Graduate Degree Student
Presentation Time:	9:10 am

The Effect of Energy-based Devices Compared to Conventional Hemostasis on Post-operative Neck Hematoma after Thyroid Operations

Importance: Energy-based devices such as the harmonic scalpel and LigaSure have been popularized for use in thyroid operations, however the effect on postoperative neck hematoma, a rare but potentially fatal complication, has not been well studied.

Objective: To examine the association of energy-based devices (EBD) vs. conventional hemostasis (CH) in thyroid operations on the development of neck hematoma.

Design, Setting, and Participants: Retrospective cohort study of 10,903 patients in the Thyroid-Specific Database of the National Surgical Quality Improvement Program (NSQIP) between 2016-2017. One-to-one nearest-neighbor propensity score matching was conducted to adjust for differences in baseline covariates including demographics, comorbidities, indications for thyroid procedure (goiter, Graves, malignancy, benign), and several other thyroid-specific characteristics, between EBD and CH groups.

Main Outcomes and Measures: Primary outcome was postoperative hematoma, requiring intervention with open evacuation, return to the operating room, tracheostomy, additional observation, or extended length of stay. Secondary outcomes include recurrent laryngeal nerve injury, operative duration, and hospital length of stay.

Results: One-to-one propensity-score matching yielded 6,522 patients with 3,261 in each exposure group such that distribution of observed baseline covariates was not different between groups of the same propensity score. Within the matched cohort, CH was associated with 2.33 (CI: 1.55-3.49, $p<0.001$) higher odds of neck hematoma compared to the EBD group, with 34 (1.04%) hematomas in the EBD group and 78 (2.39%) in the CH group. Based on this analysis, the number needed to treat with an energy-based device in order to prevent one postoperative hematoma was 74. Secondary outcomes demonstrated longer length of hospital stay (IRR 1.29 [CI: 1.23-1.36, $p<0.001$]) in the CH group as compared to EBD, but no difference in odds of recurrent laryngeal nerve injury (OR 0.90 [CI: 0.73, 1.11, $p=0.32$]) or operative duration (IRR: 0.99, [CI:0.96, 1.01, $p=0.24$]).

Conclusions and Relevance: Use of energy-based devices during thyroid operations was associated with reduced odds of neck hematoma compared to conventional hemostasis techniques without increasing odds of nerve injury. This study suggests postoperative neck hematoma rates after thyroid surgery may differ based on the hemostasis technique. These differences should be considered when developing strategies for quality improvement of postoperative outcomes.

Presenter:	**Ms. Claire McSweeny**
Mentors:	Drs. Jennifer Campos, Sharon Cushing, Karen Gordon, Blake Papsin
Presenter Status:	Graduate Degree Student
Presentation Time:	9:20 am

Working Memory and Academic Performance Impairments in Children with Hearing Loss

Purpose: To identify deficits in working memory and potential academic implications in children with unilateral and bilateral deafness.

Background: We now know that hearing loss in adults is linked to dementia due, in part, to increased taxing of working memory. Working memory deficits are also likely to occur in children with hearing loss. Cochlear implantation does not restore normal hearing and thus even children receiving bilateral cochlear implants at young ages must work hard to hear. Children with single sided deafness often do not receive any treatment, putting them also at risk for cognitive impairments. We hypothesized that children with single-sided deafness, and those using bilateral cochlear implants develop impaired working memory which affects their academic skills.

Method: Thirty-six children who received bilateral cochlear implants at a mean age of 2.17(SD=1.30) were tested at 8.40(SD=2.35) years of age. Eighteen children with congenital single-sided deafness were tested at a mean age of 10.76(SD=4.06). Measures included tests of working memory (digit span, the Corsi block tapping test and dot matrix test) and academic performance (four WIAT-III subtests). The same measures were tested in a group of 35 normal hearing peers at 10.10(SD=3.26) years of age.

Results: Accounting for improvements with age (linear regression), children with bilateral cochlear implants and single-sided deafness had poorer scores on the dot matrix, and the pseudoword decoding and word reading WIAT-III subtests ($p<0.05$) compared to their normal hearing peers. In addition, children with bilateral cochlear implants performed poorer on the early reading and mathematic WIAT-III sub-tests ($p<0.05$). Future exploratory factor analyses will determine if working memory and academic scores load to the same factor indicating a correlation between these cognitive abilities.

Conclusions: Children with hearing loss have working memory and academic deficits. Deficits in children with single-sided deafness supports treatment of the deaf ear with auditory prostheses when possible. Moreover, auditory prostheses provided to children with hearing loss require further therapy and support which recognizes the increased cognitive load that these children experience.

Presenter:	**Dr. Peter Dixon**
Mentors:	Drs. Joseph Chen, Sharon Cushing, David Feeny, Murray Krahn, George Tomlinson
Presenter Status:	Graduate Degree Student
Presentation Time:	9:30 am

Improving Hearing State Discrimination of the Health Utilities Index, Mark 3

Background: Health state utility is a preference-based measure of health-related quality of life and its accurate measurement is pivotally important to cost-utility analyses. The Health Utilities Index, Mark 3 (HUI3) is the most commonly used utility instrument in patients with hearing impairment, but like other existing generic instruments, it has several important content limitations that threaten its validity in this population. This is particularly true for patients with cochlear implants, an important and increasingly common intervention for moderate-to-profound hearing impairment.

Methods: The Hearing attribute of the HUI3 was redesigned to better characterize the abilities and disabilities of hearing-impaired patients. A list of potential items was generated by systematic review of the literature. 2,783 articles were screened from MEDLINE, EMBASE, Cochrane, PsycINFO, and CINAHL databases, and 57 studies that qualitatively explored health-related quality of life of 1,088 cochlear implant users were included. The resulting list was supplemented by a focus group including 6 clinical experts, and by 30 semi-structured interviews with patients who had a wide spectrum of hearing impairments and treatment experience. The final list after multi-method item generation included 106 items. Items were organized into domains, and domains and items were selected by considering (1) their relative importance according to survey of 108 patients with hearing impairment, (2) response burden, and (3) structural independence. Sensibility, including face- and content-validity, was assessed by pilot testing and cognitive debriefing with 10 patients and review by 10 clinical experts.

Results: The novel HUI Hearing attribute classifies hearing status according to 7 domains: speech recognition, environmental sounds, sound localization, listening effort, tinnitus, music appreciation, and reliance on assistive hearing devices. It has substantially improved face and content validity compared with existing utility instruments.

Conclusions: Combined with the other HUI3 attributes, the HUI-Hearing is a comprehensive health state classification system that aims to facilitate appropriate health resource allocation through more accurate discrimination of health states that are important to patients with hearing impairment. Ongoing work involves valuation of health states defined by the new instrument.

Presenter:	**Ms. Ayesha Noman**
Mentor:	Dr. Trung Le
Presenter Status:	Graduate Degree Student
Presentation Time:	9:40 am

Manipulating the Blood Labyrinth Barrier to Treat Cisplatin-Induced Hearing loss

Introduction: Cisplatin is a chemotherapeutic medication used to treat many types of cancers. It has been known to cause ototoxicity as it induces hearing loss by increasing ROS and activating the pathway leading to hair cell apoptosis. There is currently no Health Canada approved medication for cisplatin-induced hearing loss even though researchers have spent years focusing on combating cisplatin-based ototoxicity at the level of the hair cell. Since the discovery of cisplatin accumulation in the stria vascularis, scientists are uncovering new ways to alter the pharmacokinetics of cisplatin. Mannitol, a diuretic medication which has been shown to adjust the permeability of the blood-labyrinth barrier, may have a potential to extract cisplatin from the cochlea (inner ear). In this study, our hypothesis is that mannitol will allow cisplatin to egress the inner ear and thus decrease its ototoxic effects.

Methods: To study whether mannitol alters the pharmacokinetics of cisplatin in the inner ear, rats were divided into three groups. The groups were administered with either 1) cisplatin with mannitol, 2) cisplatin without mannitol, or 3) cisplatin with mannitol administered 6 hours post injection. Rats were subjected to a clinically relevant cisplatin regime comprising of 2 cycles. Each cycle consists of 4 days of injections followed by a 10-day recovery period. Hearing tests were measured pre-treatment and at the end of each cycle. Further studies will include collecting the perilymph, CSF, and serum matrices from another set of rats at 0.5, 1, 2, 3, 6, 12, 24 hours after the cisplatin injection. Cisplatin concentrations will be detected using LC MS/MS.

Results: Mannitol administration after cisplatin injections may increase the clearance of cisplatin from the perilymph and CSF indicated by a greater reduction in cisplatin concentrations over time. Currently, mannitol has shown some beneficial results in reducing hearing loss noted with a lower threshold potential for each frequency when compared to cisplatin controls. Both mannitol groups show significant improvement in hearing loss.

Conclusion: By manipulating the blood labyrinth barrier and preventing long-term retention of cisplatin in the cochlea, mannitol can reduce cisplatin ototoxicity in susceptible tissues of the inner ear. Our results will demonstrate the role of mannitol in the manipulation of the blood labyrinth barrier and provide an important therapeutic strategy to prevent cisplatin ototoxicity, a direct implication in hearing rehabilitation in cisplatin chemotherapy.

Presenter:	**Dr. Catriona Douglas**
Mentor:	Dr. Jonathan Irish
Presenter Status:	Research Fellow
Presentation Time:	9:50 am

Nanoparticle Mediated Photodynamic Therapy Enables Tumor Specific Ablation in Preclinical Models of Differentiated Thyroid Cancer

Background: The incidence rate of differentiated thyroid cancer has increased significantly during the last several decades, in part due to an increase in the diagnosis of small and early stage papillary thyroid carcinoma. Surgical resection is the primary treatment of these early stage thyroid tumors and is highly effective, resulting in 5-year survival rates of greater than 98%. However, surgical resection can also result in multiple short and long-term treatment related morbidities. Therefore, there is a clear unmet need for therapeutic options that minimize the risk of surgery related morbidities while simultaneously providing an effective treatment. Photodynamic therapy (PDT) has the potential to reduce treatment related side effects by decreasing invasiveness and limiting toxicity. PDT treatment to tissues requires a combination of photosensitizer accumulation and controlled laser exposure.

Methods: Owing to multiple advantageous properties of recently developed porphyrin-HDL nanoparticle (PLP) as a PDT agent including preferential accumulation in tumor, biodegradability and unprecedented photosensitizer packing, we evaluate PLP mediated PDT as a treatment for thyroid cancer.

Results: On both biologically-relevant thyroid tumor mouse model and anatomically-relevant VX2 tumor-implanted rabbit thyroid model, the intrinsic fluorescence of PLP enabled tracking of tumor preferential accumulation and guided PDT. This resulted in significant and specific tumor apoptosis in tumor tissue, but not proximal normal tissues including trachea and recurrent laryngeal nerve. The long-term survival study further demonstrated that PLP-PDT enabled complete ablation of tumor tissue while sparing normal thyroid tissue and the recurrent laryngeal nerve from damage.

Conclusion: The results here demonstrate several advantageous properties of PLP mediated PDT treatment for thyroid cancer. This method has the potential to be delivered via a minimally invasive, ultrasound guided approach using local anesthetic and laser fiber placement, reducing the morbidity associated with thyroid cancer treatment.

Presenter:	**Dr. Fatemeh Hassan Nia**
Mentor:	Dr. John Rutka
Presenter Status:	Research Fellow
Presentation Time:	10:00 am

Contralesional High-Acceleration Vestibulo-Ocular Reflex Function in Vestibular Schwannoma

Background: Impairment of ipsilesional vestibulo-ocular reflex (VOR) is well described in vestibular schwannoma. Contralesional reduction in VOR gain has been demonstrated in vestibular neuritis and following vestibular neurectomy. This study investigated the effect of unilateral vestibular schwannoma on ipsi- and contralesional VOR.

Material and Methods: Sixty-two patients with unilateral vestibular schwannoma were enrolled in the study. Vestibular function testing (VNG, vHIT, VEMP) identified patients with unilateral or bilateral VOR impairment. Patient and tumor factors predicting contralesional VOR impairment were determined.

Results: Ipsilesional vHIT impairment was present in 49 patients (79%). Contralesional VOR impairment was present in 25 patients (40%). Mean patient age and tumor size were greater in patients with bilateral VOR impairment. Patients with bilateral VOR impairment were more likely to demonstrate brainstem compression on MRI. However there were young patients with tumor size of less than 2cm and no brainstem compression who had bilateral VOR loss. Other possible factors responsible for bilateral VOR loss are discussed.

Conclusion: Bilateral VOR impairment is possible in unilateral vestibular schwannoma. As such, ability to compensate following tumor ablation might be compromised. Factors responsible for contralateral VOR loss include but not limited to age, size of tumor and degree of brainstem compression.

The next step would be to determine any changes in contralateral VOR after tumor resection.

Category 2 – Work undertaken by
PGY2 residents during clinical rotation

Presenter:	**Dr. Justin Cottrell**
Mentor:	Dr. Eric Monteiro
Presenter Status:	PGY2
Presentation Time:	10:10 am

Measuring Quality: Development of Quality Indicators for Chronic Rhinosinusitis

Background: Chronic rhinosinusitis (CRS) has been identified as a high-priority disease category for quality improvement. To this end, this study aimed to develop CRS-specific quality indicators (QIs) to evaluate diagnosis and management that relieves patient discomfort, improves quality of life, and prevents complications.

Methods: A guideline-based approach, proposed in 2012 by Kotter et al. was used to develop QIs for CRS. Candidate indicators (CIs) were extracted from 3 practice guidelines and 1 international consensus statement on the diagnosis and management of CRS. Guidelines were evaluated using the Appraisal of Guidelines for Research and Evaluation II (AGREE II) tool. Each CI and its supporting evidence was summarized and reviewed by an expert panel based on validity, reliability, and feasibility of measurement. Final QIs were selected from CIs utilizing the modified RAND Corporation–University of California, Los Angeles (RAND/UCLA) appropriateness methodology.

Results: Thirty-nine CIs were identified after literature review and evaluated by our panel. Of these, 9 CIs reached consensus as being appropriate QIs, with 4 requiring additional discussion. After a second round of evaluations, the panel selected 9 QIs as appropriate measures of high-quality care.

Conclusion: This study proposes 9 QIs for the diagnosis and management of patients with CRS. These QIs can serve multiple purposes, including documenting the quality of care; comparing institutions and providers; prioritizing quality improvement initiatives; supporting accountability, regulation, and accreditation; and determining pay-for-performance initiatives.

Presenter:	**Dr. Shireen Samargandy**
Mentor:	Dr. Antoine Eskander
Presenter Status:	PGY2
Presentation Time:	10:20 am

Parathyroid Hormone Driven Algorithms After Thyroid Surgery: Not One Size Fits All.

Background: Hypoparathyroidism, which can result in hypocalcemia, is the most common complication following total or completion thyroidectomy. Hypocalcemia can be associated with poor health-related quality of life, increased costs of care, and rarely, severe complications. There are many strategies that have been employed to anticipate and manage hypocalcemia after thyroid surgery including: empirical prophylactic supplementation, watchful waiting, or a PTH-driven approach. Due to the variation in the PTH assays amongst different laboratories, and as a first step towards a quality improvement initiative, each hospital requires an assessment of the predictability of PTH on post-operative hypocalcemia.

Objective: Develop a unique PTH-based algorithm to predict hypocalcemia after thyroid surgery and compare to previously developed algorithm based on the same assay.

Methods: Retrospective chart review of sequential patients who underwent total or completion thyroidectomy, with or without central neck dissection performed at Michael Garron Hospital between 2016 and 2018. Patient who had lateral neck dissection were excluded. A receiver-operating curve (ROC) was used to determine the sensitivity and specificity cut-off values for PTH to predict hypocalcemia, and the Area Under Curve (AUC) determined its predictive accuracy. A 99% specificity and >95% sensitivity were chosen as the acceptable cut-offs.

Results: Ninety-five patients were included. Sixty percent of the patients included had a total thyroidectomy. Only 2 patients had symptomatic hypocalcemia. In 25 cases (26%), there was hypocalcemia for which calcium was indicated. A prescription for calcium was given in 38 (40%) patients. Mean length of stay was 41 ± 23 hours. The ROC showed a 96% sensitivity of PTH drawn post-operatively to detect hypocalcemia at 1.5 pmol/L or less, and 99% specificity to detect normocalcemia at 2.8 pmol/L or more with (AUC= 0.97, standard error of mean = 0.018).

Conclusion: Post-operative PTH can reliably predict hypocalcemia after thyroid surgery. Once developed, the PTH-based algorithm must be reassessed and outcomes continuously evaluated with the goal of implementation for quality improvement. Even with the same assay, different hospitals may have to use different cut-offs in a PTH-driven supplementation algorithm.

Presenter:	**Dr. Neil Verma**
Mentor:	Dr. Douglas Chepeha
Presenter Status:	PGY2
Presentation Time:	10:50 am

Evaluation of the Peri-Tumoral Inflammatory Microenvironment in Patients with Oral Cavity Squamous Cell Carcinoma

Background: The invasive front of the tumour of oral cavity squamous cell carcinoma (OCSCC) represents a critical area for tumour progression and natural history of disease. Our group has previously demonstrated the presence of a peri-tumoral inflammatory response is associated with improved survival outcomes and distant control of disease. We sought to characterize the molecular mechanisms of this inflammatory response, looking at markers of epithelial-mesenchymal transition including alpha Smooth Muscle Actin (α-SMA), a surrogate fibrogenic marker.

Methods: Paraffin-embedded tumor blocks for each patient (n = 175) were obtained. The invasive front was then sliced and stained with Hematoxylin and Eosin (H&E). The stained slides were then graded by pathologists for degree of keratinization, nuclear pleomorphism, pattern of invasion, number of mitoses and inflammatory response. Clinical and pathological staging was performed for each case, as well as a review of the treatment received, recurrence and survival rates. Tissue microarrays (TMAs) were also obtained and the invasive front was stained for CD44 and alpha-SMA. A univariate comparison of the means of the inflammatory response in relation to both CD44 and alpha-SMA levels was performed.

Results: The presence of a peri-tumoral inflammatory was associated with a lower CD44 level than a low inflammatory response, which is consistent with current literature. High host inflammatory response has been found to be associated with lower levels of fibrogenesis and improved survival. Low levels of α-SMA were measured in relation to a high inflammatory response.

Conclusions: There is still progress to be made in order to use the invasive front as an effective prognostic tool. The next step would be to expand the cohort and determine whether the results are consistent. The invasive front slides can also be stained for epithelial- mesenchymal transition markers such as vimentin, e-cadherin and n-cadherin. This would provide more detailed information on the aggressiveness of the tumor invasive front.

Presenter:	**Dr. Daniel Lee**
Mentor:	Dr. John Lee
Presenter Status:	PGY2
Presentation Time:	11:00 am

Full-house Sinus Surgery versus Limited Sinus Surgery for Chronic Rhinosinusitis in Patients with Cystic Fibrosis

Background: Endoscopic sinus surgery (ESS) is effective in managing sinonasal outcomes among cystic fibrosis (CF) patients with chronic rhinosinusitis (CRS). However, its effect on pulmonary outcomes is unclear.

Objective: To compare the pulmonary outcomes following full-house ESS versus limited ESS in CF population

Methods: This was a retrospective cohort study of CF patients, who underwent ESS at St. Michael's Hospital between 1999 and 2016. Operative notes were reviewed to determine full-house (maxillary antrostomy, complete ethmoidectomy, sphenoidotomy, and frontal sinusotomy) versus limited ESS. Pulmonary outcomes including the number of pulmonary exacerbations (use of IV/PO antibiotics), hospitalizations and length of stay within 2 years of the pre- and post-operative period were compared. The FEV1% change within 1 year of the pre- and post-operative period was secondarily compared. The mean differences (MD) between post-operative and pre-operative values were used for statistical analysis.

Results: We identified 70 procedures (30 in full-house and 40 in limited) in 57 patients. There were no sinonasal or pulmonary baseline differences between the two groups. Full-house ESS resulted in a significant reduction of oral antibiotic use compared to the limited ESS group (Median MD -1.0[IQR -2 – 0] in full house vs. 0 [IQR -1 – 1] in limited, z = -2.191, p=0.028). There was no difference in the use of IV antibiotics, antibiotic duration, number of hospitalizations, and length of stay between the full-house and limited group. There was no difference in FEV1% change.

Conclusion: Full-house ESS may have a greater role in reducing the use of oral antibiotics and improving pulmonary health in CF patients.

Presenter:	**Dr. Terence Fu**
Mentors:	Drs. Antoine Eskander, Eric Monteiro, Al Chiodo, William El Masri, Brad Hubbard, Kevin Higgins, Danny Enepekides
Presenter Status:	PGY2
Presentation Time:	11:10 am

Surgical Tray Optimization as a Simple Means of Reducing Perioperative Costs: A Quality Improvement Initiative

Background: Surgical trays contain frequently unused instruments leading to unnecessary reprocessing and replacement costs. We implemented a quality improvement initiative aimed at optimizing surgical trays for common otolaryngology procedures, and examined the impact on costs, operating room (OR) efficiency, and balancing measures.

Methods: We reviewed surgical instruments used in five common otolaryngology procedures (adenotonsillectomy, myringotomy, septoplasty, endoscopic sinus surgery, thyroidectomy) over a 10-month period at a single community hospital. After consultation with stakeholders, instruments with a utilization rate less than 25% were removed. Operative time, tray setup time, and tray rebuilding time were compared between pre- and post-implementation periods. Frequency of instrument recall/replacement and stakeholder satisfaction were examined as additional balancing measures. We estimated cost-savings from an institutional perspective over 1- and 10-year time horizons. Costs were expressed in 2017 Canadian dollars and modelled as a function of surgical volume, labor costs, instrument depreciation, and indirect costs.

Results: At baseline, approximately 3 of 10 instruments were utilized on average. We achieved an average instrument reduction of 26% per surgical tray, yielding 1-year cost savings of $9,010 CDN ($7,196 USD) and 10-year cost savings of $69,576 CDN ($55,572 USD). We also measured significant decreases in OR tray setup time (average 3.7 ± 0.2 min) and tray rebuilding time (average 3.3 ± 0.1 min) for septoplasty, thyroidectomy, and endoscopic sinus surgery trays. There was minimal impact on balancing measures with no significant change in OR time, a single case of instrument recall, and negligible impact on patient safety and trainee education based on stakeholder feedback.

Conclusions: Surgical tray optimization is a simple, effective, and potentially scalable strategy for improving operating room efficiency and reducing perioperative costs.

Category 3 – Work undertaken by
PGY3 residents during clinical rotation

Presenter:	**Dr. Christopher Hong**
Mentor:	Dr. David Goldstein
Presenter Status:	PGY3
Presentation Time:	11:20 am

Surgical Margins and Outcomes in Oral Tongue Squamous Cell Carcinoma (OTSCC): A Retrospective Chart Review

Objectives: For oral tongue squamous cell carcinoma (OTSCC) what constitutes an "adequate" margin remains controversial. There has been recent work that has brought into question the impact of margin status and distance on outcomes such as recurrence and survival as well as the role for adjuvant therapy. The purpose of this study was to investigate the relationship of margin status and distance on local recurrence free survival (LRFS) based on margin location.

Methods: A retrospective chart review of adult patients with newly diagnosed OTSCC (T1-T3, any N, M0) managed surgically at UHN between 2005-2011 was performed. According to the pathologic report, patients were categorized into one of three groups: 1) positive (tumor at the inked margin of the main specimen), 2) close (≤5.0 mm from the inked margin) and negative (>5.0 mm from the inked margin). Associations of positive, close and negative margins with LRFS based on the location of margins were analyzed using the Kaplan-Meier survival model. Potential clinically relevant variables for local recurrence were assessed and entered into a univariate analysis.

Results: A total of 168 patients were included in the analysis. In the Kaplan-Meier survival curves for LRFS, no statistically significant differences were found between the close and negative margins in both the deep and mucosal margin groups. On univariate analysis, the only variables that affected LRFS were carcinoma-in-situ at the mucosal margin and pathological T stage.

Conclusions: No statistically significant difference in LRFS between the close and negative margins were found in our study, suggesting that the surgical margin cut-off of 5.0 mm may not affect the LRFS of patients undergoing surgical resection of OTSCC. A larger sample size is needed to draw definitive conclusions and to assess the optimal margin cut-off and whether it differs based on margin location.

Presenter:	**Dr. Neil Arnstead**
Mentor:	Dr. Eric Monteiro
Presenter Status:	PGY3
Presentation Time:	11:30 am

Surgical Safety Culture Among Toronto Otolaryngology Residents

Initiatives on improving care for surgical patients often focus on technical skills and better equipment. However, recent studies show that focusing on the non-technical aspects of care and improving the safety culture of healthcare providers can lead to decreased adverse events[1,2]. The safety culture in otolaryngology is a topic that has never been studied in Canada. In this study we hope to gain a better understanding of the current safety practices in otolaryngology to help identify areas in need of improvement. The Safety Attitudes Questionnaire (SAQ) is a validated questionnaire that is commonly used in the literature to measure surgical safety culture. It targets domains of teamwork climate, safety climate, perceptions of management, job satisfaction, working conditions, and stress recognition[3]. The SAQ results from the otolaryngology residents at the University of Toronto are presented here. The findings of this study will identify areas for targeted improvement, serve as a useful baseline for iterative measurements, and help track changes in safety culture in the era of a new competency-based residency curriculum.

References:

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Presenter:	**Dr. Christopher Noel**
Mentor:	Dr. John de Almeida
Presenter Status:	PGY3
Presentation Time:	11:40 am

Deriving Health Utility Scores from Head and Neck Cancer Quality of Life Instruments: Mapping UWQoL and EORTC QLQ-C30 & HN-35 ONTO EQ-5D and HUI-3 Indices

Importance: In head and neck oncology, health-related quality of life (HRQoL) data are often collected through disease-specific patient questionnaires while generic, patient-level utility data required for health economic modeling are not routinely obtained.

Objective: To develop mapping functions that use disease specific QoL scores [the University of Washington Quality of Life Questionnaire (UWQoL) and the European Organization for Research and Treatment of Cancer Quality of Life & Head and Neck Cancer Specific Module (EORTC)] to approximate health utility scores [the EQ-5D and the Health Utilities Index Mark 3 (HUI-3)].

Design: In a cross-sectional study, outpatients with head and neck cancer (HNC) completed the EORTC, UWQoL, EQ-5D and the HUI-3. Results of the EORTC and UWQoL were mapped onto both EQ-5D or HUI-3 scores using ordinary least squares regression (OLS) models. Stepwise selection with Akaike information criterion were used to reduce the full model and examine which dimensions best predicted a patient's utility score. The predictive power of the model was assessed using 10-fold cross validation.

Setting: Outpatient oncology clinics at the Princess Margaret Cancer Centre from November 2017 – April 2018.

Participants: Patients with HNC were recruited. Participants with metastatic disease and non-English speakers were excluded from the study.

Exposures: Head and neck cancer, QoL and health measures
Main Outcomes and Measures: We assessed performance of the mapping models through adjusted R-squared analysis. Mean square errors were calculated to measure deviation of the predicted from the actual utility values.

Results: A total of 209 patients were recruited. The most common cancer subsites were oral cavity (35%) and oropharynx (25%). Using regression analysis, the mapping algorithm converting EORTC scores onto EQ-5D scores performed best (adjusted R-squared = 0.73, RMSE = 0.065, 10-fold cross-validation RMSE = 0.067). In total, 13 of the 33 dimensions were included in the final model. The estimated mean utility score was 0.84 (SD 0.11), which perfectly matched the observed mean utility score in the cross-validation study. The mapping function converting UWQoL scores onto EQ-5D scores also performed well (adjusted R-squared =0.63, RMSE = 0.073, 10-fold cross-validation RMSE= 0.076). Conversely, the EORTC and UWQoL mapped less well to the HUI-3 (EORTC: adjusted R-squared =0.57; RMSE = 0.16, 10-fold cross-validation RMSE= 0.17; UWQoL: adjusted R-squared =0.37, RMSE = 0.198, 10-fold cross-validation RMSE= 0.200 respectively). All models demonstrated construct validity by accurately discriminating between various clinical indices of disease severity on subgroup analysis.

Conclusions and relevance: Several of the mapping algorithms developed have good predictive validity, and therefore, enable researchers to translate HNC specific health-related quality of life scores to health utility scores.

Presenter:	**Dr. Florence Mok**
Mentor:	Dr. Adrian James
Presenter Status:	PGY3
Presentation Time:	11:50 am

The Impact of Esterified Hyaluronic Acid on Mucosal Scarring and Recurrence Rates After Intact Canal Wall Surgery for Cholesteatoma

Objectives: To test the hypothesis that esterified hyaluronic acid lamina [eHA] can prevent post-operative adhesions in the middle ear and improve tympanomastoid ventilation by assessment of (1) middle ear histopathology at second stage surgery, (2) middle ear pressure with tympanometry and (3) recurrence of cholesteatoma.

Study Design: Cohort study

Setting: Tertiary/quaternary pediatric hospital

Methods: Consecutive patients were identified from a prospective surgical database having completed canal wall up tympanomastoidectomy for resection of cholesteatoma between 2007 and 2019. Patients who underwent eHA placement in the mesotympanum or epitympanum had a biopsy of the same location taken at the second stage of surgery, and biopsy findings were compared to those of a control group of patients who did not undergo eHA placement. Middle ear pressure measurements at 1 year, before second stage surgery, were compared between patients with and without eHA. Cholesteatoma recurrence rates at 5 years were compared between patients with and without eHA placement using Kaplan-Meier survival analysis.

Results: 64 patients underwent eHA placement during middle ear surgery. The mean age at the first surgery was 10.2+/- 2.7 years. The mean interval between the first and second surgeries was one year. Biopsies from the eHA placement site at the second stage of surgery frequently revealed a dense cicatrix-like fibroconnective tissue containing a foamy histiocyte infiltrate. This was not seen in the middle ear scar tissue of patients without eHA. Middle ear pressure at 1 year was measurable in 52% of ears that underwent eHA placement with a median of -182mmHg, compared to 54% of ears without eHA that produced a median of -95mmHg. The difference in middle ear pressure was not significant (p=0.2, Mann-Whitney). The cholesteatoma recurrence rate after the first stage of surgery with eHA placement was 7% at 5 years compared to 9% without eHA placement, which did not reach statistical significance (p=0.4, Kaplan Meier log rank).

Conclusions: Placement of an eHA lamina in the middle ear appeared to be frequently associated with the formation of a dense fibrotic scar and did not prevent mucosal adhesion. eHA lamina placement also did not significantly affect middle ear pressure measurements at 1 year or cholesteatoma recurrence rates at 5 years. No clinically beneficial improvement in tympanomastoid ventilation was detectable to justify the use of eHA lamina in surgery for cholesteatoma.

Category 4 – Work undertaken by
PGY4 residents during clinical rotation

Presenter:	**Dr. Frédérick Laliberté**
Mentor:	Dr. David Goldstein
Presenter Status:	PGY4
Presentation Time:	1:50 pm

Volumetric Comparison of Bone Resorption in Fibula Versus Scapula Tip Free Flaps in Mandibular Reconstruction

Objective: To evaluate the bone resorption of fibula and scapula tip free flap reconstruction of mandibular defects over time in patients with both benign tumors and malignant tumors that require postoperative radiation therapy.

Design, Setting, and Participants: A retrospective cohort review of patients with mandibular defects requiring osseous reconstruction at a tertiary referral academic center from August 2002 to May 2015 were evaluated.

Main Outcomes and Measures: Postoperative computed tomography images were used to calculate bone volume (cm^3) and to assess bone resorption over time.

Results: A total of 107 and 42 patients who underwent mandibular reconstruction, with fibula and scapula tip flaps respectively, have been identified for analysis. Bone volume was measured at every postoperative computed tomography scan available and compared over time. Additional data regarding patient demographic, primary pathology, reconstruction (i.e. defect classification, osteotomies, plating, microanastomosis) and overall outcome (i.e. early and late) was collected. Final analysis pending.

Discussion: We intend to accurately compare bone resorption between Fibula and Scapula tip free flap with volumetric assessment using postoperative computed tomography images.

Presenter:	**Dr. Sunita Rai**
Mentor:	Dr. Jennifer Anderson
Presenter Status:	PGY4
Presentation Time:	2:00 pm

Variations in Tracheostomy Pathways of Care in a Level 1 Trauma Centre

Introduction: There is very sparse epidemiological data on current incidence and patterns of care for patients living with temporary or permanent tracheostomies cared for in Canadian trauma centers. There is a need to understand and improve the current pathways of care for tracheotomised patients in our tertiary trauma center as a quality improvement initiative.

Type of study: Longitudinal cohort study.

Objective: To present epidemiological data regarding pathways of care (surgical, inpatient and outpatient care) of tracheotomised patients within a tertiary academic trauma center over a 2-year period.

Methods: A chart based retrospective review of all patients who underwent a tracheostomy at St-Michael's, Toronto, Canada from January 2014 to January 2016 was conducted. Data detailing pathways of care was collected and analyzed for all incident tracheostomy performed within the hospital during the study period in terms of surgical technique and management, inpatient care and outpatient care. The primary outcome was decannulation as inpatient, secondary outcomes included complications, time to wean off the ventilator, services involved and final disposition.

Results: 112 charts met inclusion criteria and were reviewed. A total of 47 patients (42.0%) were decannulated before discharge from the hospital while 87 patients (77.8%) were weaned off the ventilator during the admission. The mean time from intubation to tracheostomy was 18.8 days, mean time from tracheostomy to weaning off the ventilator was 9.8 days and mean time from tracheostomy to decannulation was 29.1 days. The otolaryngologist was the performing surgeon in 44.0% of the cases. Most patients leaving the hospital with a tracheostomy were transferred to other facilities (hospital, long term care) and only 6.2% of the patients leaving with a tracheostomy were provided with follow up hospital care.

Conclusion: There remains important gaps in care for tracheostomized patients in our tertiary care center. Quality improvement initiatives should focus on better documentation and transfer plans for patients leaving the hospital with a tracheostomy as well as standardized follow up care.

Presenter:	**Dr. Joel Davies**
Mentors:	Dr. John de Almeida, Jonathan Irish
Presenter Status:	PGY4
Presentation Time:	2:30 pm

Evaluation of Hardware Complications Following Oromandibular Reconstruction Using Three-Dimensional Analysis.

Background: The primary goals of oromandibular reconstruction include restoration of mandibular continuity, function and aesthetics. Considerable time, and effort, is spent on contouring reconstructive plates to approximate the native mandible prior to performing a segmental mandibulectomy in order to restore mandibular continuity. However, no literature exists as to the importance of plate contour as it relates to outcomes such as postoperative complications. The objective of our study was to evaluate if mandibular reconstruction plate contouring is associated with postoperative complications following oromandibular reconstruction using three-dimensional (3D) computer modeling.

Methods: Postoperative CT images were obtained from patients undergoing segmental mandibulectomy and free flap reconstruction at the University Health Network between 2003-2014. Computer-based 3D models were generated using Mimics v 18.0 (Materialise, Leuven, Belgium) to calculate the: (1) mean plate-to-bone distance and (2) overall percentage of plate surface area contact. Patient demographic information, comorbidities, smoking history, details regarding surgical and adjuvant treatment were recorded. Our primary outcome was development of surgical site infection (SSI). Secondary outcomes included intraoral dehiscence, neck dehiscence and plate exposure. Univariate/multivariate analyses were performed.

Results: Ninety-four patients were included (M=58;F=36). Reconstruction was performed with fibular (n=54) and scapular free flaps (n=40). Univariate analysis demonstrated an association between the development of SSI and the type of free flap selected for reconstruction (30% fibular free flap vs 12% scapular free flap; p = .04) and the mean distance between the mandibular reconstruction plate and the underlying bone (SSI: 1.41±0.52mm vs. No SSI: 1.11±0.45mm; p = .01). Multivariate analysis demonstrated narrower mean plate-to-bone distances (i.e. <1mm) were associated with a reduced risk of developing a surgical site infection (odds ratio [OR], 0.32; 95% CI, 0.10 to 0.97). Secondary outcome measurements including the development of intra-oral dehiscence (odds ratio [OR], 0.22; 95% CI, 0.07 to 0.67) and plate exposure (odds ratio [OR], 0.11; 95% CI 0.02 to 0.57) were also reduced with smaller mean plate-to-bone distances (i.e. <1mm). The percentage of surface area contact between the reconstructive plate and the underlying bone was not associated with the development of any postoperative complications.

Conclusion: Optimizing plate contouring during oromandibular reconstruction may limit the development of postoperative complications.

Presenter:	**Dr. Josie Xu**
Mentor:	Dr. Eric Monteiro
Presenter Status:	PGY4
Presentation Time:	2:40 pm

Characteristics of Surgeons Disciplined by Professional Colleges in Canada

Objective: The aim of this study was to investigate the number and nature of disciplinary cases amongst surgeons compared with those of other disciplined physicians.

Methods: Our retrospective study created a database of all disciplined surgeons from 2000 to 2018 in Canada based off provincial Colleges of Physicians and Surgeons (excluding Quebec 2016-2018).

Results: Our database identified 103 surgeons implicated in 108 cases out of a total of 1265 disciplinary cases. Disciplined surgeons comprised 9.4% (103/1099) of all disciplined physicians. International medical graduates were disciplined more frequently (26.9%) than their proportional national representation. General surgeons (41.7%), orthopedic (22.3%) and plastic (10.7%) surgeons were most commonly implicated. Surgeons were most likely to be disciplined for inappropriate standard of care (39.8%), unprofessional behaviour (29.1%) and sexual misconduct (14.6%). The most common penalties were a fine, formal reprimand or suspension of license.

Conclusion: This study illustrates the trends in characteristics of disciplined surgeons that may warrant preventative action in areas of proportionally high offences.

Presenter:	**Dr. Mirko Manojlovic Kolarski**
Mentor:	Dr. John de Almeida
Presenter Status:	PGY4
Presentation Time:	2:50 pm

Cost Effectiveness of Salvage Laryngectomy Closure Technique

Introduction: Primary chemoradiation has become widely adopted for locally advanced laryngeal cancer. Depending on the treatment regimen, 18-33% of these patients will require salvage surgery for persistent or recurrent disease. Compared to primary surgery, salvage laryngectomy is associated with higher rates of complications. Pharyngocutaneous fistula (PCF) is of particular concern as it is the most common complication and is associated with increased morbidity and cost. There is evidence that reinforcement of the laryngeal closure with a healthy tissue flap, either as a pedicle or free tissue transfer, can reduce the incidence of this complication, but the long-term outcomes have not been shown. In the absence of outcome data to definitively support a particular closure method, cost analysis can be used to influence preoperative surgical planning. While primary closure has lower upfront operative costs, it is associated with higher complication rates that may incur higher long term costs. Therefore, a cost effectiveness analysis can be performed to calculate the cost per PCF avoided.

Methods: Data was collected retrospectively from Toronto General Hospital from 2000-2015. Patients undergoing salvage laryngectomy with minimal or no pharyngeal involvement, with defects that were amenable to primary closure, were included. Patients were grouped according to pharyngeal closure technique, type of tissue reinforcement, and presence of PCF. Due to the small number of free flap patients and PCFs, arms were grouped together to create five groups for cost analysis: primary closure without PCF, primary closure with PCF, pedicled closure without PCF, free flap closure without PCF, flap closure with PCF. Cost analysis was preformed from a societal perspective and incorporated surgeon costs and hospital costs. To account for the low PCF rate, models were created with different fistula rate according to previously published reports. Finally, a systematic review was performed to determine the salvage laryngectomy PCF rate each of the arms of our model.

Results: A total of 121 patients met inclusion criteria. The majority underwent primary closure (76.9%) followed by pedicled (19.8%) and free flap (3.3%) reinforcement. The fistula rates for primary closure was 27.2%, while the fistula rate for pedicled and free flap closure was 24.2% and 22.4% respectively. The average cost for one surgery by closure type, accounting for PCF, was calculated to be: $30,025.98, $30,677,72, and $30,558.35. The cost per fistula avoided, using primary closure as the reference, was calculated to be $19,168.95 and $10,237.94 for pedicled and free flap closure.

Conclusions: In salvage laryngectomy, costs vary by closure technique and PCFs are associated with higher physician and hospital costs in the perioperative period. Although our data is limited by low numbers and fistula rates in pedicled and free flap arms; it suggests that reinforcement of the pharyngeal closure with pedicled or free tissue does not incur significant additional costs.

Category 5 - Work undertaken by Post-Residency Clinical Fellows

Presenter:	**Dr. Sunil Sharma**
Mentor:	Dr. Sharon Cushing
Presenter Status:	Post-Residency Clinical Fellow
Presentation Time	3:00 pm

Vestibular and Balance Dysfunction Occurs in Childhood Cancer Survivors who have Received Ototoxic Therapies

Objectives: Paediatric cancer centres routinely monitor hearing sensitivity to detect potential cochleotoxicity of platinum based therapies, cranial radiation, surgery and related sepsis treatment. In the present study, we focus on the less commonly considered vestibulotoxic effects of these treatments in our pediatric population. Our objective was to determine the prevalence of vestibular end-organ and balance dysfunction in childhood cancer survivors who received ototoxic therapies as part of their cancer treatment.

Methods: Children <18 years with a history of cancer who were treated with ototoxic chemotherapy were included in the study. All patients were >4 years from diagnosis and 2 years off therapy, and were screened for vestibular and balance dysfunction at the time of their routinely scheduled audiologic assessment. Specifically, horizontal canal function was assessed with both video Head Impulse Testing (vHIT) and dynamic visual acuity testing (DVA), and utricular function was assessed using the subjective visual vertical test (SVV). Balance function was assessed using timed one leg stance performed eyes open and eyes closed.

Results: Sixty-three children (median age 11 years; range 1-17 years) were examined. More than half (37/63, 59%) had documented sensorineural hearing loss and 48/63 patients (76%) displayed abnormal vestibular and/or balance function. Specifically, horizontal canal dysfunction occurred in 32/63 (51%) by vHIT and 28/63 (44%) by DVA, utrical function was abnormal in 37/63 (59%) and balance function was abnormal in 45/63 (74%). Half of patients (31/63, 49%) had evidence of combined sensory deficits including hearing, vestibular and/or balance dysfunction. A higher cumulative dose of ototoxic chemotherapy was significantly more likely to result in ototoxicity ($p=0.01$) and vestibular and balance dysfunction ($p=0.03$).

Conclusion: Vestibular and balance dysfunction are common and underestimated in the setting of pediatric cancer treatment and are likely due to a combination of surgical and medical risk factors. While hearing surveillance is routine throughout and following cancer treatment, current results suggest that vestibular and balance function should also be routinely evaluated. Once identified these children may benefit from vestibular rehabilitation.

Presenter:	**Dr. Paul Douglas-Jones**
Mentor:	Dr. John Rutka
Presenter Status:	Post-Residency Clinical Fellow
Presentation Time:	3:10 pm

Gentamicin Vestibulotoxicity: Further Insights from a Large Clinical Series

Objective: Vestibulotoxicity is a clinically underrecognized but potentially debilitating consequence of systemic aminoglycoside treatment. We review our 21-year experience with gentamicin-induced vestibulotoxicity and compare the spectrum of vestibulotoxicity between single daily dosing (SDD) and multiple daily dosing (MDD) regimens.

Methods: A cross-sectional study, including patients referred to the Hertz Multidisciplinary Neurotology Clinic between January 1993 and September 2014 with clinical evidence of gentamicin vestibulotoxicity. We assess the spectrum of vestibular dysfunction demonstrated clinically and on vestibular function testing.

Results: Of 53 patients with gentamicin-induced vestibulotoxicity, 24 received SDD and 29 received MDD. Sepsis, endocarditis, and osteomyelitis were the most common treatment indications. Vestibular symptoms including disequilibrium (98%) and oscillopsia (72%) were more common than cochlear symptoms such as tinnitus (21%) and hearing loss (23%). Physical exam findings such as ataxia (64%) and a positive Halmagyi head thrust (66%) were not reliable methods of detecting vestibulotoxicity. Angular acceleration receptors (semicircular canal) were more commonly affected than linear acceleration receptors (otolithic organs of the saccule) function (100% vs. 62%). A significant proportion of patients (40%) demonstrated vestibulotoxicity in the absence of nephrotoxicity, and 32% of patients experienced delayed vestibulotoxicity occurring up to 10 days post-treatment cessation. Therapeutic monitoring could not necessarily prevent vestibulotoxicity from occurring in a delayed fashion. The rate of nephrotoxicity was lower for SDD compared to MDD (60% vs. 35%, $p=0.01$). However, vestibulotoxicity occurred earlier in the SDD group (19.4 vs. 26.3 days, $p=0.01$), despite a lower cumulative dose (5.7 vs. 6.9 g, $p=0.04$) and shorter duration of therapy (19.0 versus 32.1 days, $p<0.001$). There were no differences in the spectrum of vestibular dysfunction between SDD and MDD. Of 12 patients who launched medicolegal claims, 10 (86%) received settlements in their favor.

Conclusions and Relevance: Our study further highlights important insights regarding gentamicin-induced vestibulotoxicity, including its clinical features, spectrum and recovery profile, association with nephrotoxicity, and medicolegal implications. While SDD is associated with a decreased risk of nephrotoxicity compared to MDD, it confers a higher risk of vestibulotoxicity.

Presenter:	**Dr. Patricia Purcell**
Mentors:	Drs. Sharon Cushing, Blake Papsin
Presenter Status:	Post-Residency Clinical Fellow
Presentation Time:	3:20 pm

Hearing and Developmental Outcomes Among Children with Asymptomatic Congenital Cytomegalovirus

Introduction: This study investigates the natural history of hearing and developmental outcomes among children with asymptomatic congenital cytomegalovirus who were identified due to sensorineural hearing loss (SNHL).

Methods: Children with SNHL who underwent CMV DNA PCR testing of stored, dried blood spots (DBS) between Jan. 1, 2011, and August 1, 2018, were included. Children with positive results were referred to an infectious diseases specialist for evaluation, including developmental assessment. This study only included children who were asymptomatic at birth (no signs of cCMV other than possibly referred hearing screen) and who did not receive anti-CMV treatment.

Results: 731 children with SNHL underwent DBS testing, and 58 (12.6%) children were diagnosed with cCMV. Analysis was limited to 43 children (86 ears) with untreated, asymptomatic cCMV. Fourteen (32.6%) had passed their newborn hearing screen in both ears; they were diagnosed with hearing loss at a median age of 2.6 years (range 1 – 6.8 years). Ten (71%) of those 14 children were noted to have language delays, and 7 (50%) had gross motor or balance problems. Twenty-eight children did not pass their screen: 15 referred in one ear, and 13 in both ears. One child lacked screening results. Among children referred in both ears, 10/11 (91%) had language delay, and 6/11 (55%) had motor delays. Two did not have neurocognitive assessment results. Among 43 ears that passed newborn hearing screening, 24 (56%) developed progressive SNHL and 19 (44%) eventually received a cochlear implant (CI). Among 41 ears that referred, 29 (71%) received a CI.

Conclusion: One-third of children diagnosed with cCMV due to SNHL had passed their newborn hearing screen; targeted screening for cCMV based upon newborn hearing results may not identify a number of children with cCMV who are at risk for progressive SNHL and neurocognitive delay. Universal newborn screening for cCMV may allow for earlier detection in this situation.

Presenter:	**Dr. Matthew Crowson**
Mentors:	Drs. Joseph Chen, Vincent Lin, Trung Le
Presenter Status:	Post-Residency Clinical Fellow
Presentation Time:	3:30 pm

Active Bone Conduction Implants Improve Patient Reported Outcome Measures: A 12-Month Prospective Study

Objectives: To evaluate patient reported outcome measures after implantation of an active bone conduction system in adult patients with single-sided deafness (SSD) or conductive-mixed hearing loss (CMHL).

Study Design: Prospective cohort study.

Setting: Tertiary referral center.

Patients: Adults who were implanted with the Bonebridge from 2013-2017.

Outcome Measures: Objective audiometric variables and Health Utilities Index (HUI), Tinnitus Handicap index (THI), Speech Spatial Qualities Questionnaire (SSQ), and Bern Benefit in Single-Sided (BBSS) Deafness Questionnaire were collected at 1-, 6-, and 12-months postoperatively. Comparative quantitative and regression analyses were completed to evaluate variable relationships.

Results: 50 patients with 12-month follow-up were included**.** 33 (66%) patients were implanted for CMHL, and 17 (34%) for SSD with a mean pre-operative pure-tone average of 79.7 db. Central Institute for the Deaf (CID) auditory
test, Speech-reception thresholds (SRT), HUI-hearing subdomain, and SSQ performance were all improved at 1-month with a durable result through 12-months after implantation. There was no significant improvement in BBSS, or THI at any time interval.

Conclusion: Patient reported outcomes measures are critical in determining the utility of health interventions beyond objective performance data. Our study is the largest series published to date examining patient reported outcome measures with the Bonebridge in an adult patient population. We found that the Bonebridge active bone conduction system improved both objective audiologic performance and several patient reported outcomes measures. Future work is needed to develop a sensitive health utility measure for hearing loss so that formal cost-utility analyses may be performed.