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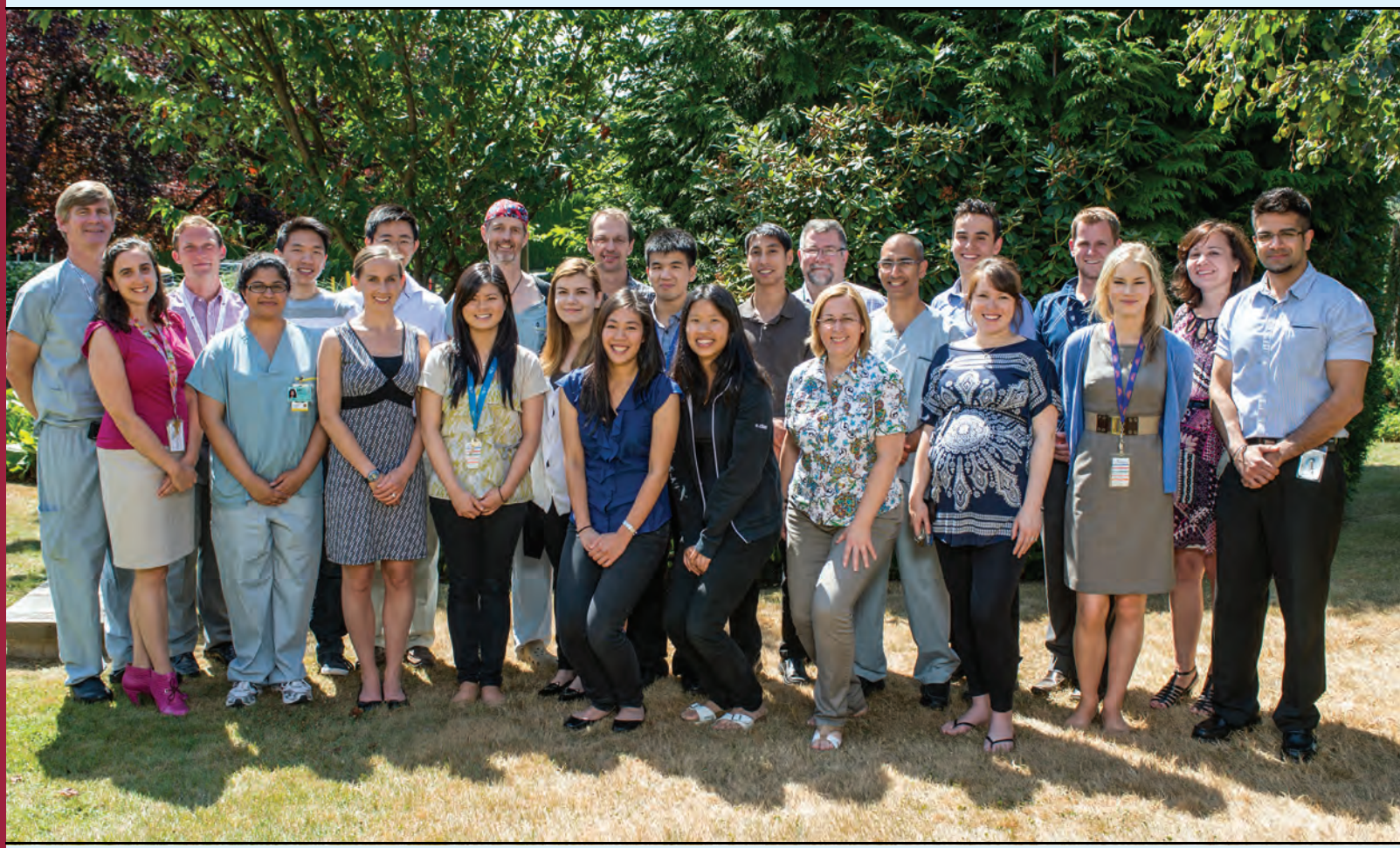

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OPSEI - iACT Writing Contest

At the Western Regional Medical Conference, Carmel, California.

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contents

A cross section of surgeons in Uganda

Challenges of the Children and Youth in Uganda

Dr. Nassar Kakembo
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Introduction:

Children comprise much of the population in developing countries. In Uganda, the current population is estimated to be 33,425,000 with 48% of the population being below 15 years of age; a population that has a growing rate of 3.2% per year. This growth can be attributed to a low usage of family planning options. It is estimated that only 37% of families in Uganda use any form of family planning. This is commonly seen in low income societies burdened by low education status of the parents and high unemployment rates. Uganda's situation is not unique in the region with a narrow middle class and much of the population surviving on subsistence agriculture.

Problems:

Many times children in such societies are prone to multitudes of life threatening challenges which lead to physical, social and psychological disability in their lives. Such challenges include: big families with limited income, food shortages, lack of parental guidance and attention, lack of access to good education, failure to access good medical and clinical services, poor accommodation facilities and lack of role modeling.

Young orphans, who have lost their parents as result of wars, accidents, violence and diseases like HIV and complications related to early pregnancies and abortions, can face even greater challenges. Much of the country suffers from lack of equitable access to safe water. Food security is an ongoing threat in some of the parts of the country. Lastly, an increasing trend towards alcohol and substance abuse is killing the young generation.

All of these factors lead to destruction of the moral fibre in the developing child. This translates into a cohort of youths who are uneducated and unguided in life and most likely with no formal employment. The end result is a family without strong roots and the cycle repeats itself from a child to a youth to a parent, again and again.

Solutions:

We can't sit and lament. Something can be done by both society and the state. This is to be handled by a multi-pronged approach through well-thought-out solutions among which include the following:

- Enforcing good family planning measures so that giving birth is by choice, not chance.
- Strengthening the education system so that public schools can also offer good education standards as they serve the largest proportion of the population.
- Emphasizing a self-reliant youth by equipping them with vocational skills in order to boost their income.
- Improving the health system in order to reduce early orphanage through control of HIV and improving maternal health services that claim many lives.
- Carrying out community mobilization towards poverty alleviation strategies and health education in order to have a productive population.
- Establishing youth-friendly social and health services in addition to counseling in order to appreciate peculiar aspects of the life of a youth and attract them to health facilities.
- Strengthening the role of sports because it does not only to keep the youth physically healthy, but serves as a good strategy for mobilizing youth communities towards setting goals and diverting them from abuse of drugs and alcohol.

Conclusions:

Understanding the root cause of the problem for children, the youth and the family is the key to improving their care. The strategies to uplift the communities should be designed in such a way that the community is involved from inception in order to own, participate and apply the interventions.

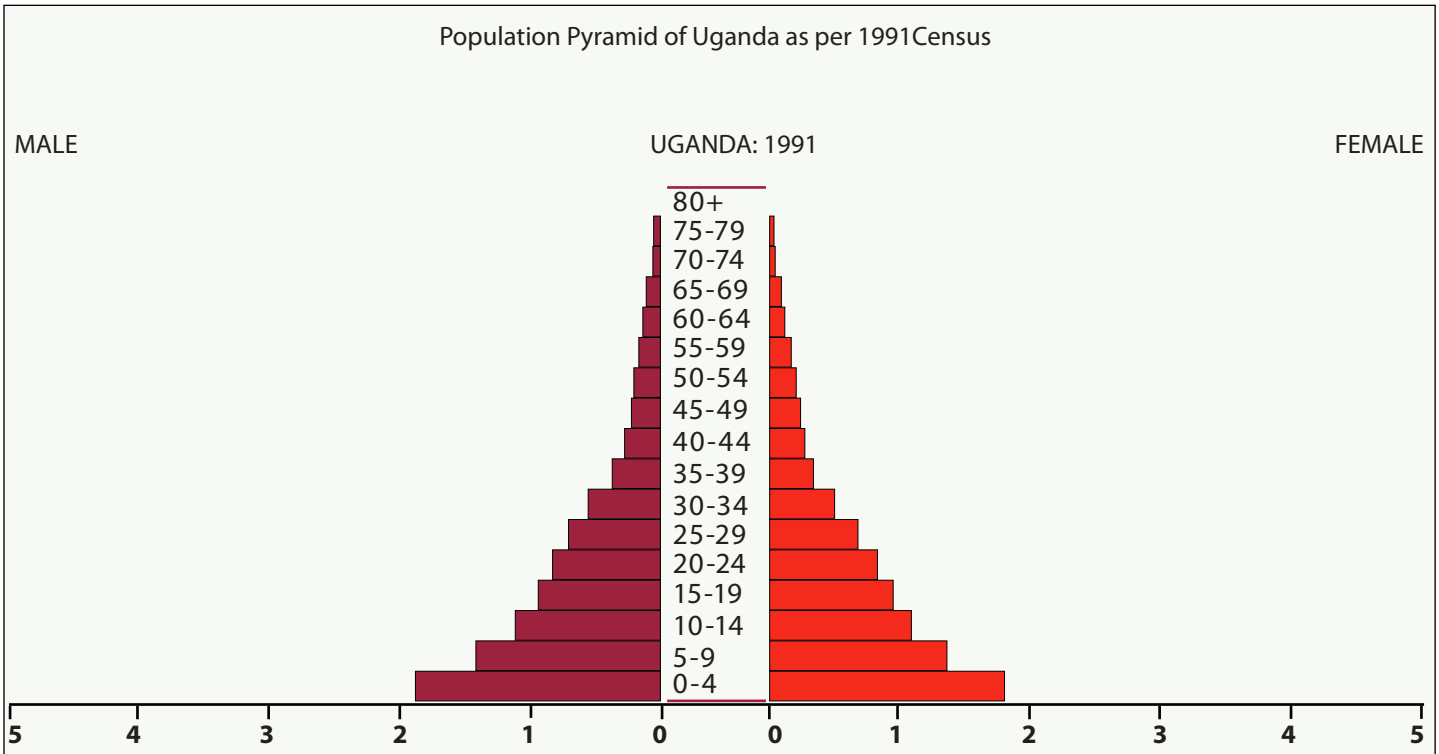

Figure 1. Population (in millions)
Source: U.S. Census Bureau, International Database

Innovative Evaluation of Pediatric Surgical Care

Mr. Erick Carreras, UBC Science Student
Supervisor: Dr. Andrew Campbell,
Division of Pediatric Cardiac Surgery

Background:

Our study on renal transplants takes some of the most effective, the most advanced, and the most modern approaches to research. Thanks to our affiliation with the Child & Family Research Institute (CFRI), we were able to troubleshoot our entire project from inception. Progress in the field of online patient health record databases allowed for us to use some of the most advanced data collection techniques available. Interdepartmental collaboration proved its invaluable worth in the planning, organization and application of this project. In its entirety, one once said, "This is a truly some innovative evaluation of pediatric surgical care."

Methods:

From the beginning, an effective study method was in mind. The Research Electronic Data Capture (REDCap) online application from the CFRI was subsequently recommended, and proved its worth as the zenith of research planning and data collection. As a data collection tool, it is structured to troubleshoot the study from the very start. With the use of extensive embedded computer programming, REDCap does not allow you to make any errors when programming the data collections sheet. The results are a set of in-depth literature reviews and discussions between the investigators to assure only the truly significant variables are included, while avoiding a costly and a timely surplus use of resources. REDCap also includes the implied planning of the statistics. If the statistics are not planned, the possibility that the data collected has been done in an erroneous fashion is more than likely. Part of REDCap's programming demands that all data collections sheets be defined by events in time. These events then correspond to all statistics for variables either, of time, or dependent on time. Hence, if the statistics to be done are not thoroughly premeditated to properly organize the data into the correct time point, it can lead to much time wasted on the part of the researcher to re-program all of the data post-collection. With CFRI's REDCap program in hand, the planning for an effective study method came all too easy, and gratefully so. Patient Record Outcome & Information System (PROMIS) online patient health record database highlights the advancement to the digital health record age. Much of the health records that would normally be archived as a hardcopy can now help in more ways than by going paperless. One such way is in the multi-layer security system and twenty-four hour online access to patient information. Having this secure access to clinical data has enabled a streamlined data collection process. Similar to how being able to fax documents was an unprecedented advancement in the Digital Revolution that increased productivity, so have these advancements in digital health record storage. Some of the most advanced research techniques indeed.

Conclusions:

Through interdepartmental collaborations, our research has taken on a modern approach that does not seclude itself to the more traditional tactics of independent research based on a single supervising individual. The results of our meetings and communications have lead to greater in depth discussions and multidisciplinary perspectives; consequently, avoiding the lack of foresight and insight when compared with the more traditional single department study. Not all that shines is gold however. These collaborations have cost a greater amount of time in the coordination of their meetings and in their communications in general as a consequence of a more complex research team. Bottom-line though, this modern interdepartmental collaboration for research allows us to answer questions that would otherwise be left untouched.

Acknowledgements:

When it was said, "This is a truly some innovative evaluation of pediatric surgical care", the investigators were taken a back by the kind compliment, and took a moment to think about it. Our study on renal transplants takes some of the most effective, the most advanced, and the most modern approaches to research. Thanks to our affiliation with the Child & Family Research Institute (CFRI), we were able to troubleshoot our entire project from inception. Progress in the field of online patient health record databases allowed for us to use some of the most advanced data collection techniques available. Interdepartmental collaboration proved its invaluable worth in the planning, organization and application of this project. "Thank you", they responded to the student researcher. "No, thank you for the chance to improve surgical patient health and care."

Minor Surgery Part 1: A Retrospective Study in a Pediatric Population

Ms. Emily Chan, UBC Medical Student
Supervisors: Dr. Marija Bucevska, Dr. Cynthia Verchere, Division of Pediatric Plastic Surgery

Background:

Today, outpatient minor surgery under local anaesthesia is becoming the preferred format for management of small lesions, scars and biopsies in the pediatric population. Recent studies have shown that the use of regional or local anesthesia techniques can limit adverse events and improve patient outcomes in surgery. It has also been demonstrated that waiting lists for surgery and the costs of minor surgical procedures can be reduced by up to 2 and 3.8 times respectively when performed in a hospital ambulatory setting instead of the operating room.[2 3 4]

Despite this evidence, there is a lack of current literature focusing on minor surgery procedures both in the pediatric population and ambulatory clinics. Anecdotally, some surgeons are hesitant to offer local anaesthesia procedures to younger patients because of concerns about patient or parent anxiety, patient compliance/cooperation at the time of surgery, among others. On the other hand, some will routinely perform pediatric otoplasties and complex hand surgery in the outpatient setting.[5 6] In our clinic, minor surgery under local anaesthesia is routinely recommended for small procedures in children at around 5 or 6 years of age if after an informal screening interview at the time of consultation, they and their parents agree that it is reasonable. Here, we will provide a snapshot of our experiences with minor plastic surgery procedures in the plastic surgery unit at BC Children's Hospital (BCCH).

Methods:

We attempted to include all patients < 18 years of age undergoing minor surgery under local anesthetic between May 1, 2011 and April 30, 2013. These procedures were performed by Dr. Verchere in the BCCH plastic surgery ambulatory clinic. Any patients with missing records were excluded from the study.

Results:

The final study cohort included 168 subjects, 68 of which were male and 100 were female. Ages ranged from 2 weeks to 18 years with a mean of 13.1 years.

The most common diagnosis and most frequently performed procedure in our clinic was nevus and simple excision respectively. Undesirable postoperative events were classified as minor or major complications. There were no major complications, defined as events which pose risk to life or limb,[7] in any of the procedures. Minor complication rates were divided into the following categories: crusting (4.6%), delayed wound healing (3.2%), hypersensitivity reactions (2.3%), scar hypertrophy (1.8%), infection (0.9%), and other complications (7.8%).

Surgical outcomes for all procedures were assessed by patient and physician satisfaction at follow up and reported under four possible outcomes: both patient and physician satisfied (90%), patient satisfied and physician unsatisfied (0.7%), patient unsatisfied and physician satisfied (3.1%), and both unsatisfied (6.2%). In this analysis, we excluded patients who did not return for follow-up from the outcome analysis.

Conclusions:

This study supports the practice of minor surgery in hospital-based pediatric ambulatory clinics for patients screened to be appropriate candidates. We found that a significant proportion of procedures performed in the BCCH plastic surgery clinic resulted in satisfactory outcomes for both the patient and physician. In addition, there were no major complications, and minor complications occurred in the minority. Infection, significantly, occurred in less than one percent. In past years, surgeons have hesitated to perform minor surgery in children younger than 9 or 10 years old. However, in our practice, we have noted that a significant proportion of our pediatric population under this age underwent successful procedures in the ambulatory clinic. Minor surgery is feasible in children as young as 5 or 6 years old and can be an appropriate treatment option.

As a result, hospital outpatient clinics may become the preferred vehicle for the delivery of minor surgery services as it combines the high quality practice of trained surgeons with the convenience of general practice clinics. These clinics also offer the ability to form personal relationships with staff which may contribute to the high degree of patient satisfaction.

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Outcomes of Sclerotherapy for the Treatment of Venous Vascular Malformations

Mr. John Gorman, UBC Medical Student
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Division of Pedatric Plastic Surgery

Background:

Venous vascular malformations (VVMs) are the second most common vascular anomaly and occur with an estimated prevalence of 1% in the general population.[1,2] VVMs are congenital lesions that grow commensurately with the child. The presenting signs and symptoms depend on the location, extent, and invasiveness of the lesion and commonly include pain, swelling, thrombosis, and discolouration.[1,3] Percutaneous sclerotherapy is the preferred treatment for VVMs and the most commonly employed sclerosing agents are ethanol and sodium tetradecyl sulfate (STS). [4,5] Unfortunately, at this time no randomized control trial has been conducted to compare sclerosing agents and there is much disagreement in the literature concerning the preferred agent to treat VVMs. The objective of this study was to review the records of patients with VVMs who have been treated with sclerotherapy at BC Children's Hospital (BCCH), with a focus on the nature of the sclerotherapy treatment, the complications, and the treatment outcomes.

Methods:

A ten year retrospective chart review with minimum two year follow-up was conducted of all patients who presented to the Vascular Anomalies Clinic at British Columbia's Children's Hospital in the period from May 1, 2001 to April 30, 2013. Data collected included demographic data, VVM characteristics and presentation, sclerotherapy treatment details, complications of treatment, outcomes, recurrence rates, and follow-up course. VVMs were classified as complex if their size or invasiveness necessitated treatment with radiological guidance in the interventional radiology suite. Small and superficial lesions were classified as simple and treated without radiological guidance. Outcomes were categorized as a successful treatment if the initial treatment indication was improved upon, or as a failed treatment if the VVM was unchanged or made worse by treatment.

Results:

Of the 65 separate lesions examined in this study, the most common location of the VVM was the head and neck (48%) and the most common presenting complaint was swelling or the presence of a mass (85%). In 36 complex VVMs, pre-treatment imaging identified the lesion to be extensive or invasive and at least partly contained within deep tissue planes; these lesions were treated in the interventional radiology suite (Table 1). The most common sclerosing agent used to treat complex VVMs was ethanol. The other 29 lesions were identified by clinical or radiological exam to be superficial lesions of the skin or subcutaneous tissue; these lesions were classified as simple and were treated as office minor surgery without radiological guidance (Table 1). The most common sclerosing agent used to treat simple VVMs was sodium tetradecyl sulfate (either 1% or 3%).

Table 1 - Demographic and descriptive data of the 65 VVMs examined included in this study. Percentage values are reported in parentheses

Characteristics	Complex	Simple	Total
Anatomical Location			
Head and Neck	10	21	31 (48)
Lower Limb	11	3	14 (22)
Upper Limb	8	0	8 (12)
Trunk	3	1	4 (6)
Unifocal Extensive*	2	0	2 (3)
Multifocal	2	4	6 (9)
Tissue Involvement			
Localized Superficially (Skin or SQ)	3	15	18 (28)
Localized Deep SQ	2	0	2 (3)
Lozalized Intramuscular	9	0	9 (14)
Mixed Lessions:	22	14	36 (55)
Superficial (Skin or SQ)	18	14	32
Mucosa	5	14	19
Deep SQ	10	0	10
Intramuscular	20	0	20
Intraosseous	5	0	5
Parotid Gland	2	0	2
Viscera (Pleura, Gastrointestinal)	2	0	2
Presenting Signs/Symptoms			
Swelling	34	21	55
Discolouration	15	28	43
Pain	30	9	39
Phlebitis	20	6	26
Phleboliths	16	3	19
Other **	6	4	10

**lesions which spanned more than one anatomical location*

***including malocclusion, bleeding, decreased range of motion, airway obstruction, coagulopathy, and compressive optic neuropathy.*

SQ = Subcutaneous

The complication rate of sclerotherapy was calculated to be 31% per VVM treated and 21% per procedure. The complication rates for the treatment of simple and complex VVMs were 9% and 29% per procedure, respectively (Table 2). Complication rates varied based on sclerosing agent used, with a rate of 5% per procedure for 1% sodium tetradecyl sulfate, 38% for 3% sodium tetradecyl sulfate, and 20% for ethanol.

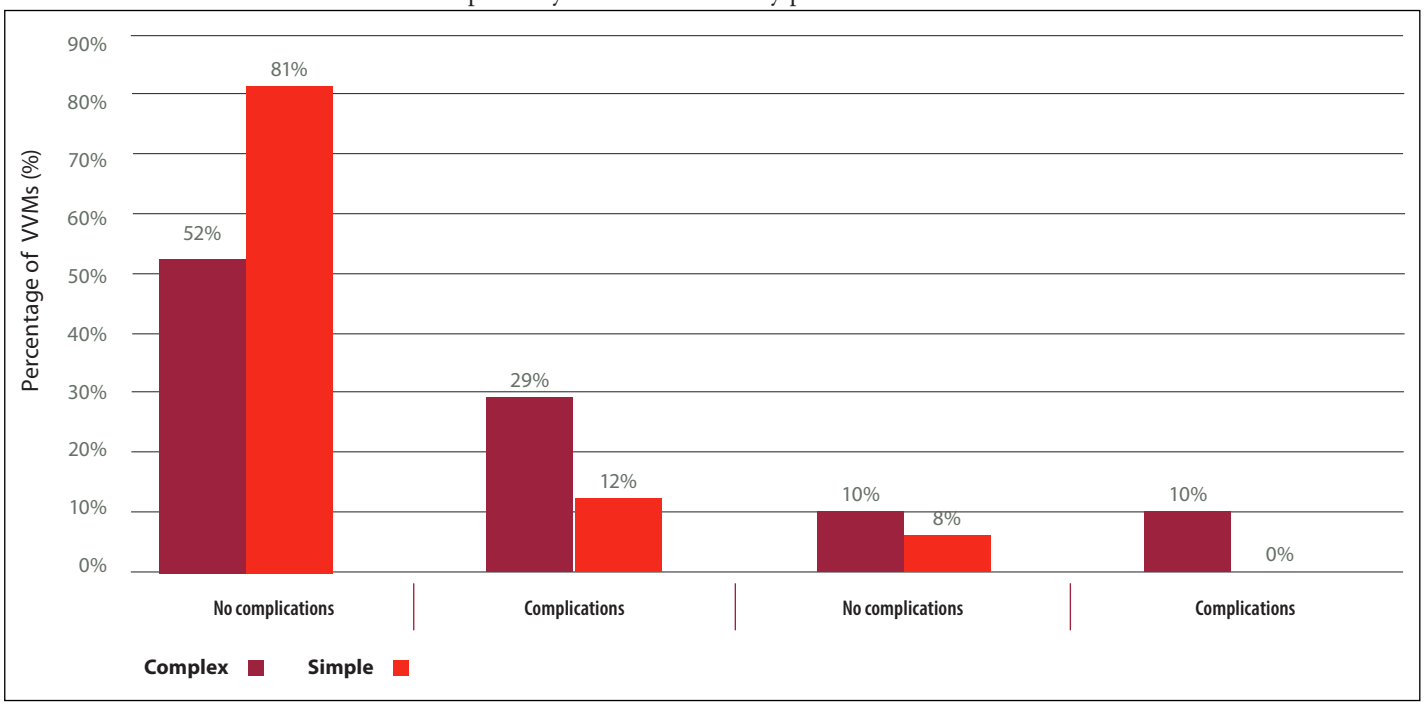
Table 2 - Complications of sclerotherapy

Complication	Complex	Simple	Total
Minor			
Significant Pain of Swelling	16	4	20
Skin Manifestations*	7	1	8
Nerve Palsy (Transient)	8	0	8
Anaphylaxis	1	0	1
Nausea and Vomitting	1	0	1
Major			
Decreased Mobility or Range of Motion	4	0	4
Chronic Pain	3	0	3
Nerve Palsy (Prolonged)	2	0	2
Compartment Syndrome	1	0	1
Renal Dysfunction	1	0	1

**including blistering, drainage, hemorrhage, necrosis & ulceration*

Of the 65 VVMs included in this study, 57 had more than two years of follow-up before the end of the study period. The mean length of follow-up from the last sclerotherapy procedure to the end of the study period was 76.8 months. The majority of lesions treated had a successful treatment outcome with no complications, for both simple (81%) and complex (52%) lesions.

Figure 1 - Outcomes of sclerotherapy as percentages of the complex (n=31) and simple (n=26) VVMs for which treatment was completed by the end of the study period



Conclusions:

Although in its advent, sclerotherapy for the treatment of VVMs was performed without radiological guidance, there has been a shift in the concept of treatment in the current day. It is common for all VVMs to be treated under fluoroscopic guidance, including those which are small and superficial.Fluoroscopic guidance is often essential to monitor sclerotherapy treatment of complex VVMs, which may infiltrate deeper tissue planes or communicate with the surrounding venous system; however, the anesthetic and radiation dose typically associated with treatment in the interventional radiology suite is not free of complications either.

This study demonstrated that a subset of patients with simple VVMs can attain the benefits of sclerotherapy as minor surgery while avoiding the potential complications of treatment under fluoroscopic guidance in the interventional radiology suite. This study also demonstrated that both simple and complex VVMs have been successfully treated with sclerotherapy at BCCH, with treatment success in 93% of simple VVMs and 81% of complex VVMs.

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Review of Complications Following Non-urgent Craniotomy: Does My Patient Need to Go to the PICU?

Mr. J. Michael Kerr, UBC Medical Student
Supervisor: Dr. Ash Singhal
Division of Pediatric Neurosurgery
Co-Winner of the 2nd Annual OPSEI/iACT Writing Contest

Background:

Patients undergoing elective craniotomy are routinely admitted to the intensive care unit (ICU) in anticipation of medical and neurological complications that may arise during the early postoperative period.[1] Only a small percentage of these patients, however, will require some kind of ICU-specific care, with intensive observation and basic post-operative care being the only services provided to a majority of patients.[2] A growing number of studies have suggested that a selective rather than a routine approach to postoperative ICU admission may be more appropriate, citing long anaesthetic times, the lateral position, and failure to extubate in the operating room as predictors for those requiring post-craniotomy ICU care.[3,4] The main arguments against routine ICU admission are cost, bed availability, and an increase in family anxiety and discomfort. The ICU is a scarce and expensive resource, and a lack of beds and staff can sometimes result in unnecessary delays of surgical procedures. Management of these patients on the regular ward, if done safely, could therefore prove to be a benefit to both the patient and healthcare system.[5]

Although the factors predicting post-operative complications have been explored in adults,[3,4] these factors have not yet been characterized in children. The purpose of this study, therefore, was to examine the nature and frequency of postoperative complications following pediatric craniotomies. Our second aim was to identify the risk factors predicting the need for pediatric intensive care unit admission (PICU) after elective craniotomy.

Methods:

We conducted a retrospective review of elective craniotomies performed at British Columbia's Children's Hospital from 2008-2011. Pediatric patients (<18 years of age) with an admission history of cranial surgery were identified through a review of our prospectively maintained neurosurgery research database. Emergency procedures for trauma and intra-cranial hemorrhage were excluded from this review.

Details of patient demographics, clinical presentation, operative details (total anaesthetic time, intra-operative complications, blood loss and transfusions, and endotracheal intubation status before leaving the OR), and postoperative course were ascertained from medical health records. Nursing notes, flow sheets, and physician notes were screened for evidence of serious post-operative complications requiring intensive care up until the time of transfer to the step-down ward. For this study, serious post-op complications were defined as complications requiring PICU-specific care. Health records were reviewed for transfers back to the PICU after discharge, and the reasons for transfer.

Descriptive statistics were used to summarize patient demographics, study variables, and the incidence of serious postoperative complications and PICU-specific interventions. Study variables of patients requiring PICU care were compared to identify common risk factors for serious post-operative complications.

Results:

A total of 76 patients (43 males: 33 females) were reviewed. The mean age of this cohort was 8.6 years (range: 0.12-17.24). Of the 76 patients, 70 (92.1%) had an uneventful recovery, 1 (1.3%) had an early cerebrospinal fluid leak (the diagnosis or management of which was not specifically enhanced by the intensive care unit (ICU) stay), and 1 (1.3%) required vasoactive drugs for hypertension (**Figure 1**).

No patients were re-admitted to the PICU after ward transfer. Forty-two patients underwent tumour resection (55%), 20 patients had surgery for epilepsy (26%), 5 patients underwent posterior fossa decompression for Chiari I malformation (7%), and 4 patients had AVM resection (5%) (**Figure 2**). The mean anesthetic time was 372 minutes (range: 132-676), with an average blood loss of 232 mL (range: 25-1000).

Among the 4 patients (5.3%) with serious early complications, 3 required urgent medical imaging for unexpected neurological deficits (1 post-operative hematoma, 1 persistent hydrocephalus, 1 unremarkable imaging exam in a slow to wake patient), and one patient required intubation/ventilation for an unexpected awakening delay.

Figure 1 - Post-operative outcomes of 76 patients who underwent elective craniotomy at BC Children's Hospital during the 2008-2011 review period. A majority of patients did not require PICU care.

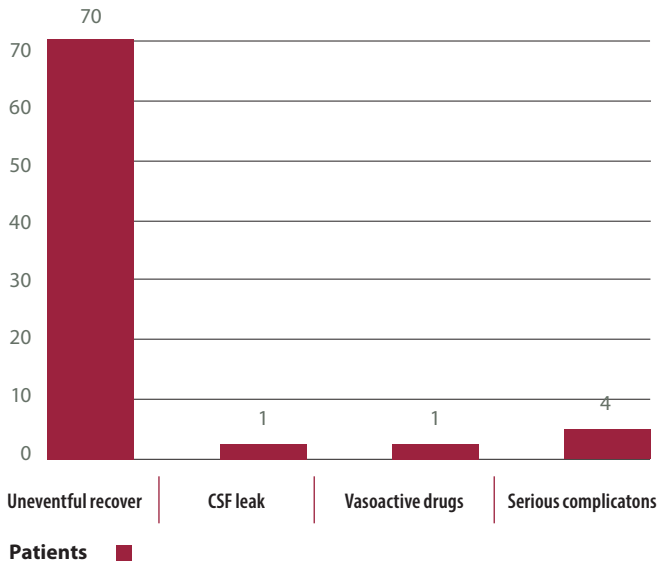

Figure 2 - Pie chart summarizing the operative procedures reviewed in study cohort (n = 76)

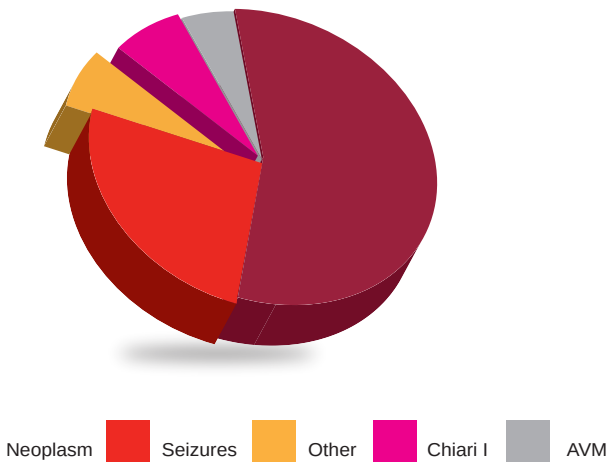

Table 1 - Case summary of 4 patients with serious post-operative complications requiring PICU care. All 4 patients had anesthetic times exceeding 450 minutes, and 3 had undergone posterior fossa tumor surgery.

Case	Age	Location	Time	Complication	Intervention
1	13	**Posterior Fossa**	**471**	Diminished consciousness	Urgent imaging
2	8	**Posterior Fossa**	**458**	Awakening delay	Bag/mask ventilation
3	10	**Posterior Fossa**	**502**	R hemiparesis	Urgent imaging and return to OR
4	8	**R occipital horn**	**480**	L hemiparesis	Urgent imaging

Conclusions:

Consistent with the findings in the adult literature, serious post-operative complications requiring PICU-specific care are a rare event. The results suggest that the children most at risk for developing serious post-operative complications, including neurological and cardio-respiratory complications, are those undergoing lengthy procedures (>450 minutes anesthetic time), often involving the posterior fossa or brainstem. Patients with shorter procedures and supratentorial pathology may not require post-operative ICU care.

Limitations:

This study is limited by a relatively small sample size (n=76). Further data collection is required before firm conclusions can be drawn from the results. Secondly, the data is based on the experience of a single institution and therefore the results may not be generalizable to other groups. Prospective studies with multicenter collaboration are necessary to strengthen the findings.

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Craniosynostosis

Mr. Victor Liu, UBC Medical Student
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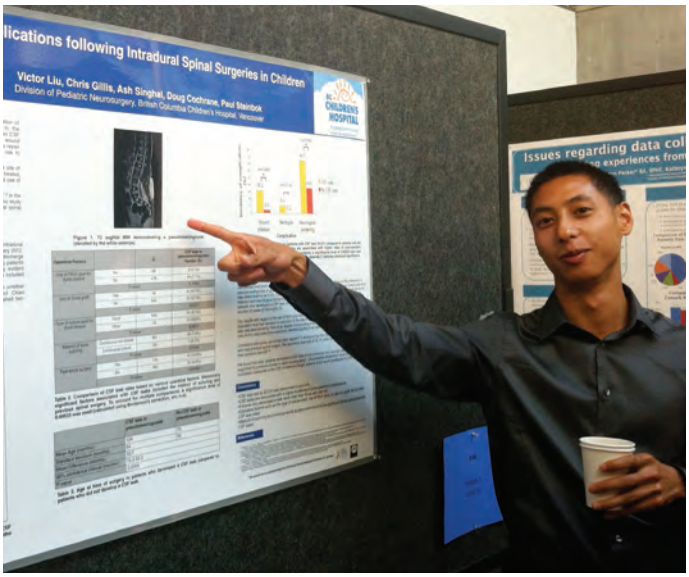


Craniosynostosis occurs in one out of 2,000 live births and affects males twice as often as females.

Background:

Craniosynostosis is a condition in which one or more of the sutures in an infant's skull prematurely fuses, thereby changing the growth pattern and shape of the skull. These patients are usually diagnosed as infants. The major concern with this condition is the abnormal shape of the skull and the impact that this might have on the child in terms of physical and psychosocial well-being. Other health issues that these patients may encounter include abnormal brain growth, impaired cognition, and low self-esteem. Surgical correction is often recommended. Over the last decade, there have been over 4000 publications on the subject of craniosynostosis, but relatively few of these studies focused on reporting the outcome of the surgery to correct the craniosynostosis and there are almost no studies that look at the long-term outcome (>10 years postop) after non-syndromic single suture craniosynostosis treatment.

The impact of skull appearance on craniofacial self image and well being (CSI&WB) in the adolescent and young adults has never been studied in patients with this condition. The purpose of this study is to assess the craniofacial self image outcome after surgery compared to no treatment on the eventual head shape after completion of cranial growth in patients with a specific type of craniosynostosis. We expect a high level of satisfaction with the aesthetic of the head in the operated non-syndromic, isolated craniosynostosis patients. We expect a modest level of satisfaction with the aesthetic of the head in the non-operated patients. However, we hypothesize that this difference of head shape satisfaction does not impact the level of self-esteem or fear of negative

Methods:

This will be a combination of a retrospective chart review and prospective follow up study in a single centre (BCCH, Vancouver). Previous craniosynostosis patients will have their chart reviewed retrospectively and those who meet the eligibility criteria will be asked to complete a brief questionnaire and to attend the BCCH Neurosurgery clinic for a single visit for follow-up and for specific non-invasive scalp measurements. All eligible patients will be sent a letter asking if they are willing to participate in the study and requesting that they complete the CSI&WB questionnaire, if they agree to participate in the study. Patients, who complete and return the CSI&WB questionnaire, will be asked if they would be prepared to attend the neurosurgery outpatient clinic at BCCH in Vancouver for a face-to-face assessment where cephalic measurements (cephalic index and scalp surface measurements) will be carried out. The primary outcome of the study is satisfaction of the aesthetic of the head in patients who were not operated compared to patients who were operated for isolated, non-syndromic craniosynostosis. We expect to have approximately 100 patients in our database that meet our inclusion criteria. We hope that our patient participation rate will be ~60-70% (questionnaire is expected to take 15minutes; outpatient clinic consultation is expected to take approximately 15-20 minutes). Considering previous >10yr postoperative studies, this would be the largest study to date.

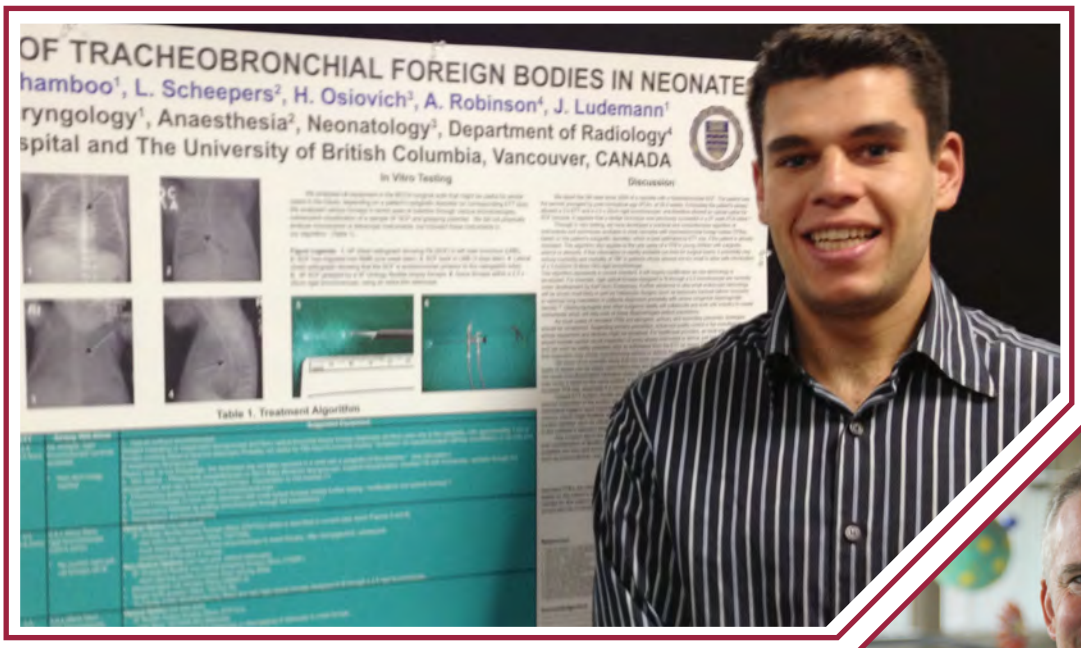
Results:

As this is an ongoing prospective study, our data collection has not been completed at the time of writing this summary, so I will describe the progress to date. The retrospective review of patients has been completed. The retrospective chart review was completed with approximately 130 eligible patients identified. We anticipated a participation rate of ~60% and currently have 26 patients enrolled. 11 patients have been assessed in our clinic.

Conclusions:

The information provided by this study will help to guide parents of children with this condition when deciding upon a treatment plan. Ultimately, the goal of following these outcomes is to provide our clinicians with more information regarding the surgical treatment of these patients and improve the health and wellbeing of craniosynostosis patients within the community.

The results of this study will increase the knowledge of this condition and facilitate counseling of patients and their families. Since the operation that has been done for craniosynostosis at BCCH has been a relatively less aggressive procedure, the results of this study might also shed some light on the extent of surgery needed to achieve head shape satisfaction in the long term. If the long-term outcomes are satisfactory, this would argue against doing more aggressive and more risky surgeries for craniosynostosis. The lessons learned from this study will allow patients and their families to be more engaged in the treatment process and make better informed therapeutic decisions.



Research Experiences at BCCH

Mr. Tin Jasinovic, UBC Medical Student
Supervisor: Dr. Jeffrey Ludemann
Division of Pediatric Otolaryngology

Background:

I had the privilege of continuing to work on a couple of projects with Dr. Jeffrey P. Ludemann in the Division of Pediatric Otolaryngology this summer; these included a case series on bronchial casts (a rare and understudied condition presenting in children with complex systemic diseases) as well as continuing development of a comprehensive educational website on childhood choking prevention. Disclaimer: the vast majority of my work this summer was dedicated to the website development so naturally I will focus more on that aspect of my research experiences.

To preface the choking prevention initiative: a sobering report written by A. Sperling – a U.S. attorney – in 2004, indicated that in the United States 150 children died and 10,000 children had to visit an Emergency Room every year because of choking. Unfortunately, choking injuries are not considered a reportable disease in Canada, but it is unlikely that we fare much better. Based on evidence, the best approach to address this issue is via primary prevention -- attempting to make children and parents more aware of the choking hazards in their everyday lives. However, that goal is associated with many barriers and challenges; these include, but are not limited to, certain fallacious beliefs seen among parents. An example would be a belief that their child is no longer at risk from choking on certain foods if they had previously swallowed them without difficulty. This is consistent with the construction of knowledge where by one's previous experience, individually or socially, in a large part influences subsequent knowledge construction – a psychological phenomenon that creates a precedence, which in this situation can potentially lead to adverse events if left unaddressed.

Additionally, parents may feel threatened or demeaned to the idea of being given advice on how to best raise their child. Consequently, we have shifted from a case-based advising role -- historically done in hospital clinics -- to a more global and efficient dissemination of information;

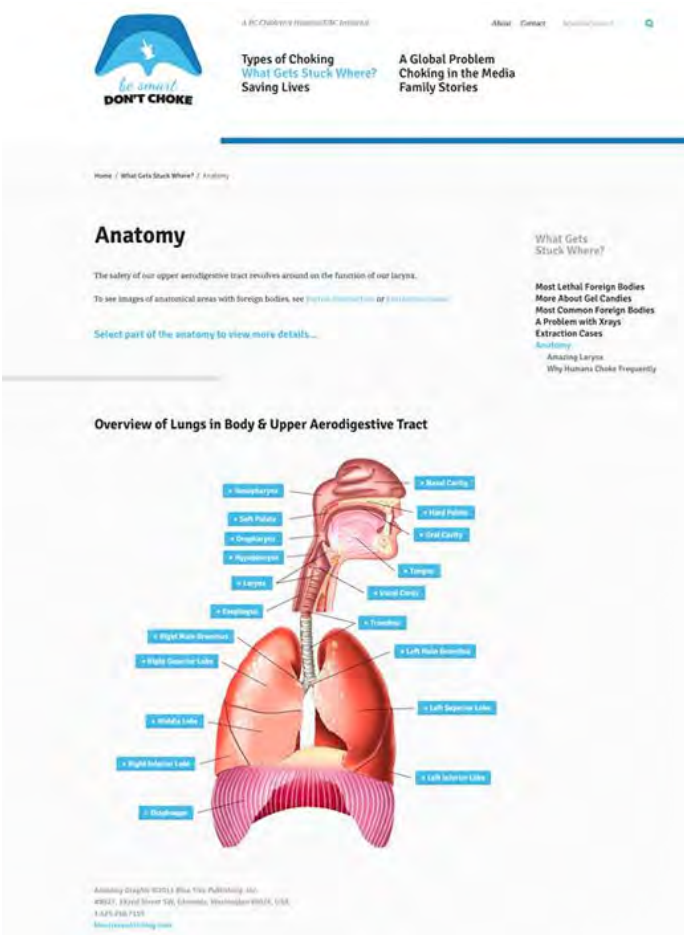
this entails creating an online resource specifically catered to three target populations – preteens, teenagers and adults/parents/caregivers.

Results:

The preteen site, virtually complete at this point, is composed of an introductory video showing five different common choking events and various types of interactive, layered information. Some notable portions include an "incredible x-rays" section as well as simple anatomy and physiology of the respiratory tract. Additionally, there is also a "Games" section where preteens are encouraged to identify potential choking hazards in a given environment.

The teenager portion (*www.dontchoke.ubc.ca*), just launched last month, is far more comprehensive – including scientific references, global data on choking, and thorough choking prevention techniques. By providing the teenagers with more advanced science and detailed information, we hope to instill a sense of social responsibility in them; a state where they are aware of potential hazards and possess an adequate knowledge base of what to do in critical situations. Lastly we have included a "Choking in the Media" section, where we try to connect with the teenage generation on a more personal level; this portion of the website compiles incidences of choking (both fictional and historically accurate) in popular movies and interesting news articles.

At this stage in the project, we have still not commenced the "Adults/Parents/Caregivers" part of the website; however, we imagine that it will include a lot of overlap with the teenager site – specifically the prevention information. Naturally, the next stage of the project would involve full completion of all portions of the website and commencement of a study protocol to evaluate the effects it will have in a prospective manner.



Acknowledgements:

I should mention that this whole initiative was developed by Dr. Ludemann, Dr. Samson Nashon from the Faculty of Education and Dr. Andrew Thamboo (PGY-5) – a fifth year Otolaryngology resident. My involvement has been very recent, and I feel very honored to be part of such a positive intervention that has potential for a large-scale impact. Lastly, I'd like to acknowledge OPSEI for their generosity and always helpful administrative support for all research initiatives; they truly are the backbone that holds surgical research at BCCH together!

The Reliability of Clinical Tonsil Size Grading in Children

Mr. Divjot Kumar, UBC Medical Student
Supervisors: Dr. Dianne Valenzuela, Dr. Frederick K Kozak, Dr. Jeffrey P Ludemann, Dr. J Paul Moxham, Dr. Jane Lea, Dr. Neil K Chadha
Division of Pediatric Otolaryngology

Co-Winner of the 2nd Annual OPSEI/iACT Writing Contest

Background:

During the past summer, I had the pleasure to work with Pediatric ENT specialists and children aged 3-17 yrs, in a study involving tonsil size grading. One of the most frequently encountered problems in the pediatric population is enlargement of tonsils which has been shown to lead to several detrimental health consequences in the pediatric population. These include swallowing difficulties, pain/discomfort, airflow limitation, and most notably, childhood Obstructive Sleep Apnea (OSA). [1,2,3] Long term consequences of OSA can result in delayed growth and development as well as cardiopulmonary problems.[2,4] Due to this, proper assessment and reliable monitoring of tonsil size becomes necessary in clinical settings. Tonsillar grading scales allow clinicians to record and communicate changes in tonsil size.[5,6,7] There is, however, significant variability associated with the use of tonsil grading systems which may potentially make tonsil size assessment unreliable. [5]A confounding problem is that the reliability of these grading systems in a 'real-life' clinical setting has never been formally studied. Understandably then, doubts may arise pertaining to the relationship between tonsil size assessment and health outcomes when there is an initial degree of uncertainty in measuring tonsil size. There is, therefore, a need to compare existing tonsillar grading scales and assess their reliability/reproducibility in clinical settings.

Among the currently used grading scales, two of the most commonly adopted ones are: i) Brodsky grading scale in which the tonsils are assigned a grade from 1 to 4, depending on the percentage of orophayngeal airway occupied by the tonsils[6], and ii) Friedman Grading Scale which classifies tonsil size using the location of the tonsils relative to surrounding structures in the oral cavity such as the anterior tonsillar pillar.[7] In our study, we aimed to investigate the Intraobserver reliability and Interobserver reliability of 3 different tonsil grading scales: Brodsky Grading Scale, Friedman Grading Scale, and a Modified-3-grade scale which was designed in Vancouver. We hypothesized that a 3-grade scale may provide a greater intra-observer and inter-observer reliability when compared to the other tonsil grading scales due to its intrinsically reduced grade classifications.

Methods:

This non-experimental, cross-sectional study was conducted in the ENT outpatient clinic at BC Children's hospital, Division of Pediatric Otolaryngology. Over the span of June-Aug 2012 and June-Aug 2013, we recruited 104 children, aged 3 to 14 years who were coming in for a clinical visit at BC Children's. For each child, four independent observers with different clinical backgrounds and in various levels of training visually assessed and measured tonsil size using the Brodsky Scale, Friedman Scale, and the Modified-3-grade scale. Each observer assessed tonsil size twice, using the three grading scales, with a 5 minute time span in between. Thus, there were 4 sets of observation pairs (4 observers assessing twice) for each child seen. Tonsil size data was analyzed by deriving the Intra-class correlation coefficients and Cronbach α, which are statistical measures of rater reliability. It was predetermined that an ICC of greater than 0.75 would indicate an "acceptable" reliability level. [8]

Results:

Preliminary Results (N=86)

Figure 1 - Interobserver reliability of Tonsillar Size Grading Scales.

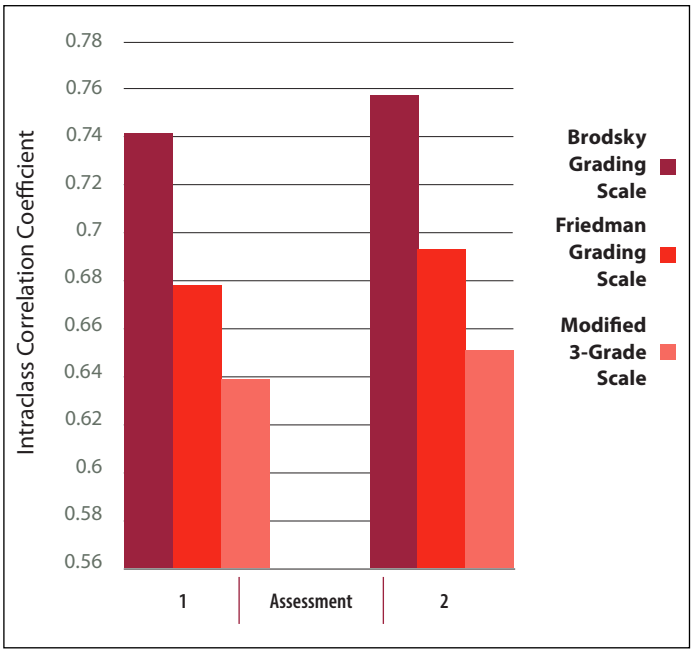
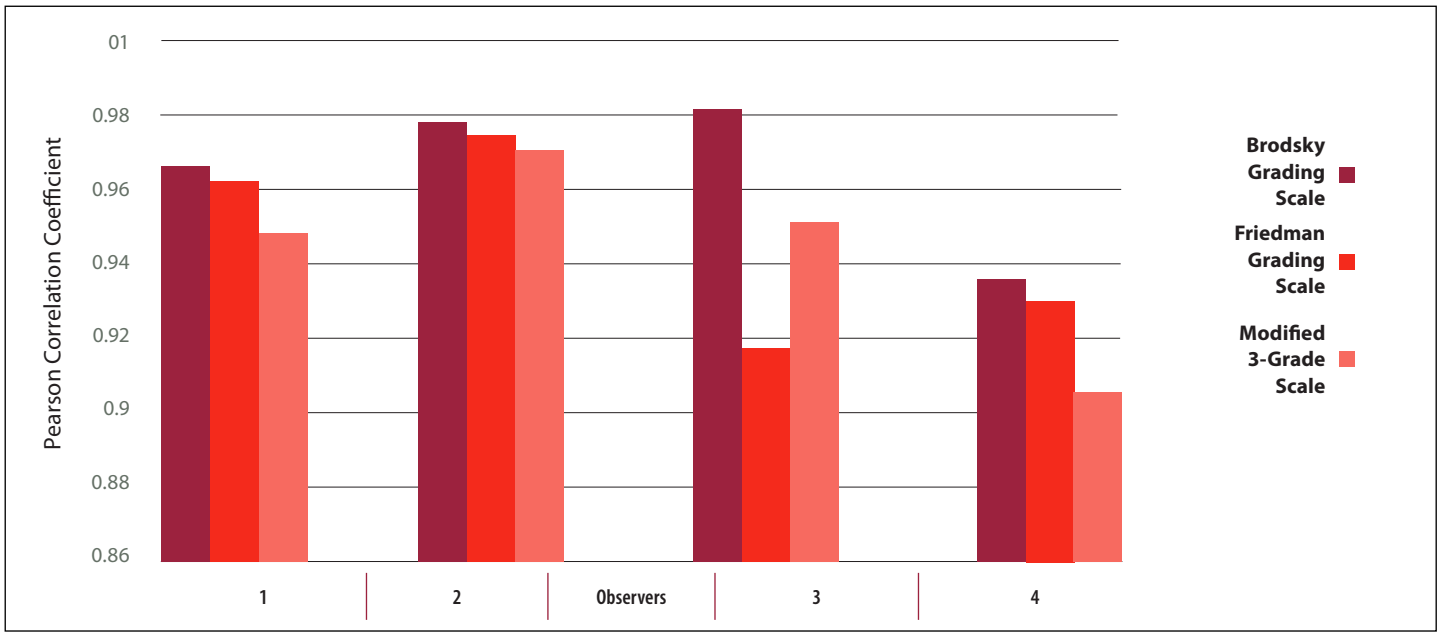


Figure 2 - Intraobserver Reliability of Tonsillar Size Scales using Pearson Correlation Coefficients



Discussion:

According to our results (figure 1), Interobserver reliability was found to be highest for the Brodsky Grading scale, while the modified 3-grade scale had the lowest inter-observer reliability. It is of note to mention that all 3 scales exhibited less than "acceptable" reliability level as was predetermined by an ICC level of 0.75 or greater, although the Brodsky scale was very close [ICC=0.748]. Although these preliminary results don't agree with our hypothesis, they are supported by the findings of Ng. *et al*. who also found the Brodsky grading scale to have higher Interobserver reliability than the Modified 3-grade scale when using endoscopic tonsil grading.[5]

They provide a possible explanation for these counter-intuitive results by stating that our eyes may be more sensitive to distinguishing between halves and quarters than between thirds. Mean Intraobserver reliability was assessed using the Pearson Correlation Coefficient. The Brodsky Scale exhibited highest Intraobserver reliability. Further data collection and analysis is currently underway to confirm these results.

Acknowledgements:

I am thoroughly indebted to Dr. Neil K. Chadha and all Staff Otolaryngologists for their help with this study. I'd also like to thank Mrs. Rachelle (Dar Santos) Moshfeghi for coordinating ethics approval. Further gratitude goes to Boris Kuzeljevic and Jeffrey Yiu for help with statistical analysis, and all Fellows/ Residents that elected to be a part of this study. It has truly been an incredibly enjoyable and satisfying summer.

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Tracheostomy at BC Children's Hospital: A Quality of Care 30-Year Review

Ms. Lauren N. Ogilvie, UBC Science Student
Supervisors: Dr. Simon Chiu[1], Jessica Kozak[1], Dr. Robert J. Adderley[2], Dr. Frederick K. Kozak[1],
[1]Division of Pediatric Otolaryngology,
[2]BCCH Home Tracheostomy and Ventilation Program

Background:

Tracheostomy and its associated outcomes have evolved from ancient origins to the present day. Tracheostomy in the pediatric population over the past 30 years has seen changes in frequency, age and indications for this procedure. BC Children's Hospital is a Canadian pediatric tertiary care centre and tracheostomies have been performed as part of care for children since 1982. Comparable medical centers have reported a decline in frequency of tracheostomy over 1980-1990 and either a continued leveling off or slight increase in frequency over the past 10 years.[1-3] The average age for this procedure has declined over the past 30 years and currently the majority are done during the first year of life.[4-8]

Figure 1. Tracheostomy, external portion of tube (***Photo courtesy of NHS Choices***)

The most prevalent indications for tracheostomy have changed over time due to advancements in treatment and technology. Introduction of the Haemophilus influenzae type B vaccine and improvements in the intensive care unit have decreased the number of procedures required for acute infectious diseases over the 1980's and 1990's.[9]

Complications of tracheostomy have remained consistent (18-46%) over the past 30 years.[2, 5, 7, 9-11] When granulation tissue around the stoma has been considered as a complication the overall reported complication rate is at the higher end of this range.[2, 7, 10-11] Many surgeons would not consider granulation tissue formation as a true complication.

At BCCH tracheostomies are performed by a pediatric otolaryngologist with follow-up care and training coordinated through outpatient programs. For children and their families living with a tracheostomy, long-term care can be challenging and requires training. Parents can learn how to change a tracheostomy tube, suction secretions, apply certain medications, and operate ventilation equipment if required.[12] Tracheostomy tube changes can be particularly stressful as there is a chance of accidental decannulation which is the most frequent cause of tracheostomy-related death although this is quite rare.[13] In addition long-term care can create stress within a family due to isolation, communication difficulties, sibling care and financial issues.[14]

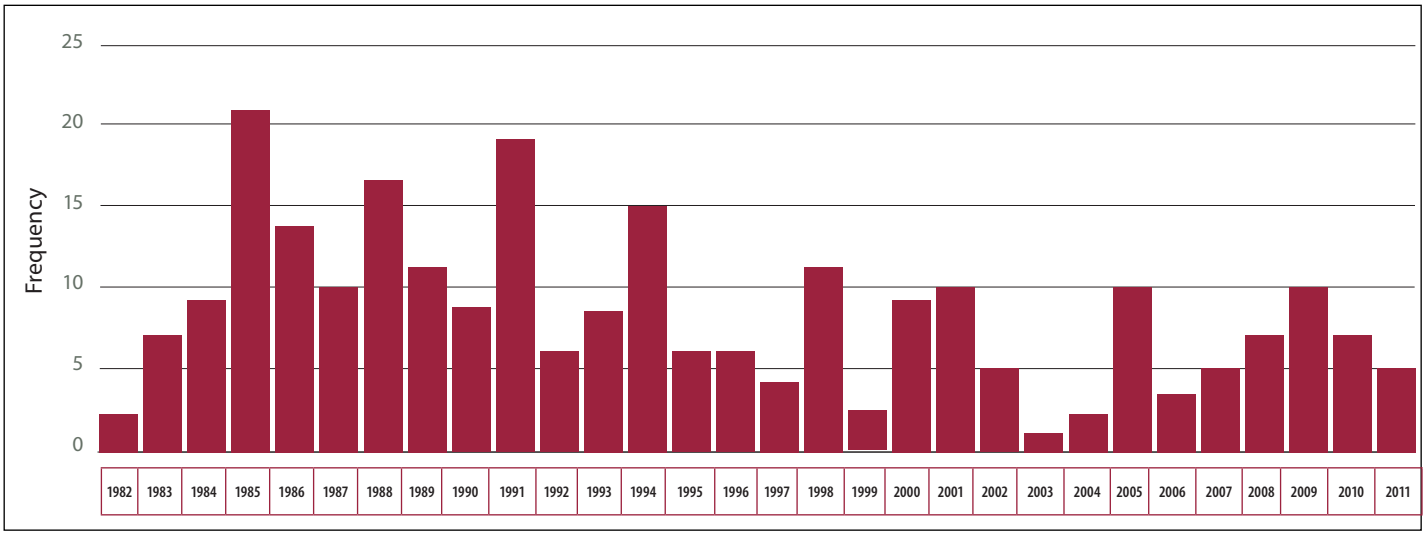
To date there has been no comprehensive evaluation of tracheostomy care at BCCH. As such, a 30 year retrospective chart review of tracheostomy patients was performed to ensure quality and compare procedural indications and outcomes with the current literature. Cases occurring between 1982 and 2011 were reviewed for demographics, date of tracheostomy, surgeon, indication, complications, mortality and date of decannulation if it has occurred.

Results:

The number of tracheostomy procedures that are done at BCCH each year has changed in a similar manner to the literature.[9] Frequency declined over the 1980's and 90's and leveled off with a slight increase over the last ten years (Figure 2).

The early portion of this pattern may reflect a decline in the use of tracheostomy for short-term airway management. The more recent increase in frequency may be attributed to the improvement of ICU care and an increased survival rate for premature infants.[15] The percentage of tracheostomies performed on children under one year of age arranged by year reveals a similar increase over the last 10 years.

Figure 2 - Tracheostomies per Year at BCCH



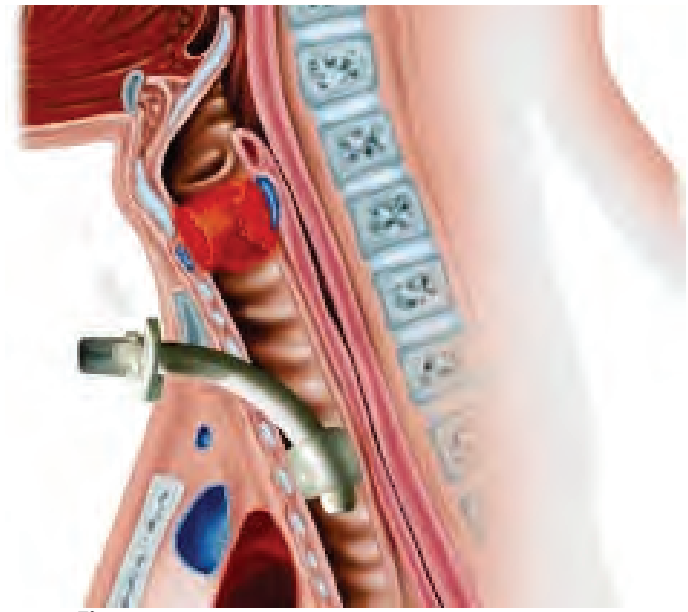


Figure 3 - Tracheostomy: internal, for Subglottic Stenosis
(Image courtesy of Google Images)

At BCCH, tracheostomies are most often performed on children with a form of upper airway obstruction (UAO). Initially some of these cases were attributed to infectious diseases but as in other tertiary care centers infection is no longer a prominent indication.[16] Acquired subglottic stenosis accounts for many of the tracheostomies performed (Figure 3). At BCCH UAO patients and those who had tracheostomies for trauma had reasonably high rates of decannulation. Those who had been diagnosed with a syndrome or who had a neurological disorder were less likely to be decannulated. In recent years tracheostomies for prolonged intubation have increased at BCCH in a similar pattern as has the number of tracheostomies. This again may be due to increased infant survival, especially since prolonged intubation is often involved in complex neonatal medical care.[6]

The long-term course of patients with a tracheostomy is often complex. Upon review, 63% of patients had a recorded decannulation while they were still in the care of BCCH.

Complications such as pneumothorax or stomal infection occurred in 19% of all cases. This relatively low complication rate may have to do with the strict criteria for complication in this review. Mortality due to tracheostomy was less than 2% with most instances of tracheostomy-related death attributed to accidental decannulation.

Conclusions:

The completion of analysis for this study and further research into the subjective experience of those who undergo tracheostomy at BCCH is necessary to determine where improvements in care may be possible. Pediatric tracheostomy is considered a safe and effective procedure at BC Children's Hospital.

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OPSEI's Academic Rounds is accredited as a Continuing Medical Education activity through the Royal College of Physicians and Surgeons of Canada

An Appraisal of the OPSEI Academic Rounds Evaluation

Mr. Quinten Clarke, SFU Health Sciences Student
Supervisor: Dr. Douglas Courtemanche[1], Damian Duffy[2]
[1]Division of Paediatric Plastic Surgery
[2]Office of Pediatric Surgical Evaluation and Innovation

Background:

The Office of Pediatric Surgical Evaluation and Innovation (OPSEI) holds monthly academic rounds that offer surgeons at BC Children's Hospital (BCCH) the opportunity to learn about new techniques and methods from presentations delivered by their peers in an interdisciplinary setting. Two different evaluation forms have been used since 2010 to evaluate these rounds; the former form (N=34), which utilizes five competencies evaluated on a 5-point Likert scale and the current form (N=24), which evaluates presenters on a 10-point scale on each of the 7 CanMEDS competencies. Although rounds are well accepted and have become a core activity within the surgical community at BCCH, there seems to be a discrepancy in the rate of completion of evaluation forms. Thus, our research question became "Is the current OPSEI Academic Rounds evaluation form effective?"

Methods:

Ethical approval was obtained and a comparison was conducted of the current evaluation form with the previous form. Data, obtained from OPSEI, was collated for the period of January 2010 – May 2013. (1) The mode and score distributions of each form was obtained through the construction of bar graphs for all score values given by attendees. (2) Regression analysis was conducted for rates of form competition as a function of attendance for both the current and former form with data being entered in form-specific tables. (3) Comments were analyzed qualitatively.

Results:

(1) The modes for the former and current form were 4/5 and 9/10 respectively. Scores were found on both forms to be spread primarily over four ratings, on the former form 2, 3, 4 and 5; and on the current form 7, 8, 9 and 10.

(2) Comments were found to be largely positive regardless of score. Critical comments in any of the scoring categories were infrequent, ranging from 5.2% to 23.5% of comments. Comments were found to be more frequently included on forms where scoring sections were not completed.

(3) Regression analysis found paradoxical trends between the two forms. Former forms were found to have a positive relationship between attendance and form completion ($R^2 = 0.582$) while current forms had a negative relationship ($R^2 = 0.157$).

Conclusion:

OPSEI Academic Rounds are well received with presenters collecting a mode score of 9 and positive comments making up 74.7% of completed comments. We have concluded that the large scoring scales used on the past and current evaluation forms have become superfluous as few scores are consistently used by attendees. Further, 65.1% of the rounds attendees do not include comments on their evaluation form. Finally, the paradoxical trends between attendance and form completion rates on the former form and the current form suggests that the current form is less accessible for the interdisciplinary round attendees.

Future Directions:

This project culminated in the creation of an OPSEI evaluation form that incorporated the improvements recommended by our study. This newly developed form has been implemented and we will, in the future, collect feedback from attendees and investigate its effect upon compliance.

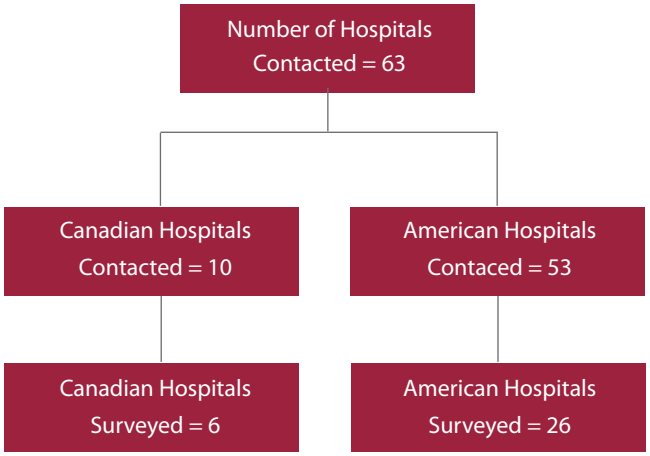
Environmental Scan of Bereavement Services at North American Pediatric and Maternity Centers

Ms. Vivian Ma, UBC Medical Student
Supervisors: Dr. Eric Webber[1], Mr. Philip Crowell[2]
[1]Division of Pediatric Surgery
[2]Department of Spiritual Care

Background:

"Bereavement" is defined by the Bereavement Committee at BC Children's and Women's Hospital as "the therapeutic process of dealing with loss of, or potential loss of, a life". Subsequently, bereavement services include any service offered to patients and their families leading up to the end of life, during and after the death of a patient or family member within the workplace. Grief therefore refers to the more acute stages whereas bereavement covers the long-term process. As such, bereavement is a valued component for a patient's families and therefore a vital component in providing complete patient care according to the biopsychosocial model of health.

The results were quantitatively and qualitatively analyzed. A breakdown of the participant pool is as follows:



Methods:

To improve patient care at BC Children's and Women's Hospital, the Bereavement Committee is currently working to assess bereavement services from a variety of angles. Two surveys are being conducted internally to determine what specific services are offered on each ward and assess areas for improvement from the staff's perspective. Therefore, an environmental scan was conducted in conjunction so that bereavement services at BC Children's and Women's Hospital could be compared against the nation's standards.

The environmental scan focuses on procedures used by major pediatric and maternity tertiary care centers in North America. A list of hospitals was obtained from the Children's Hospitals Associations Members List. Subsequently, bereavement coordinators were identified either through the International Committee of Bereavement Coordinators or the respective hospital's website. The most suitable individual was then invited to a semi-structured phone interview via email invitation.

Semi-structured phone interviews were then conducted with each hospital representative around five themes. In terms of patient services, these themes included whether a formal bereavement program was in place and what were their specific elements; whether there was a designated bereavement coordinator and their role portfolio; and if the hospital followed any specific protocols, guidelines or standards. From a staff and bereavement perspective, we focused on whether any support systems were in place for staff following a traumatic event and if any specific protocols, guidelines, and standards were used.

Results:

Quantifiable factors, such as the proportion of hospitals with a formal program or designated bereavement coordinator position, were tabulated. In general, most (defined as more than half of the responded institutions) did have a formal bereavement program in place. Furthermore, most of the pediatric and maternity centers also had an appointed bereavement coordinator position, though the exact details and extent of the position varied. Another interesting note was that the presence of a program did not always correlate with having a coordinator position. In other words, hospitals with a formal program did not necessarily also have a designated coordinator and vice versa. The following graphs demonstrate the relative distributions:

Figure 1 - Distribution of Hospitals with a Bereavement Program

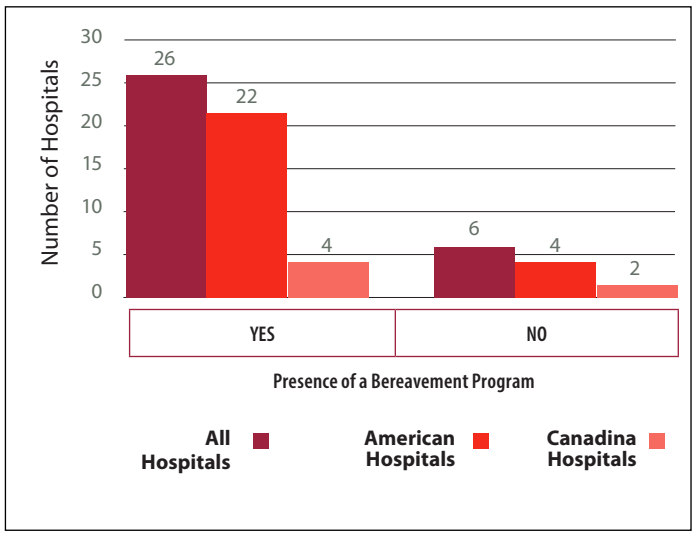
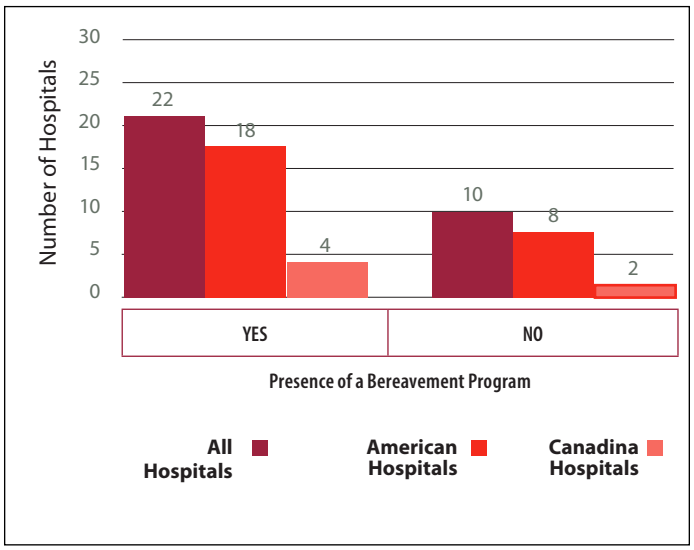


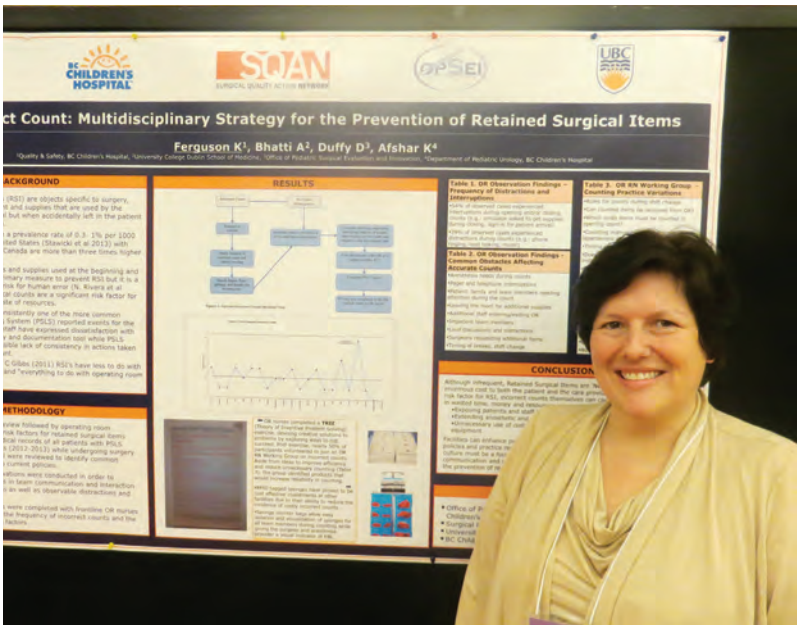
Figure 2 - Distribution of Hospitals with a Bereavement Coordinator

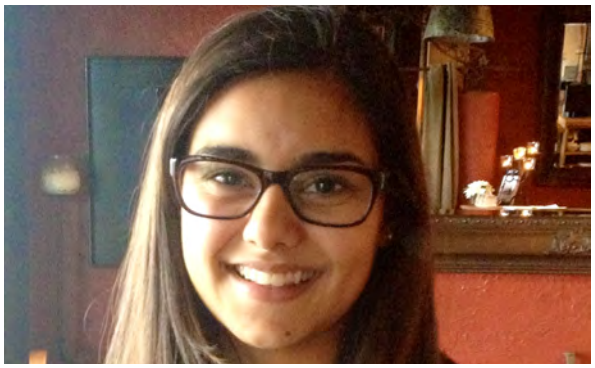


Certain trends in practice were obtained when analyzing the specific results qualitatively. From the patient care perspective, certain themes persisted throughout. During end of life care or at time of death, all hospitals offered some form of memory making including handprints, footprints, ink prints, photography and molds. Furthermore, families were also given a resource package during this time to help them prepare. They often contained information with contacts for support (*e.g.* counseling, support groups), how to emotionally cope after their child's death, and practical considerations such as planning their child's funeral. Variations existed in the exact materials, but most had various languages available and information for other family members such as grandparents and siblings. Many hospitals also offered some sort of follow-up either in the form of phone calls or letters. Most followed up via sympathy cards at least on three events, one month after the child's death, the child's birthday, and their one year death anniversary, but this depended on the hospital's capacity to carry out follow-ups. Surprisingly, not all but most hospitals had an annual memorial service for parents. Planning for the service was often under pastoral care's portfolio. Most hospitals did follow either a set of protocols, guidelines or standards, but the institution itself designed them. This was based on existing literature and what was feasible and appropriate considering their patient demographic. Common aspects for developing a standard of practice include developing a checklist for tasks at the patient's time of death and a follow-up schedule and system. Consequently, though trends persisted between hospitals, there was no consistency in terms of protocols, guidelines or standards between different institutions. Bereavement services for staff were more informal. Often, ward wide debriefings were available for when multiple deaths occurred, the death of a familiar patient, or particularly traumatic patient deaths. However, the frequency of occurrence often varied between the different wards and for the majority of wards, they were only done on an as-needed basis. However, often the intensive care units had more rigorous and regularly occurring procedures in place. For individual support, most institutions had either a chaplain or bereavement coordinator to talk to, but they were usually only available for a few sessions. Any further individual counseling was referred to the Employee Assistance Program. In general, support systems for staff following the death of a patient were informal and most hospitals do not follow a set of protocols, guidelines or standards.

Conclusions:

The environmental scan thus provides BC Children's and Women's Hospital with a better idea of what the standard of care is for bereavement services at pediatric and maternity centers in North America. From this information, we can compare those standards against the results of the survey to determine how BC Children's and Women's Hospital measures to the North America's standards and what are areas for improvement. BC Children's and Women's Hospital can use that information to better improve our practice and policies to ensure that patients and their families are receiving the best care from all aspects, including bereavement services.





"However, we are human beings after all and even though we may count each item and recount, it is possible for these counts to be in error. "

Retention of Surgical Items

Ms. Annam Bhatti, University of Dublin, Medical Student
Supervisor: Ms. Kim Ferguson
Quality and Safety Lead, Surgical Suites

Background:

Although it may sound like something that only occurs in a fictional setting, the incidence of surgeons leaving a surgical item behind in the body is very real. The types of objects that may be left behind after surgery include instruments used to perform the surgery, needles, or sponges and lap pads used to pack the area open so the surgeon can see the surgical field.

The traditional method of preventing retained surgical items is called the counting method. This requires counting the materials used for the surgical procedure. However, we are human beings after all and even though we may count each item and recount, it is possible for these counts to be in error. The patient safety and quality improvement department at BC Children's Hospital has taken on this challenge to reduce the number, if not eliminate the number, of incorrect surgical counts.

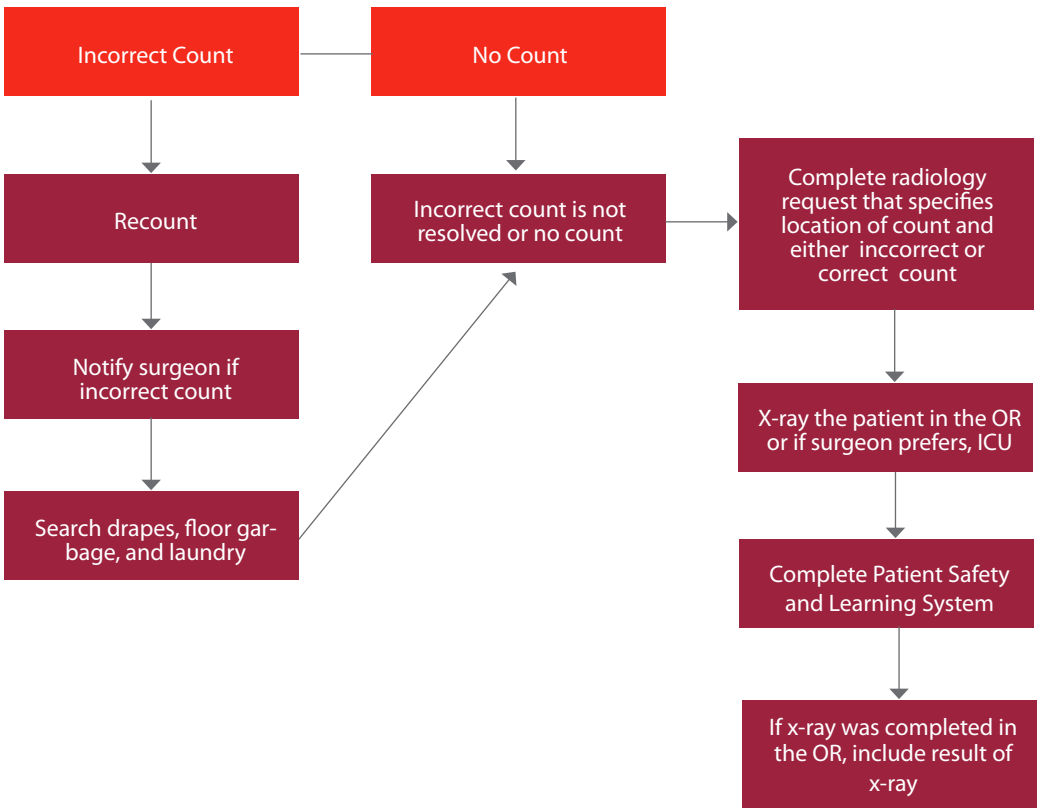
This type of project has everything to do with the operating room and surgical team culture. Therefore the purpose of this project is twofold; first, to identify the risk factors for retained surgical items at BC Children's Hospital and second, to encourage a culture of transparency in the operating room and engage front line clinicians in improving the current process for counting and handling incorrect counts.

As the student of this research project, I was intrigued at the introduction of this project, as I had never considered the possibility of retained surgical items. I was quickly fascinated by the literature of the accounts of items left behind across the world. Notable examples include:

- Published by USA Today, March 2013: In the spring of 2010 a post cesarean section patient was discharged from a hospital in Alabama with a surgical towel left in her abdomen. The patient experienced tenderness, swelling and pain before she was readmitted for exploration, which led to removal of the retained surgical item.

- Published by CTV News: In Sept. 2012, The Canberra Times of Australia reported that a patient required a second operation after a surgical instrument was left in the abdomen. The incident prompted Canberra hospitals to begin special training for staff to make sure they kept better track of instruments during surgery.

The current process at BCCH is displayed below:



Methods:

I began with a retrospective chart review followed by operating room observations to identify and monitor risk factors for retained surgical items. The medical records of the last 50 patients with reported incorrect counts were reviewed to identify common trends in occurrence and process. Operating room observations were conducted in order to identify common themes in team communication and interaction during the count process. My supervisor and I thought it was important to hear the voices of our surgical staff and team members as they knew first hand what improvements could be made. My supervisor and I held an OR Nurse In-service to talk about this project. The OR nurses spent the morning brainstorming common distractions. The activity conducted was a brainstorming activity using the TRIZ method. This method is an effective way of problem solving based on logic, data and facts. Instead of stating ways we could prevent incorrect counts, the question was posed as "How can we ensure an incorrect count every time?" Using this method we were able to brainstorm unintentional errors and distractions that occur in the operating room.

Results:

The results depict, in order to reduce the risk for incorrect counts leading to retained surgical items, we must focus on culture change within the operating theatre that will enhance team communication, and increase reporting of incorrect counts. As this project continues, I am excited to see the impact it may create in the counting system in today's operating rooms.

Conclusions:

In my perspective this project is unlike any other, the subject matter is unique and serious as well as intriguing and challenging. It is based not just on pathology or physiology that is stressed throughout medical school but instead I am able to see the practical issues pertaining to operating room culture and hospital work life. The new skills I developed and knowledge I gained from this experience so far will follow me throughout my entire career. Overall, this was an exceptional experience with exceptional people.

Emergent and Urgent Surgery Access for Acutely Ill Pediatric Patients

Mr. Anthony Yeung, UBC Medical Student
Supervisor: Dr. Sonia Butterworth
Division of Pediatric Surgery

In Canada, 7.5% of hospitalized patients suffer an adverse event and 37% of the events are felt to be preventable. It is just beginning to be understood that the timing of procedures and admission plays a role in these adverse events. 1 Medical, anesthetic and surgical outcomes for surgical (non-emergent) and non-surgical patients have been shown to be worse during out of standard working hours. [2,3,4,5] Patients who do not have immediately life, organ, or limb threatening diagnosis have been found to have worse outcomes when surgery is performed out-of-hours operating, especially between 2400-0800. In pediatric surgery, it is estimated that 40% to 60% of surgical procedures are non-elective, that is, they are immediate, urgent or expedited. Surgeries required immediately during standard operating hours generally break into the first available operating room, and 'bump' into the elective slate. However, in out-of-hours cases, emergent cases are staffed with on call or back up staff, depending whether other procedures are already in progress in the operating room.

Currently, the intra-operative and post-surgical outcomes of urgent surgical pediatric patients operated on during standard working hours compared to out of hours are extremely limited.6 Understanding the type of patients, procedures and outcomes serves as a starting point to better serve this patient population and ensure timely access to care with minimal impact on the needs of elective patients. Within urgent pediatric general surgery, the majority of non-elective cases are comprised of neonatal congenital abnormalities, oncologic surgery and abdominal/thoracic infection. In particular, our retrospective chart review focused on tracheoesophageal fistulas (TEF) and esophageal atresias (EA), a congenital abnormality that requires surgical repair within the first few days of a neonate's life. A retrospective chart review was done to investigate the surgical outcomes of patients who received a TEF/EA repair in-hours versus those who received it out-of-hours. The study included TEF/EA patients at BC Children's Hospital between 2005 and 2010, inclusive (n = 33). The major clinical characteristics between the in-hours and out-of-hours groups were the statistically the same (Tables 1 and 2). The in-hours surgery times were defined as the standard BC Children's Hospital operating hours of 0745 to 1530, while all other times were defined as out-of-hours. The primary surgical outcomes that were evaluated included the three most common post-operative TEF/EA-repair complications (esophageal stricture, esophageal leak, and recurrence of the fistula). Additional outcomes that were measured include the length of surgery time, length of post-surgery stay, intraoperative desaturations, duration of ventilation, intraoperative blood loss, blood product delivered. Our results indicate that there were a significantly higher percentage of post-operative leaks in the out-of-hour patients, compared to the in-hours patients (Figure 1). The incidence of post-operative strictures, post-operative recurrences, and intra-operative complications remained the same between the two groups (**Figures 2, 3** and **4, Table 3**).

The higher incidence of post-operative leaks suggest the possibility that physician fatigue may contribute to increased post-operative and intra-operative complications. These results agree well with the existing literature on surgical outcomes during out-of-hours operations.[2,3,4,5]

Future directions on the research project include analyzing patient characteristics and surgical outcomes such as gestational age and cost of hospital stay. These variables will further elucidate the overall outcomes between in-hours and out-of-hours surgery. Additionally, the results generated so far gives good reason to do more powerful case-control studies to further investigate the trends. Ultimately, this data from this research will be useful in determining changes to operating procedures and policies that can lead to better outcomes for pediatric patients.

Table 1 - Patient demographics

		In hours (n = 25)	Out of hours (n = 7)	Out of hours (n = 7)	P value (Pearson)	P value (Yates Correction)
Gender	Male	48% (n = 12)	85.71% (n = 6)		0.075	0.178
	Female	52% (n = 13)	14.29% (n = 1)			
Congenital Heart Disease	Present	64% (n = 16)	71.43% (n = 5)		0.715	1.00
	Absent	36% (n = 9)	28.57% (n = 2)			

Table 2 - Preoperative, intra-operative, and postoperative clinical characteristics

	In-hours (n = 25)			Out-of-hours (n = 7)			
	Mean	**SD**	**N[b]**	**Mean**	**SD**	**N**	**P value**
Preoperative							
Age at operation (days)[a]	9.29	17.61	24	0.43	0.535	7	0.199
Body weight at operation (kg)	3.83	6.74	25	2.41	0.72	7	0.587
Intraoperative							
Skin-to-skin operative time (minutes)	135.92	28.77	25	141.00	47.81	7	0.725
Incidence of intraoperative desaturations	0.68	2.26	25	0	0	7	0.439
Intraoperative Blood loss (cc)	1.76	2.65	25	3.14	3.76	7	0.275
Postoperative							
Total ventilation time (days)	10.55	19.46	25	16.12	18.69	7	0.505
Length of hospital stay (days)	35.83	32.43	25	37.71	22.37	7	0.505

[a] One patient did not have the TEF repaired until 10 years of age, was excluded as an outlier.
[b] Number of patients from which data were available.

Table 3 - Clinical outcomes

		In hours	Out of hours	P value (Pearson)	P value (Yates Correction)
Intraoperative complications	Present	0% (n = 0)	14.29% (n = 1)	0.055	0.489
	Absent	100% (n = 25)3)	85.71% (n = 6)		
Postoperative leak	Present	4% (n = 1)	42.86% (n = 3)	0.006	0.036
	Absent	96% (n = 24)	57.14% (n= 4)		
Postoperative stricture	Present	40% (n = 10)	57.14% (n= 4)	0.419	0.706
	Absent	60% (n = 15)	42.86% (n = 3)		
Postoperative recurrence	Present	8% (n = 2)	0% (n = 0)	0.44	1.00
	Absent	92% (n = 23)	100% (n = 7)		

Figure 1 - Incidence of post-operative leaks (n=33, p<0.05)

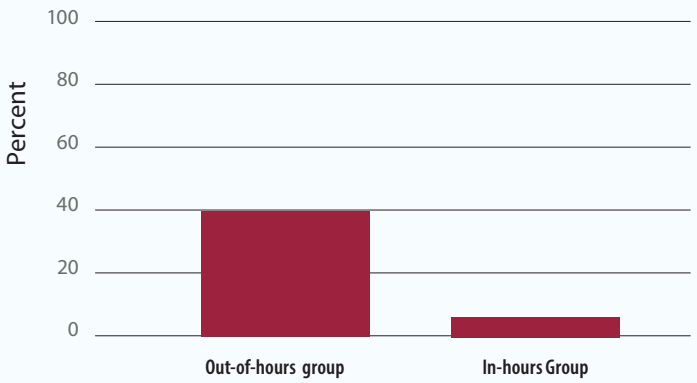


Figure 2 - Incidence of intra-operative complications (n=33, p > 0.05)

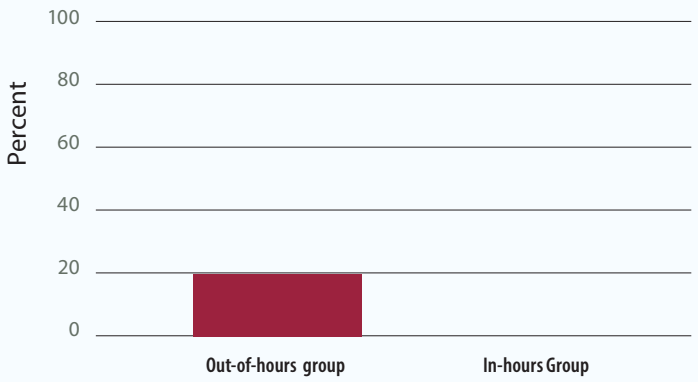


Figure 3 - Incidence of post-operative strictures (n=33, p > 0.05)

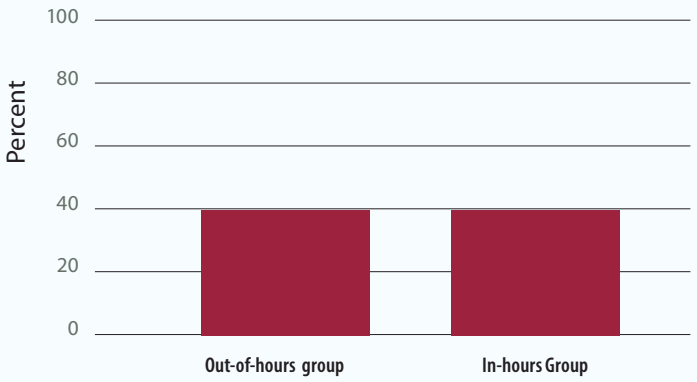
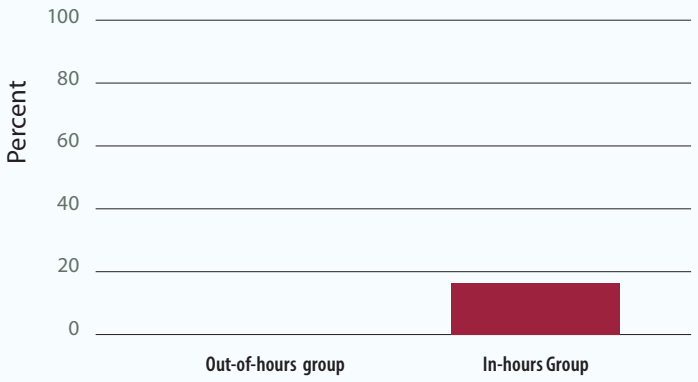


Figure 4 - Incidence of post-operative recurrences (n=33, p<0.05)



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My Summer with the Brachial Plexus, Study Groups and Vovici

Ms. Megan Neufeld, UBC Medical Student
Supervisors: Dr. Cynthia Verdhere, Dr. Marija Bucevska
Division of Pediatric Plastic Surgery

My project this summer was with Dr. Cynthia Verchere and Dr. Marija Bucevska in the Division of Plastic Surgery at BC Children's Hospital. We looked at Birth Related Brachial Plexus Injuries (BRBPI) and how they are managed across the country.

Background:

What is a BRBPI you might ask? The brachial plexus is a complex network of nerve roots C5 to T1 which supplies motor and sensory innervation to the upper extremity. At birth, the plexus can be compromised by overstretching or tearing of the nerves leading to partial or complete paralysis of the muscles in the upper extremity. Clinical presentation is variable depending on which nerves are affected and how severely they are injured; therefore, management is also variable and is often tailored to the individual.

Currently, there is a lack of literature available to describe the algorithms used in the management of BRBPI. The purpose of our study was to identify and compare the general algorithms used at centres from across Canada. As the project began to unfold, we also identified a second objective for our study. We wanted to initiate the creation of a nationwide study group. In essence, a study group is a group of centres that collaborate in data collection and research. It provides a common database of patients that can then be used for large-scale multicentre research studies. The establishment of a study group is a lengthy process and has several requirements. First, there must be a leader to initiate (ideally this will be us) and coordinate its formation. Centres then need to be recruited for participation and each centre must have an interested member, a research coordinator and personnel for data entry into a database. In order for this to occur, a common database must be available to each centre involved. Lastly, a standard template for data to be entered needs to be developed. In this study, we aimed to begin this lengthy process and hopefully stimulate interest among the BRBPI community.

Methods:

So as the title suggests, my summer was spent with the brachial plexus, study groups and Vovici. But what is Vovici? Vovici is a survey tool through UBC that we used to distribute our survey. First we generated a list of Canadian centres that manage BRBPI and created a contact list of plastic surgeons and other professionals involved in the BRBPI care at those centres. The survey was then distributed online (after many revisions and feedback from multiple sources) via email. **The survey was composed of 6 parts.**

- Part 1 surveyed basic information about the clinic including which specialties are involved in BRBPI care, how clinics are scheduled and how many new patients each year.
- Part 2 and 3 elicited information on referral sources, age of initial visit, information provided at first visit as well as follow-up schedule, and physiotherapy and/or occupational therapy routines.
- Part 4 gathered information on the use and details of interventions including primary and secondary surgeries, Botulinum toxin A, splints, and casting.
- Part 5 assessed the use of radiological imaging and nerve conduction studies in the evaluation of BRBPI.
- Part 6 addressed the potential for a nationwide study group by inquiring about the center's research involvement in BRBPI management, whether or not they kept a database of patients with BRBPI and their interest in being a part of a study group.

Results:

We were a bit concerned that we might not receive many responses due to the length of the survey and the fact that the survey was being distributed over potential summer holidays; however, out of the 9 centres we contacted, 6 responded and all demonstrated an interest in being a part of a BRBPI study group. There were many similarities seen among the centres. The ideal referral criteria and age at initial presentation were the same across all sites. Plastic surgeons and occupational therapists were both routinely involved in BRBPI care although centres found it would be helpful to have more dedicated personnel involved in their BRBPI clinics.

Classification of BRBPI at each of the centres was done using the Active Movement Scale (AMS) assessment tool. The most variation was seen with regards to the follow-up schedule and indications for interventions. The following 2 tables provide a snapshot of the responses so far. The numbers in brackets indicate the number of centres that gave that response.

Table 1 - Follow-up Schedule

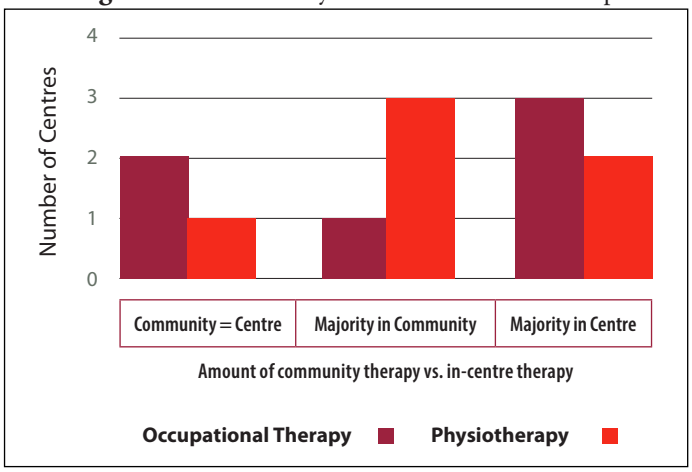
Age	Neurapraxia	C5/6 Injury	Complete Plexus Injury
0-6 months	1-2 times per month (1) **q 3 months (5)**	q 1 month (2) **q 3 months (4)**	q 2 weeks (1) q 1 month (1) **q 3 months (4)**
6-12 months	P1 time per month (1) **1 time in this interval (4)** 1 did not answer (1)	q 1 month (1) **q 3 months (5)**	q 2 weeks (1) q 1 month (1) **q 3 months (3)** 1 time in this interval (1)
1-2 years	as needed (1) q 6 months (1) discontinues if full function returns (1) 1 time in this interval (1) did not answer (2)	q 2 months (1) q 3 months (1) **q 6-12 months (2)** q 1 year (1) did not answer (1)	q 1-2 months (1) q 3 months (1) **q 6 months (3)** q 6-12 months (1)
2-3 years	as needed (1) 1 time per year (1) q 6 months or q 1 year (1) did not answer (3)	q 3-6 months (2) **q 1 year (3)** did not answer (1)	q 3 months (1) **q 3-6 months (2)** q 6 months (1) **q 1 year (2)**
4+ years	as needed (1) **q 1 year (2)** q 6 months or q 1 year (1) did not answer (2)	q 3 months (1) q 6 months (1) **q 1 year (2)** q 1 year, unless contracture results then monthly (1) did not answer (1)	q 3 months (1) q 6 months (1) **q 1 year (4)**

Table 2 - Indications for interventions

Intervention		Indications
Primary Nerve Surgery		Complete paralysis at 3 months (6); Failed cookie test at 8-9 months (4) AMS <1 at 1 month, no change or AMS <3 at 3 months, no change or AMS <4 at 4 months, plateau in AMS or AMS <5 at 5 months16 (1)
Secondary Musculoskeletal Surgery		
	Shoulder	Insufficient external rotation and/or abduction (3) Shoulder tightness not responding to splint or physio (1) Shoulder subluxation or dislocation on exam and poor functional usage (1)
	Elbow	Elbow flexion contracture (2); Poor functional use (2); Cosmetic reasons (2) Did not answer (2)
	Wrist	Wrist in permanent flexed position/poor extension (2); Tendon transfers (1) Poor grasp/wrist function (2); Did not answer (1)
	Hand	Poor grasp or functional use (2); No ability to hold objects with fingers and thumb (1) Did not answer (2)
Splinting		Weak wrist/poor functional hand position (1); Imminent or existing contracture (4) Post-op or following botox (3); Loss of external rotation (2); Loss of supination (2)
Casting		Immobilization post-op (3); Contractures (1); Loss of shoulder external rotation (1) Too big for thermoplastic splint (1)
Botulinum Toxin A		Excessive co-contraction limiting active movement (3) Decreasing shoulder external rotation not responsive to splinting or physio (2) Stalled elbow flexion post-reconstruction (1)

In addition to the above variations, there were also differences in terms of where patients received physiotherapy and occupational therapy. Some patients received the majority of their therapy in the centre, whereas some patients received the majority of their therapy in the community. The following graph depicts these distributions.

Figure 1 - Community and Centre Based Therapies

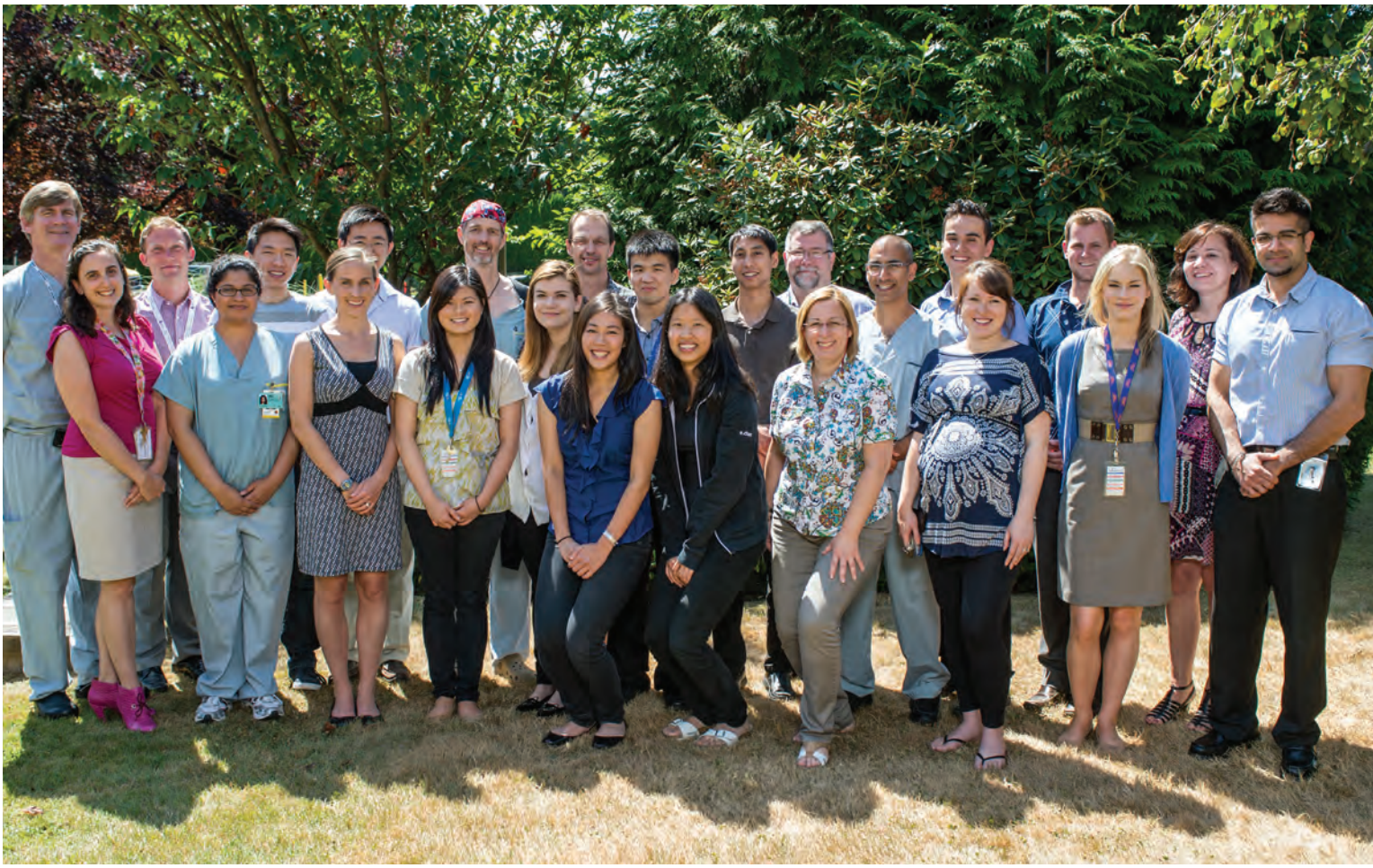


Conclusions:

We are still aiming to get responses from the remaining 3 centres despite the summer work term being over. We can conclude so far however that BRBPI are managed similarly across Canada, with a few variations. There also showed considerable interest in the development of BRBPI study group among Canadian centres which is encouraging. Future directions include the establishment of a BRBPI study group which will facilitate collaboration for large-scale multicentre research studies. In addition, the data collected from this study will be used to establish a standard protocol to be compared with a novel splinting protocol that has been developed here at BC Children's Hospital.

Acknowledgements:

Overall, it has been a great summer working with OPSEI and the Division of Plastic Surgery! The project has been a success and will hopefully help pave the way to a BRBPI study group and facilitate future large-scale multicentre research studies.



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