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It is an honor to write the editorial for the 11th issue of the UAHSJ. We are very excited about publishing this issue since it has been exactly 10 years since the concept of an undergraduate journal has materialized into the publication that it is today. Over the past 10 years, we have had outstanding support from the University of Alberta, from the Faculty of Medicine, and from the students. We have grown from what was once a local university-specific journal to a journal that publishes articles received from across Canada. We are proud of the fact that our journal has remained a student-led initiative, giving students a much-needed foray into the world of scientific publications. Our journal is proof that students can succeed in scientific research and achieve publication of their work, especially when guided by their able mentors.

This past year has been an amazing year for the Faculty of Medicine at the U of A. Our faculty has made progress in understanding the pathophysiology of complex diseases such as primary biliary cirrhosis, improving the lives of patients suffering from COPD, and unfolding the secrets of cancer biology and metastasis. 2014 was also remarkable for the U of A given that our recent MD graduates were bestowed with the prestigious Rhodes scholarship. Over the past decade, our university has continued to make remarkable discoveries in all aspects of medicine, from basic science to direct patient-oriented outcomes. This consistency is something we ought to be proud of.

In this issue of UAHSJ, we highlight the mental resiliency of medical students who brave foreign conditions, learning the art of medicine as practiced in countries outside of Canada. Their stories are both inspirational and educational. Medical students are helping inspire change across the medical curriculum in Canada, from incorporating quality improvement strategies in undergraduate medical education, to transforming curriculum through the help of online educational resources. This issue of the UAHSJ also emphasizes the strategies adopted to overcome research hurdles and improve research methodologies.

Finally, we would like to thank our journal contributors, our awesome editorial Board, and our two new Junior Editors, Amit Persad and Youness Elkhalidy. We extend our thanks to the Faculty of Medicine and Dentistry for their generous support, and in particular to Dr. Fraser Brenneis, Vice-Dean of Education, for his guidance and support.

Our readers deserve a special thank you for supporting this initiative!

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ER in the ER: a case of exertional rhabdomyolysis

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CASE REPORT
A 17-year old Chinese-Canadian male presented to the emergency department with tea-coloured urine and bilateral quadriceps pain on exertion for the past day. On further history, it was revealed that 48 hours prior, he had participated in one hour of a “BodyPump” class, an intense exercise event consisting of aerobic weight training. He reported adequate fluid intake during the class and did not feel overheated. The day following exercise he felt weakness, cramping, and unsteadiness in his quadriceps bilaterally with 10/10 pain when climbing stairs. Quadriceps pain at rest was 3/10. He denied dysuria or decreased urination, and did not have any recent illness, vomiting or diarrhea. He was taking Minocycline 100 mg po daily for acne for three months, and had an unremarkable past medical and family history. On social history, he was a high school student and did not use alcohol, tobacco, or other illicit substances. He had taken part in the same exercise class regularly six months prior without complication, before and after which he was rather sedentary.

In the ER, his vital signs were stable and appropriate: temperature 37.1 °C, heart rate 88 bpm, blood pressure 143/87 mmHg, O2 saturation 98%. His quadriceps were qualitatively enlarged, warm, and tender bilaterally, and all other muscles were grossly normal and non-tender. Relevant investigations were as follows: leukocytes 11.9 x 109/L (neutrophils 8.3 x 109/L), urea 3.4 mM/L, creatinine 56 mM/L, AST 1145 U/L, ALT 194 U/L, alkaline phosphatase 70 U/L, lipase 19 U/L, Ca 2.34 mM, and CK reported as “unable to obtain results due to interfering substance”. A urine dipstick revealed “large” blood content, however urine microscopy revealed only 1-5 RBC per HPF.

The patient was given a 1-litre bolus of normal saline intravenously in the ER and admitted to hospital. Maintenance IV normal saline was given at 120 mL/h and decreased to 100 mL/h on day 3 of admission with PO fluids encouraged throughout. Calcium supplement was given for the mildly depressed calcium. Urine myoglobin remained negative from days 2-6 of admission. By day 3, urinalysis was negative for protein or blood. Repeated serum CK levels remained above the upper detectable limit for five days (>14,000 U/L) before dropping to 7484 U/L (day 6) and 4147 U/L (day 7). Throughout the admission, electrolytes, creatinine and BUN remained within reference ranges with the exception of mild hypocalcemia despite supplementation. Serum albumin was not measured. His leg pain and discoloured urine had completely resolved by day 2 of admission, and he was discharged following 7 days of admission after CK dropped below 5000 U/L. At follow-up 15 days after admission, CK had fallen to 291 U/L (reference 35-230 U/L), calcium was 2.18 mM, and he was feeling well. At one month and two month follow-ups, serum and ionized calcium were normal. Unsurprisingly, he was reluctant to return to exercise in the near future.

DISCUSSION
The presentation of discoloured urine with ‘dipstick hematuria’ but normal urinalysis points to a differential diagnosis of haemoglobinuria, myoglobinuria, concentrated urine, and rigorous exercise. Given the additional clinical presentation of muscle tenderness and pain and the large rise in creatine kinase, a diagnosis of rhabdomyolysis was made. Clinical features include muscle soreness, tenderness, pain, weakness, swelling, myoglobinuria, and ‘hyperCKemia’. The differential of rhabdomyolysis is broad, with common causes including medications such as antipsychotics and statins, illicit drugs, bacterial or viral myositis, trauma, and overexertion. Exertional rhabdomyolysis (ER) is uncommon, with the majority of cases seen in young adult males engaging in intense exertion, often in the military or marathon running. In this case, the patient developed clinical signs of rhabdomyolysis of the quadriceps bilaterally shortly after a single hour of intense exertion. Myoglobin was not detected in the urine by the time the test was ordered, as is often the case due to its transient nature. Blood CK was greatly elevated and the initial urine dipstick was most likely falsely positive for blood due to the oxidation of the test strip by myoglobin, confirming rhabdomyolysis. Elevated liver aminotransferases as seen in this case are another common finding due to skeletal muscle injury, while hypocalcemia occurs due to the release of phosphate from lysed myocytes. Additionally, the patient had risk factors for ER including a low base-line fitness level and engaging in repetitive eccentric exercises. Other potential risk factors for ER include exertion in hot weather, high BMI, and ongoing illness. Treatment focuses on early and aggressive volume resuscitation to prevent acute kidney injury (AKI) due to the nephrotoxic effect of myoglobin. Asymptomatic hypocalcemia is actually best untreated due to risk of hypercalcemia as calcium deposited in damaged muscle tissue is reabsorbed. Interestingly, AKI is less likely to occur in ER than in other causes of rhabdomyolysis, and recurrence of ER is very low after returning to previous activity levels (0.08% per person per year). Recurrence should lead the clinician to explore genetic metabolic disorders such as McArdle’s disease. Unfortunately with this patient, the lengthy hospital stay appeared to dissuade him from future physical activity, highlighting the importance of a gradual return to physical exertion in the sedentary patient. Case reports of managing ER on an outpatient basis with close follow-up suggest a future area of study to reduce the impact of hospitalization on select, otherwise healthy patients.

REFERENCES
Diagnosing the Unspecific

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ABSTRACT
Addison's disease is the result of adrenal insufficiency, most commonly caused by autoimmune adrenalitis. The symptoms of this disease are many, including weight loss, fatigue, myalgia, and abdominal discomfort. Since these symptoms are quite nonspecific, the diagnosis of Addison's disease can be easily missed. A delay in diagnosis may contribute to an increased risk of adrenal crisis and a poor patient outcome. However, a prompt diagnosis can decrease hospitalizations and avoid placing patients with Addison's disease at grave risk. This case study serves as a refresher for trainees and physicians regarding the clinical presentation, diagnosis, treatment and follow-up of patients with autoimmune adrenalitis.

This case study follows the perspective of a senior medical student in the outpatient medical clinic who is involved in the care of a 29-year-old male patient. He presents with fatigue, shortness of breath and weight loss. An approach to weight loss is discussed along with pertinent history and physical findings of Addison's disease. Intricacies and difficulties in establishing the diagnosis are also presented.

Key words: Addison's disease, autoimmune adrenalitis, Adrenal insufficiency, corticosteroid, and mineralocorticoid

As a medical student rotating through the internal medicine clinic, the attending explains that there is a 29-year-old male who is referred to the clinic for fatigue, shortness of breath and over 20 pounds of weight loss. The attending wishes for you to develop an approach to weight loss for the upcoming clinic visit.

Weight loss is a common symptom discovered on review of systems. The threshold for when the amount of involuntary weight loss becomes concerning is unclear. Some authors suggest that involuntary weight loss of greater than 10 pounds or more than 5% of the usual body weight in non-obese patients over a period of 6-12 months warrants further investigations.

According to this definition, the amount of weight loss in this case is clinically significant. Although there may be many different causes for this, a standard evaluation usually reveals a diagnosis in the majority of cases. Unintentional weight loss can be broken down into organic, psychosocial, and idiopathic causes. Within the organic causes, frequent diagnoses include malignancies, gastrointestinal disorders, endocrinopathies, inflammatory disorders, psychiatric disorders, infections and medications. When taking a history, one should obtain a detailed account of weight loss and establish a timeline if possible. In addition, dietary and exercise history should be explored to rule out voluntary weight loss. Pertinent questions for this particular patient include changes in bowel movements, motility problems, hyperthyroid symptoms, type 1 diabetic symptoms, chronic adrenal insufficiency and psychiatric screening. Given the particular age and demographics of the patient, further questioning may be warranted regarding infectious risk factors such as IV drug use or TB risk exposure and testicular cancer risk factors.

On history, the patient’s presenting complaints at the emergency department were fatigue, malaise, shortness of breath and anorexia. The patient explains he has had 30 pounds of weight loss in the past 6 months. There have been no intentional dietary changes or increase in physical exercise. His shortness of breath had started within the past month and he states that he can only climb 3 flights of stairs before feeling out of breath. There is no related cough, fever, sputum production or chest pain. He denies orthopnea, paroxysmal nocturnal dyspnea or ankle swelling.

The patient further states he has felt more fatigued in the past 2 months and requires 12 hours of sleep at night. Activities that previously required no effort, such as holding a spray can at work, are now tiring. Additionally, the patient complains of lightheadedness when getting up quickly. During warm showers, the patient experiences a quick heartbeat and lightheadedness. He has had no syncope.

Additionally, he has noticed longstanding, vague, abdominal pain with decreased appetite. He experiences a decreased frequency of bowel movements which are occasionally painful and bloody on wiping. A review of systems does reveal any associated night sweats, fever, rashes or obvious psychiatric disorders.

Past medical history includes a varicocele repair. The patient is not on any medications and has a sensitivity to penicillin. With regards to family history, his mother has hypothyroidism and celiac disease. He is an ex-smoker, occasional binge drinker and admits to trying cocaine twice. However, he does not otherwise use any street drugs otherwise.

At first glance, this is a strange constellation of symptoms. The patient’s history seems to be vague because the patient has not been feeling well for a while but cannot describe the timeline or course of the disease. He estimates it has been around 6 months since he started losing his appetite and weight. An extensive discussion on eating habits, nutrition, exercise levels and supplements did not provide any insight as to the cause of weight loss.

When addressing his other symptoms, there seems to be an inescapable theme of fatigue. The increase in sleep requirements and the inability to accomplish daily activities demonstrate his ongoing tiredness. Also, it is quite difficult to determine whether the patient has shortness of breath due to general fatigue or due to cardio-pulmonary pathology. Fatigue as a symptom is highly non-specific and together with weight loss does not limit the differential. The lack of other respiratory symptoms seems to point away from a respiratory cause. Hyperthyroidism seems unlikely due to the lack of other symptoms such as tremors, sweating, and diarrhea. Given the symptoms of just weight loss and fatigue in this patient, the most likely diagnosis may include malignancy, adrenal insufficiency, HIV, endocarditis and mal-absorption diseases.

When discussing gastrointestinal symptoms, it is quite difficult for the patient to describe his symptoms. His best description is as a “tightening of the stomach” which he has ex-
experienced for quite a while. He usually shrugs it off but sometimes it is painful enough for him to stop what he is doing. The severity of abdominal pain has not changed over time. It is quite tempting to attribute his symptoms to some kind of pathology in the GI system. He does have abdominal pain but the characteristics are quite vague and do not readily lead to a diagnosis. Constipation also is not consistent with symptoms of mal-absorption. In short, the severity and characteristics of the gastrointestinal symptoms are not conclusive.

Lastly, the patient voluntarily admits that he has been experiencing postural instability and also difficulty with warm environments. Possible hypotension points toward either intravascular depletion or autonomic instability.

In summary, the main symptoms include fatigue and weakness, anorexia, gastrointestinal symptoms, reported weight loss and symptoms of hypotension. The patient’s history does not include any risky behaviours that would suggest HIV or endocarditis. His gastrointestinal symptoms are not consistent with mal-absorption. Respiratory causes are unlikely given the lack of other respiratory symptoms aside from shortness of breath. However, the constellation of symptoms the patient experiencing is consistent with either a malignancy or an endocrinopathy, such as adrenal insufficiency.

On physical exam, the patient looked well and was in no acute distress. He was thin and his vital signs were a blood pressure of 80/60 mmHg with an orthostatic blood pressure of 76/58 mmHg, a pulse of 100 beats per minute and respiratory rate of 16 breaths per minute. His heart and lung exam were unremarkable with no presence of lymphadenopathy. The abdomen was soft and non-tender with no obvious organomegaly. He had no rashes, inflamed joints or skin changes.

The physical exam displays a thin male who is slightly hypotensive and borderline tachycardic. Along with normal findings on the rest of the exam, the physical exam is not particularly helpful. No lymphadenopathy lowers malignancy on the differential. Normal respiratory sounds lower possible respiratory infection or respiratory malignancy. The lack of murmurs or abnormal heart sounds decrease endocarditis on the differential. However, hypotension on exam corroborates a diagnosis of adrenal insufficiency. Additional physical signs for primary adrenal insufficiency are absent as no hyperpigmentation or vitiligo is noticed.

The patient has had an initial work up from both the emergency department and his family doctor. His white blood cell, hemoglobin, and platelet counts were normal. Other lab work shows a normal random glucose, and hemoglobin A1C. Electrolytes show a sodium of 133, a potassium of 5.2 and normal creatinine and eGFR. Extended electrolytes were normal. Liver enzymes and function testing were normal. TSH was slightly elevated with normal free T4 and T3 levels. Anti-TTG antibody was within normal levels with a normal IgA level. Both a chest x-ray and ultrasound of the abdomen were normal. Creatine kinase and C-reactive protein were both normal. An HIV test was negative. A random cortisol was ordered and the result was reported normal at 265 nmol/L taken at 10am.

Hyponatraemia and hyperkalaemia are both supportive of a primary adrenal insufficiency diagnosis. The hyponatremia is caused by the hypersecretion of ADH in response to decreased cortisol and aldosterone. Similarly, the hyperkalemia is due to deficiency of aldosterone.

In order to confirm the diagnosis of adrenal insufficiency, there are three steps. The first is demonstrating inappropriately low cortisol secretion. The random cortisol ordered previously was done at 10am and the value of 265 nmol/L is difficult to interpret. At first glance, the range falls into the normal provided by the lab. However, a quick search reveals that a morning serum cortisol of 275 nmol/L has a sensitivity of 62% and a specificity of 77% for adrenal insufficiency. Unfortunately, the sample was taken at 10am, which complicates the interpretation due to the circadian rhythm of cortisol. Thus the interpretation of this result is equivocal.

A decision was made to repeat the A.M cortisol with an ACTH level revealing an A.M. cortisol of 235 nmol/L at 08:50 and a pending ACTH level.

A repeat of the morning AM cortisol was again not low enough (<80 nmol/L) to strongly suggest adrenal insufficiency but was not high enough (>500 nmol/L) to rule out adrenal insufficiency. A simultaneous ACTH level was ordered, which is expected to be elevated for primary adrenal insufficiency. Unfortunately, this result was not available immediately but did come back at an elevated level above normal (278 pmol/L) at a later date. The second step in confirming the diagnosis is determining whether the deficiency in cortisol responds to an ACTH stimulus. A standard high dose ACTH stimulation test (250 mcg) followed.

The cortisol levels at 30 and 60 minutes after a standard high dose ACTH stimulation test were 231 nmol/L and 233 nmol/L, respectively. A normal response to this ACTH stimulation test would be a rise in cortisol at 30 or 60 minutes to >500 nmol/L. These results were clearly below the normal threshold of 500 nmol/L thus confirming a clinical diagnosis of adrenal insufficiency. Furthermore, the increased ACTH serum level received at a later time, confirms a diagnosis of primary adrenal insufficiency.

For treatment of Addison’s disease, the patient was placed on hydrocortisone 10mg orally every AM and 5 mg every 4 pm, and fludrocortisone 0.05 mg orally daily. The patient was educated regarding adrenal crisis and the need for a Medic Alert bracelet. Since starting the medications 5 days ago, his energy and appetite have improved.

With regards to treatment, it is important for the patient to be educated about the particular deficiency and the rationale behind treatment. Explanation should emphasize that the dose is spread out over two to three times a day because that mimics the circadian physiology of cortisol. Additionally the patient needs to understand why he may need to increase glucocorticoid doses 2-3 times during a few days of minor illnesses before seeking help from a physician. Also, the patient needs to be informed of emergency glucocorticoid treatment during severe stress or trauma.

The goals of treatment are to mimic the endogenous cortisol rhythm without putting the patient at risk to the Cushingoid side effects of overtreatment. Different variations of two or three time a day regimens can be used in order to achieve the lowest dose required for resolution of symptoms. The patient should receive reassessment to determine whether treatment dose is appropriate. This will involve assessing symptoms of adrenal insufficiency or signs of Cushing’s syndrome such as weight gain and facial plethora. In addition, electrolytes are monitored to determine if treatment doses are appropriate.

Most patients with primary adrenal insufficiency also require mineralocorticoid replacement. This prevents sodium loss, intravascular depletion and hyperkalemia. The adequacy of treatment will need to also be monitored through use of clinical signs such as blood pressure, orthostatic hypotension, pulse,
and edema. Additional lab work will focus on potassium to determine whether the fludrocortisone dose is appropriate. Lastly, in women, replacement of dehydroepiandrosterone (DHEA) may be beneficial for mood and psychological well-being.

A month has passed and the patient returns for a follow up. He is doing very well on his medications and no titration is needed. A plasma renin activity was ordered and an abdominal ultrasound was performed to assess the etiology of the primary adrenal insufficiency.

Approximately 70-90% of cases of primary adrenal insufficiency are due to autoimmune adrenalitis, while 7-20% may be caused by tuberculosis. Other considerations include disseminated fungal infections, HIV infections and hemorrhagic infarctions. An abdominal CT is usually done to assess if there are enlarged or calcified adrenal glands suggestive of non-autoimmune etiology. In this particular case, a CT was avoided and a MRI was opted for because of the risk of radiation exposure to this young male. An autoimmune etiology is usually established with the exclusion of other causes and the presence of associated autoimmune disorders.

COMMENTARY

The prevalence of primary adrenal insufficiency in Western countries has been estimated anywhere from 36-144 per million. Autoimmune adrenalitis, the most common cause, is the result of autoimmune destruction of the adrenal cortex. Both humoral and cell-mediated mechanisms are implicated in the pathogenesis of autoimmune adrenalitis. Antibodies that react with steroidogenic enzymes and all three zones of the adrenal cortex are present in 86% of patients with autoimmune primary adrenal insufficiency.

Diagnosing chronic adrenal insufficiency can be difficult when early complaints of fatigue, malaise and weight loss are all non-specific findings. This case is an example of when weight loss and gastrointestinal complaints could possibly lead one to erroneously pursue a gastrointestinal malignancy as a diagnosis. Patients suffering from chronic adrenal insufficiency complain of gastrointestinal symptoms in the majority of cases. Another common complaint is of myalgia that may mislead the clinician towards diagnosing primary muscle disease. Furthermore, although most patients display hyperpigmentation as a sign of primary adrenal insufficiency, this particular patient did not exhibit this obvious sign. In response to cortisol deficiency, there is increased production of pro-opiomelanocortin that is subsequently cleaved to melanocyte stimulating hormone that translates into increased melanin synthesis and hyperpigmentation. The pigmentation is most obvious in the face, neck, dorsum of the hands, elbows, knees and palmar creases. However, the lack of the characteristic physical signs of hyperpigmentation does not necessarily rule out primary adrenal insufficiency.

It is important not to simply follow the laboratory normal values for the morning AM cortisol. For instance, the norms given in this particular facility were 120-620 nmol/L for AM cortisol. A value in the 200s would have appeared normal. It would be tragic to dismiss this result as normal and rule out adrenal insufficiency. This is because cortisol secretion is episodic and normal ranges are quite broad. A patient can have adrenal insufficiency but retain the ability to keep cortisol concentrations within “normal” levels. Thus, AM cortisol values within reference ranges may be misleading. Additionally, there are other factors that should be taken into consideration when interpreting cortisol results including diseases such as liver cirrhosis or nephrotic syndrome that could affect the cortisol binding globulin levels.

In a non-acutely ill patient, a random cortisol is of limited utility in detecting chronic adrenal insufficiency. This is because a random cortisol is unlikely to be high enough to rule out adrenal insufficiency given the circadian rhythm of cortisol. And unless severely abnormal, any value lower than that will be difficult to interpret. Instead, a morning cortisol is much more likely to be beneficial in determining whether an ACTH stimulation test needs to be pursued. In general, an ACTH stimulation test is performed in all patients where adrenal insufficiency as a diagnosis is being considered, unless the morning cortisol result is high enough to rule out adrenal insufficiency.

In patients with autoimmune adrenal insufficiency, it is important to investigate for other autoimmune endocrine disorders. Approximately half of patients with autoimmune adrenalitis will have one or more autoimmune endocrine disorders. Hence, it is important to screen for thyroid disorders, type 1 diabetes, hypoparathyroidism, and gonadal failure in women. As this patient is followed in the future, the responsible physician may need to remain vigilant towards these conditions.

In short, the clinical diagnosis of adrenal insufficiency can be difficult given the lack of specificity of symptoms but delay in treatment increases the risk of adrenal crisis. Studies have shown that patients with primary adrenal insufficiency can wait anywhere from one month to five years for a diagnosis. A rapid diagnosis of this disease can decrease hospitalizations for adrenal crisis in this patient population. This case study serves as a review for future physicians in establishing a prompt diagnosis of adrenal insufficiency and preventing fatalities from adrenal crisis.

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REFERENCES

Dissociative Identities as Allies and Enemies: The Development of Dissociative Identity Disorder in Childhood Trauma Victims

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ABSTRACT
Dissociative identity disorder (DID), formerly known as multiple personality disorder, is defined as a disorder in which as many as one hundred personalities or fragments of personalities coexist within one body and mind. Though often diagnosed in the adult, DID almost always originates in childhood and is seen most often in a child victim of chronic abuse. These children escape from trauma by using their strengths of imagination to create their own world. Such imaginary worlds are dissociative mechanisms that allow temporary escape from pain and suffering.

This paper will examine dissociative identity disorder and its development through childhood trauma. If exposure to trauma is chronic and relentless, ordinary defenses and mechanisms of coping are not enough. Through deliberate suppression of thoughts, minimization, and denial, victims learn to alter an intolerable reality into smaller, bearable fragments. There are two aspects of the traumatized patient: an adult who strives to form relationships, feel accepted, and to forget, and a child who struggles to remember, and find a voice to be heard. Through discussion of the psychoanalytic roots of DID and its use as a method of coping, the authors hope to explore an area of mental health that is not broadly accepted cultural, religious practices, or part of the normal fantasy play of children.

Dissociative identity disorder (DID), formerly known as multiple personality disorder, is defined as a disorder in which as many as one hundred personalities or fragments of personalities coexist within one body and mind. Clinically, the DSM-V provides 5 criteria required for the diagnosis of DID:

1. Disruption of identity characterized by two or more distinct identities or personality states. This disruption may be observed by others, or reported by the patient.
2. Amnesia between parts of the personality
3. The disturbance is not a normal part of broadly accepted religious or cultural practices, or part of the normal fantasy play of children.
4. Causes clinically significant distress and impairment in social, occupational, or other important areas of functioning.
5. The disturbance is not due to the direct physiological effects of a substance.

CAUSES AND SYMPTOMS OF DID
There is a strong and consistent relationship between trauma and dissociation. Well-known psychiatrist Frank Putnam found that of 100 patients with multiple personality disorder, 97 had histories of significant childhood trauma, usually physical or sexual abuse. However, DID is not just caused by active abuse; it comes from a natural tendency to escape the anguish associated with severe childhood trauma. This includes children who have witnessed the brutalities of war.

Dissociation consists of five major features: amnesia, depersonalization, derealization, identity confusion, and identity alteration. Although DID is usually diagnosed in adulthood, it almost always originates in childhood. The first splitting-off of an alter personality, as with many following alters that arise, occurs in the context of immediate and overwhelming trauma. These dissociative mechanisms allow temporary escape from pain and suffering associated with the traumatic abuse.

Traumatic memories often lack verbal descriptions, but become encoded in the form of vivid images and sensory cues. They appear suddenly and strangely, in the behaviour of a child during playtime or through visual drawings. These memories tend to become disconnected from the original source of the trauma, taking on a life of their own. Intense emotion can be felt without clear memory of the event, leading to fragmentation and eventually dissociation.

Richard Klift emphasizes the instinctive, biological quality of dissociation as well. Our personalities, emotions, reactions, and thoughts vary across moods, contexts, and situations – one identity is often not enough. According to Putnam et al., we come organized as a basic set of behavioural states with the capacity to generate new ones. Multiple selves are a part of who we are, and the emotional damage of trauma can be so severe that those selves no longer feel that they fit together as one. Innate survival mechanisms creatively adjust to environmental stress by segregating and sacrificing parts of ourselves in order to protect the whole.
THE LINK TO CHILD ABUSE
Chronic trauma occurs in conditions of what Herman calls “captivity.” These are the circumstances surrounding religious or spiritual cults, institutions, and families. Children are held in captivity because they are dependent on others to care for them. When abuse is early, severe, and chronic, some children start to form separate personality fragments with their own names and histories. This kind of dissociation serves as a defensive adaptation, allowing the child to unconsciously cope with the abuse, but it eventually prevents the integration of identity.

Children with the adaptive capability to develop dissociative identity disorder often present hidden symptoms, and are much more likely to be diagnosed with problems such as ADHD, conduct disorder, or schizophrenia without being evaluated for significant childhood trauma. In many cases of child sexual abuse, the detrimental effects come more from the depths of the betrayal than from the abuse itself.

PSYCHOANALYTIC ROOTS
It was very common for extreme emotional reactions of traumatic events to produce altered states of consciousness. In the mid-1800s, Janet and Freud both recognized the connection between altered states and a traumatic past, and that somatic symptoms could represent repressed memories of these events.

The psychoanalytic theory behind psychopathology focuses on abnormal associations that make up a person’s mind, and the splitting of the ego as an active defense. Children that have fallen victim to physical and sexual abuse display negative behavioral and affective outcomes that impact their psychic structure. Reactions are influenced by the intrapsychic meaning they attribute to the event, and their emotional and cognitive ability to cope with it. With unpredictable defenses and a traumatized psychic structure, soul-murdered children can develop psychopathological symptoms. Dissociation is used as a desperate attempt to preserve life by creating identities to manage pain, anxiety, shame, and terror. Those who experience an unbearable situation will attempt to intrapsychically create the illusion of a more tolerable reality. Abuse creates unacceptable and threatening feelings inside these victims; alter personalities emerge as a means of expression of these feelings and their associated conflicts, in the form of behavioral symptoms.

DISSOCIATION AS A MECHANISM OF COPING
If exposure to trauma is chronic and relentless, ordinary defenses and mechanisms of coping are not enough. Through deliberate suppression of thoughts, minimization, and denial, victims learn to alter an intolerable reality into smaller, bearable fragments. Children who experience routine punishment often create a fantasy world in their minds to escape, and those who suffer prolonged trauma may come to depend on imaginary friends for support, who perhaps transform into alter personalities. Thus, fragmentation may not be a consequence of trauma as much as it is an adaptation to it. Kluit tells of three children who learned to dissociate, on cue, when their mother became violent. Another child became so accustomed to being raped by his father that upon the usual signal, he was conditioned for a dissociative switch. Using techniques of dissociation, none of these children would have to consciously be present for the trauma they were to endure. Child abuse victims who develop DID are able to retain feelings of pleasure and happiness in their lives, as well as some form of sexuality, because these sensations can be preserved by alter personalities. Victims without DID often go on to experience anhedonia and sexual dysfunction, because the trauma they’ve experienced leaves no part of them unscathed. The personalities arise as desperate coping attempts in an overwhelmed child, but they persist beyond the stressors to which they are responses. Dissociative defenses become maladaptive when discrimination between a stressful event and a traumatic event fails, resulting in disproportionate panic or startle response. These defenses also make it difficult for the child to consciously and accurately assess danger as an adult, because it may lead survivors to neglect essential social cues. Risks of rape, sexual harassment, and physical assault are twice as high for childhood abuse survivors.

Dissociation often results in temporary relief from the stress and anxiety caused by the trauma, reinforcing its repeated use as a coping mechanism. Nonetheless, it is important to note that dissociation as a defense only creates the illusion of safety, as it doesn’t offer any real protection from danger or pain. In essence, alter personalities represent a child’s desire not to face the trauma alone.

ALTERS: WHO ARE THEY?
For many individuals, the development of this disorder is a means of survival in the face of relentless abuse. Specific alter personalities are often associated with certain kinds of abuse, each dealing with a set of related conflicts and emotions. Alter personalities perform specific functions in the individual’s life, each with a life history of his or her own. This includes the host personality as well as helper personalities, persecutor personalities, suicidal personalities, sexual personalities, avengers, defenders, and/or opposite-sex. Child personalities are by far the most common alters found in DID patients. Goodwin examines “Snow White and the Seven Dwarfs” in the context of DID, and draws interesting parallels between the two. Snow white is a charming young woman who escapes from an abusive queen mother. She survives only with the help of several child-like beings that spend days in the “unconscious” of the mines and come out mostly at night. Snow White’s character experiences many common symptoms of dissociation, including angry outbursts, trance states, self-isolation, and constant fear. Each dwarf represents necessary parts of her identity: for example, Grumpy is irritable, trying to keep every part satisfied, while Happy attempts a constantly positive state. Doppy’s endearing disconnection from reality is almost drug-induced, and Doc is the internal self-helper, always ready to lend a hand and figure out the problem. The dwarfs notice everything about Snow White and almost all of their interventions deal with keeping her safe, which is the main purpose of alter personalities. In the face of an abusive, wicked queen who purposely tries to destroy her daughter, all seven voices are required to help Snow White’s superego evaluate what she needs and what will cause her harm.

CONTROVERSIAL ASPECTS OF DISSOCIATIVE IDENTITY DISORDER:
A NEUROPSYCHIATRIC PERSPECTIVE
There have been claims by both professionals and the public that in reality, dissociative identity disorder does not exist. They maintain that the alter personalities are created by the therapists, through suggestive and coercive techniques. Establishing DID as a unique entity, rather than a manifestation of other psychiatric conditions, is challenging because of its relative rarity as well its high psychiatric comorbidity. However, there is a growing body of literature around this topic. Dorahy et al.’s review of DID-specific literature found enough construct, criterion and content validity to differentiate it as a unique psychiatric condition separate from other disorders and from feigned presentations. In fact, they estimate the prevalence of DID to be up to 5% in inpatient psychiatric settings and 1% in
the general population. Functional neuroimaging has been able to distinguish between “neutral” and “traumatic” identity states in DID patients with regards to amygdala and hippocampal activity, frontal and occipital perfusion, and insular cortex activity. Reinders showed that these neuropsychiatric changes can result in alternate states that have entirely independent memories. As well, DID patients can show distinct subjective and autonomic reactions in response to neutral and trauma related memory scripts. Schlumpf et al.’s research on fMRI activity in DID patients responding to different facial expressions suggested that each state will have variations in response activation, which has clinical implications for therapeutic approaches. With regards to the effect of childhood trauma in creating a separate identity, Forrest postulates that the experience-dependent maturation of the orbitofrontal cortex is altered in DID such that there is lateral inhibition between conflicting self-representations, which are normally integrated into one unified self. Although the body of current research is limited in sample size, there is certainly enough to warrant consideration for the existence of DID. Despite the controversy over the credibility of dissociative identity disorder, those who have the greatest difficulty believing its existence are the patients who have it themselves.

CONCLUSIONS
Dissociative identity disorder is like an auto-immune disease in which the psyche is unable to distinguish between self and non-self, and in mistaking the self for a foreign intruder, initiates a destructive attack. From a developmental perspective, there are two aspects of the traumatized patient: an adult who strives to form relationships, feel accepted, and to forget, and a child who struggles to remember, and find a voice to be heard. When working with severely dissociated individuals, the goal is to help them realize that they have survived. This allows them to become full participants in their own suffering rather than dissociative fragments that separately contain pieces of the trauma. Bromberg states that “psychological integration does not lead to a single you or true self... it is the ability to stand in the spaces between realities without losing any of them.” For dissociative patients, standing in the spaces between fragments of themselves is how they know they have survived. They own their traumatic past – it no longer owns them.

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ABSTRACT
The appearance of the ocular and periorbital regions can be indicative of our emotions as well as our state of health. These revealing indicators may be indecipherable if the ocular and periorbital regions are permanently masked by tattoos. This report gives an overview of ocular tattoos: dermal, cosmetic, and periorbital. Their diverse indications, possible complications, and reversibility are discussed. Indications for ocular tattooing range from cosmetic to aesthetic purposes. Complications are rare occurrences but may include allergic reactions, scarring, dissatisfaction, and infections. The most common removal methods for cosmetic and dermal tattoos are superpulsed CO2 lasers and Q-switched neodymium-doped yttrium aluminium garnet (Nd:YAG) lasers with low fluence and large spot size, respectively. There is no literature concerning the removal of corneal tattoos.

Key words: corneal tattoo, eyeliner tattoo, permanent make-up, blepharopigmentation, keratopigmentation, laser

INTRODUCTION
Tattoos are one of the most ancient art forms known to humanity. It is a type of body art that involves permanent insertion of pigment into the dermis by perforating the skin with a sharp instrument. The application of tattoos has been attributed to an assortment of reasons, the most common being skin embellishment. Throughout history, tattoos have invoked a wide range of connotations.

Early manuscripts have estimated dermal tattooing to have originated around 8000 BC. The first evidence of tattooing is exemplified on an Ancient Egyptian mummy dating back to 2000 BC, but archeaic corpses displaying tattoos have additionally been found in other corners of the world such as Peru, the Philippines, and the Arctic Circle.

Similarly to the first evidence of tattooing, eye cosmetics have also been traced back to Ancient Egypt and have been estimated to have originated at around 3500 BC as can be seen in the paintings inside tombs and limestone caves.

These two art forms, tattooing and eye cosmetics, were first unified by ophthalmologist Dr Giora Angres to establish contemporary permanent makeup. He initially wanted to provide women suffering from physically limiting medical conditions, such as arthritis and Parkinson’s disease, with an alternative to eyeliner application. Angres performed the first blepharopigmentation tattoo procedure, or better known as “permanent eyeliner”, in 1984 and the procedure has since been widespread to include women without physical limitations.4 Following the establishment of blepharopigmentation tattoos, permanent eyebrow tattoos, lip liner, and blush have since been introduced.

Ocular tattooing for cosmesis has been used in the healthcare field for many centuries. In the second century, the Greek physician Galen used metallic salts of copper sulphate to form a chemical reaction on corneal tissue resulting in pigment precipitation and obscuring unattractive corneal leucomata. It was not until the 19th century that corneal tattooing was used for therapeutic purposes to reduce glare from corneal scars and other opacities. Tattooing of the cornea is used less often in contemporary medical therapy due to advancements in corneal surgery.6

This review explores the prosthetic and aesthetic uses of tattoos in the ocular and periorbital regions, as well as their complications and reversibility.

INDICATIONS AND AREAS OF OCULAR TATTOOS
Tattooing in the periorbital region can be performed for decorative, prosthetic, cosmetic, or research purposes. For the purposes of this report, the tattoos in the eyelid, eyebrow, and corneal regions will be reviewed. Due to sufficient thickness of eyebrow skin, eyebrow tattoos will be classified as general tattoos.

DECORATIVE
Due to the artistic nature of tattooing, its progressive popularity and societal acceptance, decorative tattoos are becoming increasingly common in the perioral area.

Eyeball tattooing is another type of body ornamentation that has only surfaced very recently. Using a needle, ink is introduced into the subconjunctival space. The effects of such a procedure have not been fully established, but like any invasive eye procedure, the risks associated are many, especially when performed outside of a healthcare institution. Eyeball tattooing will not be examined in this report. Further academic research on this kind of tattooing must be carried out in order to draw conclusions.

MEDICAL
Corneal tattoos are usually performed for medical purposes. It was initially introduced in order to conceal leucomata of the cornea. Advancements in keratoplasty and contact lenses have reduced the need for procedures involving corneal tattoos.

There are some cases where a corneal tattoo is the most appropriate method for treatment, such as treating irregular corneal scars, contact lens intolerances, or high risk of keratoplasty rejection. Aesthetically, corneal tattooing or keratopigmentation (KTP) is still used to camouflage corneal scars or opacities formed after amniotic membrane transplantations, such as procedures in pterygium excision and corneal ulcers.

Corneal tattoos can also have a therapeutic effect. A corneal tattoo is recommended if the patient experiences symptoms of debilitating glare and light scatter due to iris loss or trauma. Cases where a patient has suffered from monocular diplopia due to iris capture from cataracts surgery can also be resolved by the application of a corneal tattoo.5 A corneal tattoo can transform a light scattering cornea into a light absorbing one. It can also reduce the entrance pupil size in order to help eliminate aberrations.5 Furthermore, symptoms of photophobia can be relieved in posttraumatic aniridia or iris coloboma.

Islam & Franks of Moorfields Eye Hospital document an iridotomy patient who proceeded to have a corneal tattoo. The glaucomatous patient complained of glare that appeared to be due to the misplacement of peripheral iridotomies that were located...
at 10’oclock in the right eye and 2 o’clock in the left eye as opposed to 12 o’clock in both eyes. After examining all possible solutions, it seemed that a corneal tattoo was the least invasive and the best available option. The patient proceeded with a corneal tattoo and her symptoms of glare were relieved.12 More recently, a patient who had undergone a trabeculectomy also experienced symptoms of glare that coincided with the region of incision. His symptoms were also relieved with a corneal tattoo.

COSMETIC
Indications for cosmetic tattooing vary vastly. Cosmetic tattoos may be applied because patients are unable to apply makeup themselves due to a physical or visual impairment. Individuals with allergies to conventional makeup may also find tattooing beneficial. Furthermore, it can also be applied to conceal scars, birthmarks, vitiligo and alopecia. And there are those individuals who choose to commit to a cosmetic tattoo just because it is water-proof, time-saving, and hassle-free.

RESEARCH
Tattooing has been used to emphasize anatomical structures of the cornea for research purposes. Busacca used a tattooing method to highlight Herbert’s pits, lesions caused by a trachomatous infection, on the cornea. During eye movement investigation, Hartridge & Thomson suggested that the sclera may be used if it is tattooed at a suitable area.

COMPLICATIONS
GENERAL TATTOOING
Complications can occur from either the tattoo itself or from the tattooing process. The possibility of a complication is very rare. Historically, before the discovery of antibiotics, the most common complication of tattoos was bacterial infections that sometimes resulted in amputations or death. But with the high standards of sterilization of the equipment that exist among tattoo artists today, bacterial infections have become nearly nonexistent.17 In modern times, if a professionally drawn tattoo becomes infected, it is usually because the recipient was negligent in taking care of the healing area.17

Sterilization is no longer an issue in tattoo shops in developed countries, but it does continue to be an issue in prisons. Inmates often administer tattoos on each other using any available sharp object, such as a sewing needle or copper wire, while paying little attention to its cleanliness. Prisoners may also have past intravenous drug use and homosexual activity; therefore, there is high risk of blood-borne diseases, such as human immunodeficiency viruses that can eventually manifest as AIDS.17

Tattoos can also trigger the development of certain conditions. There have been cases where psoriasis has been developed over the tattooed area. Tattoos have also been documented to reactivate certain infections such as herpes simplex and herpes zoster.18 Both herpes simplex and herpes zoster infections are considered to be medical emergencies as they can cause epithelial dendritic ulcers or stromal disciform keratitis in the cornea and threaten corneal health and vision.

The most common complication today is hypersensitivity reactions to the pigment. The pigment colours that are most likely to cause reactions are red, green, yellow, and blue. Hypersensitivity reactions to the pigments usually manifest as localized responses of dermal hardening, redness, and itching. Hypersensitivities can usually be managed by topical steroids.17 Due to the various pigments that can be used to produce different shades, it is often difficult to determine which pigment is the culprit for eliciting a reaction.

Interestingly, red pigmented tattoos are more likely to cause discoid lupus erythematosus, sarcoideal granulomas and keratoacanthomas.17 Granulomatous reactions may manifest because the body is reacting to the pigments as foreign bodies.19 Sarcoidosis, being a systemic condition, can also cause granulomas to be observed in the conjunctiva, choroid, retina, and optic nerve head as well.20 Granulomatous reactions can be treated by intralesional or systemic steroids and oral antibiotics. A systemic reaction may occur because the tattoo pigment may have been released into circulation by macrophages.22 Granulomas can develop months or even decades after the tattoo application. If the interval time of granuloma manifestation is prolonged, it is likely that the patient may have an underlying systemic disease such as sarcoidosis.

COSMETIC
Complications of cosmetic tattoos are highly uncommon. There have been some cases of granulomatous reactions and eyelid margin necrosis with madarosis and secondary cicatricial entropion. But the most common complication of cosmetic tattoos is misapplication and dissatisfaction.25 There have also been cases of underlying conjunctival staining. Some permanent makeup pigments contain nickel sulfate which has been documented to cause allergic reactions.

Permanent makeup tattoos, specifically, have been documented to cause MRI artifacts, which are false attributes that appear in the image produced, and can sometimes induce false negatives or false positives resulting in mistaken pathologies. Furthermore, MRI imaging carried out on an area with a cosmetic tattoo can cause short-term skin irritation, cutaneous swelling, and heating sensations. Iron oxide is a pigment most often used to produce black tones in cosmetic tattoos. The particles of iron are thought to interact with the electromagnetic fields and radiofrequencies during an MRI procedure and resulting in pigment movement and symptoms.29 The importance of having medical imaging far outweighs the discomfort that can be experienced with patients with tattoos. In order to prevent severity of symptoms, patients with tattoos that are undergoing an MRI should be well informed of the possible associated risks and should have a cold compress applied to the site of the tattoo.29 In a study done by Tope & Shellock, only 1.5% of patients who had undergone MR imaging had experienced symptoms of discomfort or irritation.29

CORNEAL
The complications associated with corneal tattoos are toxicity reactions, colour fading, colour changes, and over or under pigmentation. Complications may also involve corneal ulcerations, iridocyclitis, and panophthalmitis. There are some conditions that are at a higher risk of iridocyclitis such as adherent leucoma, keratctasia, anterior staphyloma, neurotrophic cornea, phthisis bulbi, and glaucomatous eyes. Patients with any of the forenamed conditions should not be considered for a corneal tattoo.

MALIGNANT MELANOMAS
There have been cases reported where malignant tumours developed within a tattooed region. The types of malignancies that have been documented are malignant melanomas, basal cell carcinomas, squamous cell carcinomas, and non-Hodgkin lymphoma. Because of the concealment of the area, tattoos tend to further delay the diagnosis of a tumour. There is currently not enough evidence to suggest that there is a causal relationship between tattoos and malignant tumours, but it is certainly a possibility that needs to be further explored.
REMOVAL

The most frequently removed tattoos are those located on the hands and face. Although tattoo removal does remove the pigment, almost every removal procedure leaves behind a scar.17

The latest advancement in tattoo removal and the most appropriate for the periorcular region is using lasers to vaporise the intradermal pigments. A concentrated laser beam is applied to the area causing the tattoo pigments to absorb the radiation and the increased temperature causes the pigment to be vaporised. During laser removal of a tattoo, pigments are phagocytosed by macrophages and transferred to nearby lymph nodes.21 Due to the thermal burn reaction produced by the laser, a scar will also result with this technique.17 Laser removal is most suitable for smaller tattoos and several sessions may be required to fully remove the tattoo. A combination of lasers may also have to be used to remove the cosmetic tattoo and the various pigments shades involved.

The ideal option for removal of a periorcular or periorbital tattoo is by neodymium-doped yttrium aluminium garnet (Nd: YAG) laser with a larger spot size and lower fluence in order to prevent paradoxical darkening of the tattoo. Paradoxical darkening has a tendency to occur with tattoo dyes containing red or flesh pigments.39 The superpulsed CO2 laser is also appropriate for removing eyelid and eyebrow tattoos because of its high precision capabilities. It allows for the removal of pigmentation in between the eyelash or eyebrow hairs without causing damage to the follicles.

Before applying the laser beam for the removal of the tattoo, lidocaine 1% is usually applied to the tattooed area.39 During the removal of an eyelid or eyebrow tattoo, it is absolutely necessary to protect the eye from any damage by applying a topical anaesthetic, such as proparacaine, to insert a metallic scleral contact lens to shield the eye.39 If the eyes are not well-protected during the laser tattoo removal process, there is possibility of developing anterior uveitis, pupillary distortion, posterior synechiae, iris atrophy, nuclear cataract, visual field defect, macular hole, and retinal scarring.

Conornal tattoos are performed for medical and therapeutic purposes and, thus, there are no recorded cases of corneal tattoo reversal.

CONCLUSION

Ocular and periorcular tattoos have seen resurgence in recent years both from a decorative and medical standpoint. Decorative tattoos in the ocular regions have been popularized by pop culture and musical artists that can be seen arraying their skin with tattoos. In terms of a medical resurgence, while the advancements of keratoplasty and contact lenses drastically reduced the use for corneal tattooing in healthcare, recent case studies have indicated that corneal tattoos can have an important role to play in surgical advancements and complications. Cases of misplaced iridotomies and glare-producing trabeculectomies can be corrected with the application of a corneal tattoo.12,13

There are a large number of possible complications with tattooing, but the majority is very rare. Aside from aseptic inflammation which occurs in all tattoos, the most common types of complications are hypersensitivities to the pigments. Specifically in eyelid tattooing, the most common type of complication is misapplication or dissatisfaction.25 The complications associated corornal tattoos are toxicity reactions, colour fading, and colour mismatch.30

It is still uncertain whether or not a relationship between tattooing and malignant melanomas exists. Further research in this area is required. Dark pigments generally have light-absorbing properties, so it may be that the tattoo pigment is allowing UV absorption into skin cells and may leave the skin at risk. The tattoo pigments would not act similarly to melanin because melanin is able to destroy free radicals.

The most appropriate option for removal of a periorcicular or periorbital tattoo is by laser, and specifically Nd: YAG with a larger spot size and lower fluence in order to prevent paradoxical darkening of the tattoo. During a laser tattoo removal in the periorcicular and periorbital regions, eye protection is fundamentally important in order to prevent vision loss.40 There have been no reported cases of reversal of corneal tattooing mainly because they have been performed for medical and therapeutic purposes.

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The Internet has evolved into a multi-purposed Care, Health Literacy, medical Education, Health Education, Patient-Centered Care, and Health Literacy. keywords: Internet, Patient Education, Medicine on the Web. the Internet is the greatest source of information – and misinformation – on the planet. the consequences of this relatively new paradigm shift are not yet fully understood. it is unclear whether patient access to web-based medical information has improved health literacy in a manner that benefits the patient and the medical profession, or if the consequences of misinformation have dominated. Physicians, medical trainees and other health care providers must consider the role the Internet plays in patient education and obfuscation, and adapt accordingly.

Keywords: Internet, Patient Education, Medical Education, Health Education, Patient-Centered Care, Health Literacy

ABSTRACT

For the first time in the history of the medical profession, the patient has access to an abundance of medical information, comparable to that of their treating physician. The Internet is the greatest source of information—and misinformation—on the planet. The consequences of this relatively new paradigm shift are not yet fully understood. It is unclear whether patient access to web-based medical information has improved health literacy in a manner that benefits the patient and the medical profession, or if the consequences of misinformation have dominated. Physicians, medical trainees and other health care providers must consider the role the Internet plays in patient education and obfuscation, and adapt accordingly.

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Medicine on the Web

The Internet has evolved into a multi-purpose platform that allows people to share ideas, learn, socialize and organize their lives. In a single browser people can contact their friends, order dinner, search for peer reviewed literature and join millions of others watching funny cat videos on YouTube. It is a world where anyone can make a claim and if properly packaged, the message will be delivered. As information spreads like wildfire on the web, the line between truth and falsity becomes obscured by opinion and false claims. The unfortunate reality is that while searching the web for facts, it is often easier for an individual to find a miscellany of material than relevant and well-informed information. Internet search algorithms frequently favour the popular and plentiful, which can result in a failure to provide the genuine. This is further magnified by the fact that when seeking health information, the general public will often use lay-terms in their search, which has been shown to result in lower quality, less accurate information. By stumbling upon lesser quality websites, patients may discover a discrepancy in the information that they find online versus the information provided by their physician. This discrepancy can often lead to confusion and expression of doubt over a diagnosis. It can also lead to a contradiction in a treatment plan, and result in disruption of the physician-patient relationship. In fact, increased use of online information has led to a growing perception that physicians can be bypassed altogether during the pursuit of diagnosis and treatment options. It is reported that younger patients are more likely to seek health information online, indicating that these trends may continue to proliferate and be of particular concern for the next generation of physicians.

The search for online health information is common; the Pew Research Internet Project estimates that 8 in 10 Internet users have looked online for health information and 1/3rd have done so with the specific objective of self-diagnosis. Attempts in self-diagnosis can provoke “cyberchondria”, an online form of illness anxiety. The psychological consequences of this online epidemic continue to be elucidated. A recent survey suggests that 25% of online health seekers feel overwhelmed and 10% experience a significant
level of fear by the nature of the information they find online. Perhaps the most prominent impact of Internet-based misinformation is the current stigma surrounding vaccinations in society. Those promoting the anti-vaccination movement use the Internet as a medium to help propagate their school of thought through social media and websites such as “The Age of Autism”. Parents’ decisions are often driven by fear and the desire to do what is best for their children, but the consequences of this propaganda have had increasingly profound medical consequences.

It has been shown that parents who have visited anti-vaccination websites are indeed less likely to vaccinate their children. The sudden decrease in childhood vaccinations have led to a decrease in herd immunity and a resurgence of previously near-eradicated diseases. Examples include a recent rise in the prevalence of measles across Canada, and the worst pertussis outbreak in nearly 50 years in California. Another health trend gaining rapid popularity through blogs and social media is that of gluten-free dieting. This wheat-based protein has achieved celebrity status through the non-scientific claims that it is a malevolent substance that should be avoided by non-Celiac’s to improve health and lose weight. These examples demonstrate the manner in which assertions made online, lacking in evidence-based research, can falsely legitimize a medical opinion. A further unfortunate adjunct to the abundance of web-based misinformation is attempts made in creating patient-oriented websites. These websites are often insufficiently accurate and informative, but are not actually written at appropriate reading levels. In fact, regardless of an individual’s reading level, evidence indicates that all patients—not just those with limited literacy skills—prefer easy-to-read materials to more complex or comprehensive resources. While accurate and evidence-based resources are essential, the authors of these websites need to further consider their audience by simplifying the message with less medical jargon.

Should health professionals be concerned with patient education in the first place? The answer lies in the concept of health literacy. Health literacy is defined as the capacity to obtain, interpret, and utilize basic health information and services. Health literacy has been touted as one of the most important factors in an individual’s health status. Its value has been demonstrated in studies showing that a lower health literacy level leads to increased hospital visits, length of hospital stay per visit, and thus overall cost to the healthcare system. Patient education has been shown to increase levels of health literacy and has repeatedly been linked to positive health outcomes. Since health literacy is an important dictator of an individual’s health status, it naturally follows that efforts must be made to improve effective methods of patient education; however, is the Internet a useful and appropriate means of delivering this information?

The convenience and accessibility of the Internet provides a unique advantage over conventional teaching tools. Patients who otherwise might not have had the opportunity to educate themselves can now attend their appointments with a more advanced level of understanding. In 2009 the Canadian Medical Association (CMA) surveyed 2,688 Canadian physicians, and found that 83% of respondents reported having patients who regularly come prepared with information derived from the Internet. Some physicians feel that this simplifies their role and enables shared participation in informed decision making, converting the old physician-patient monologue into a dialogue. The ability to access educational materials online also affords patients the ability to review information after a potentially anxiety provoking encounter with their physician. This provides the means for patients to pursue relevant information at their own pace, in an environment that is comfortable to them, and also encourages patients to become advocates for their own health. It is important to consider that in order for the information to be beneficial to patients, they must be able to access websites that are credible, informative and easy to understand. Fortunately, despite the rampant presence of misinformation and medical jargon, there is also an ample supply of peer-reviewed resources online that are appropriately designed to help educate patients. In 1998, due to the expanding desire of the public to search online for health information, the National Library of Medicine launched a website called MEDLINEplus. This website aims to provide rapid access to health information at a more suitable reading level. Another example is the Health On the Net foundation, which is an organization that reviews, evaluates, and certifies websites containing medical information. When patients use sources such as these, the Internet can elevate health literacy levels as intended, and facilitate informed decision-making.

THE PHYSICIAN’S ROLE

The influence of the Internet on patients’ health decisions is substantial. The Internet has the benefit of promoting health literacy and patient-physician collaboration. Still, the negative consequences must be considered as well. Healthcare providers can adapt their practice to harness the efficacy of the web, while minimizing the drawbacks. For example, physicians have the opportunity to help their patients navigate the web by directing them to suitable websites, i.e., web-based information prescription. This guidance will encourage patients to become advocates in their own health, while decreasing the likelihood that they will encounter misinformation. The 2009 CMA survey suggests that 57% of Canadian physicians currently direct their patients to online resources, 24% do not, and 18% say they will only when requested. As healthcare providers recognize the benefits of online resources, these numbers may change to reflect an increased willingness to direct patients towards valuable web-based health resources. Healthcare providers can also advise patients on how to properly evaluate websites. As Dr. David Keegan, Interim Head of the Department of Family Medicine at the University of Calgary explains: “The Internet is out there with all the good and bad it entails, but more good than bad. Our job is to help people develop health information critical appraisal skills, so they can sort the good information that is relevant to them from everything else.” Enlightening patients to the potential negative medical consequences of misinformation and self-diagnosis may help them understand the value in critically assessing the integrity of the websites they subscribe. In doing so, one may decrease both the level of general anxiety amongst patients, while aiding to minimize misinformed decisions that may affect individual and public health.

It is also important for healthcare providers to advocate for improved Internet-based educational resources with accurate information delivered at appropriate reading levels. Some physicians and practice groups have even created their own websites, and utilized social media to deliver suitable patient educational materials. One example is the efforts put forth by Family Physician Dr. Mike Evans. The Evans Health Media Lab creates entertaining and easily accessible whiteboard educational health videos, such as the popular video “23 and ½ hours”. These videos are free to the public and have quickly gained popularity on YouTube and social media. As Dr. Evans describes, the Internet can clearly be utilized to transform an educational message into “a healthy virus”. Some physicians are opening twitter accounts or personal blogs as efforts to increase health literacy levels through public medical education and peer-to-peer healthcare. It is clear that the utility of the Internet in patient education is being increasingly and
rapidly appreciated. As this trend continues to gain popularity it is important that there is continual research towards improving the delivery of medical information and overall health literacy. This can be further achieved through disseminating information at medical conferences, as well as adding emphasis on the relevance of patient education and techniques in medical schools. Regardless of the chosen method, physicians must adapt their practice to the inevitable evolution towards internet-based patient education, in order to harness the advantages and help their patients avoid the negative consequences.

CONCLUSION
It is important to recognize that while no single medical intervention can target an entire population, the majority of adults are seeking health information online. Physician awareness and understanding of both the positive and negative aspects of web-based medical education must increase. Internet-based information resources should be a commonly prescribed educational adjunct for physicians to use with their patients. Whether it is providing an information prescription, advising how to evaluate websites, or even having a personal online presence, there are many opportunities for physicians to improve the health literacy of their patients. It is time for physicians to transition away from their piles of pamphlets and follow a modern movement towards improving the delivery of medical information to patients.

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A Call to Action: Quality Improvement in Healthcare Should Start at Student Education

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ABSTRACT
Quality Improvement in healthcare is gaining increasing attention across healthcare systems that are under pressure to provide high standards of care, improve patient outcomes and increase efficiency while reducing costs. The problem is that QI education targets complex clinical environments that have pre-embedded work cultures, set values and beliefs about clinical practice, which makes improved change a difficult process. The Edmonton Healthcare Improvement Network (EHIN) argues that QI in healthcare should start at student education. Integrating QI into student education would equip our future healthcare professionals with the skills to recognize poor healthcare quality and to create effective improvements in clinical practice. EHIN calls to action the need for all health faculties at the University of Alberta to integrate QI education into their formal curriculum.

Key words: healthcare, quality improvement, education

INTRODUCTION
Quality improvement (QI) in healthcare are the efforts made to make changes that lead to better patient outcomes, better health system performance, and better professional development. QI has also been defined as a process that uses actions to improve the procedures and outcomes of healthcare and to increase the implementation of QI methods in practice. The Institute of Medicine, a non-profit, non-governmental organization that provides evidence-based information about health and science to policy-makers, researchers, professionals and leaders in health developed six aims for improving the quality and delivery of healthcare: safe, effective, patient centered, efficient, timely and equitable. QI requires a change in how current health systems work and in how people that work within health systems think, with changes being based on the best research evidence and scientific knowledge. One central argument to our commentary is that QI principles and values need to be taught and implemented during the educational training of healthcare professionals, both at undergraduate and graduate training. Currently QI principles and values are implemented across various clinical practice settings that are complex and diverse with individual work cultures, values and beliefs about QI. We believe that if QI in Healthcare started at student education and was embedded into our way of thinking from an earlier stage, QI efforts would be more effective and consistent across clinical settings. The lack of QI education for trainees is not consistent with the current drive for QI in clinical practice, since it fails to prepare our future healthcare leaders to be drivers of QI and initiate improved practice change.

THE NEED FOR QI IN HEALTHCARE
There are several key arguments for why QI is critical to healthcare: to improve patient outcomes, increase patient safety, reduce error and reduce costs to be more efficient. A recent study on medical errors estimated that 7.5% of hospital admissions in Canada result in adverse event such as unintentional injury, disability at discharge or death. Of these adverse events and estimated 37%-51% are preventable amounting to 70,000 preventable adverse events annually in Canada. Identifying the sources of these errors and educating students about identifying and reporting errors will enable us to improve the patient outcomes and facilitate a culture shift to one that focuses on QI.

A perceived barrier to implementing QI initiatives is the pressure to reduce healthcare costs while simultaneously ensuring continuous quality improvement using the best available research evidence to inform clinical practice. However, carefully selected quality improvement initiatives have been shown to reduce costs while improving patient outcomes. Educating health sciences students about the principles of QI and engaging them in ongoing QI initiatives will equip our future healthcare professionals and leaders with the knowledge and skills to effectively improve our Canadian healthcare system.

QI EDUCATION IN STUDENT CURRICULUM
Despite growing interest in QI among practicing healthcare professionals current undergraduate professional programs are sorely lagging in providing educational opportunities for students to learn and engage in meaningful QI experiences. Despite the fact that the majority of educators believe in patient safety and QI education be embedded in medical education, only ~25% of medical schools in the USA and Canada incorporate instruction on these topics, the majority of which only include lectures and small-group discussion. Our experience collaborating with faculty, practicing professionals and students from various health sciences disciplines over the past year has revealed that this trend is no different at the University of Alberta. QI education is not consistently offered across the spectrum of health disciplines and does not appear to be valued as a major component to health professional trainee education. This discrepancy places the training of healthcare professionals at odds with the current emphasis on QI in clinical practice.

In a recent systematic review of QI related curricula in medical schools, Wong, et al. (2010) found that the majority of students reported positive attitudes and interest in QI and Patient Safety (PS) topics and students reported significantly improved levels of knowledge in QI topics. Beyond the benefits to students’ education, they found that QI projects have a demonstrated ability to generate significant changes in process of care and the potential to improve patient care above what would be achieved with passive student exposure to QI initiatives. For example, students involved in safe medication prescribing initiatives were less likely to make prescribing errors and more likely to exhibit safe prescribing practices. We have experienced these benefits at the University of Alberta through the Edmonton Healthcare Improvement Network (EHIN). EHIN is an inter-professional collaborative student group that engages students in learning about the principles, methods, and tools of healthcare QI.
CONCLUSION: CALL TO ACTION
The EHIN executive team call to action the integration of QI to the curricula of the health disciplines at the University of Alberta. We believe that QI is a major issue in the Canadian healthcare system, however QI initiatives often fail to include healthcare trainees. Over the past two years EHIN has made strides towards engaging students in QI principles, however there is a paucity of QI education in the formal curriculum across the University of Alberta’s health disciplines.

We argue the need for innovative quality improvement approaches to be taught at the trainee level, incorporated into the education curriculum.

One method of offering QI education would be through clinical shadowing opportunities for trainees with healthcare leaders to observe QI approaches in the clinical setting. The curriculum needs to engage various healthcare professionals to work together as a team to understand existing quality issues, identify areas of inefficiency and work together to develop a more fluid process that provides efficient high quality patient centered care. We envision that the future of health care depends on the consistent integration of QI into the formal educational curriculum. We hope that this paper creates discussion amongst our health professionals, students and faculty as to how we can make QI education an integral part of the learning experience for all health disciplines.

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It’s hard for me to believe that just one year ago I was halfway across the world by myself. I have always known I was going to visit Africa. I fell in love with the stories my friends told me about the people, the way of life, the wildlife and even the red dirt. My undergrad stream was very specific, so there were not many opportunities to study abroad; therefore, I was ecstatic to be accepted into the University of Alberta Medical School and to become part of their global health department. The University of Alberta has strong relationships with various medical schools and hospitals worldwide, including the University of Ghana Medical School.

I chose Ghana not just because of its stability while I travelled alone, but also because I had heard stories from one of my close friends from there. I am very independent, and had no real fear about travelling by myself, but I had some second thoughts while travelling to the airport! Not that I needed to. Ghanaians are very nice people. I kept thinking the whole time they are like Canadians in the sense that they are very polite and friendly. They call women “my sister”, or say “thanks mum” to an older lady. They also call men “boss” the same way we say “guys”.

I studied at a teaching hospital in Accra, the capital city of Ghana, and I was assigned to a pediatric ward with a team of other learners and the attending physician for three weeks. Everyone was very kind to me, helping me with the rhythm of the hospital and translating the local language. (Interestingly, there are so many dialects in Ghana that even the local students had to find translators!)

I entered the group with the same competitive mindset that a lot of Canadian students have, but soon found that the medical students in Ghana were very relaxed and strived to help each other. Once, our attending asked a question and when I answered correctly, the attending didn’t hear it. Another student said the same answer a couple minutes later. Afterwards, I went up to that student and said I wished I had been a little louder. He answered, “Why does it matter who said it first? It’s a good thing we both know the answer!” This was a revelation for me. It doesn’t matter who said what first or who gets the most praise, just that all the students know the information at the end of the day for the sake of the patients.

When it came to meeting patients, I quickly learned that my name was officially Obroni (which means white person in the local language). One little boy would scream “MOM-MA OBRONI!!” every time I walked by him on the wards. Another little boy who had kidney problems and retained fluid in his belly would strut around like he owned the place, which I loved, and always called me Alice. Another girl had bows in her hair, on her dress and on her shoes so we all called her “Miss Ghana”. Many of the other kids would stare at me and were scared because they had never seen a white person before, but I was quick to get them to laugh or at least smile.

The hospital had ward rounds each morning, grand ward rounds each week, and various specialty clinics each afternoon, including neurology, sickle cell disease, cardiac, asthma, and ICU follow-up. Because it was a public hospital, some patients had insurance and some had to pay out of pocket. Even for something so simple as getting blood work, a family member had to go buy the bottles, come back to get the blood sample, drop it off at the lab for the testing, then go back the next day for the results. Many of the decisions that the healthcare team made took the financial situation of the parents into consideration. It was hard for me - I wanted to help everyone but deciding where to draw the line is extremely difficult. It is impossible to help everyone, but just as impossible to choose.

*Permission was granted to publish this photo from the guardian of the patient*
The doctors told me that they have learned that the only thing you can do is the best you can with what you have, whether it is limited treatment options or having no reagents for necessary lab tests.

The teaching at the hospital put a lot of weight on the history and clinical features of diseases. We were drilled on the description of breath sounds and which sounds indicate which diseases. The professor said many times, “Every disease can be determined by history alone, and confirmed by clinical exam. You need to ask the right questions.”

It was interesting to compare this to how medicine is practiced in Canada, where we often rely more on a chest X-ray than a pulmonary clinical exam.

I also spent a week in the Obstetrics & Gynecology department, where I saw gynecological issues in clinic, surgery, and emergency situations, plus the low risk and high risk labour wards. For practical reasons of space and for the privacy of other patients, no family members were allowed into the labour wards. I was struck by the contrast between births in Ghana, where husbands cannot witness the birth of their child, and births in Canada, where private rooms mean whole families can attend.

A lot of things were different in the obstetric ward there. In the two days my team was on labour wards, 60 babies were born. The low risk labour ward only had one resident in charge because midwives do most of the deliveries. There were two operating rooms that the residents used for back-to-back C-sections. These surgeries went smoothly and were similar to procedures in Canada, scrubbing in with autoclaved gowns and surgical kits. The residents joked that my hospital in Canada probably had fancy disposable gowns, but I quickly corrected them to say we have the same autoclaved gowns and drapes as they did.

I also took day trips around Accra on the weekends. I saw a fort and a castle that were involved in the transatlantic slave trade. It made me sick that this happened to innocent people. African Americans have come back to Africa and left wreaths to honour their loved ones and relatives who had to bear those terrible conditions. Another weekend I went up to a small city near breathtaking waterfalls. One waterfall has two streams that merge after the rainy season. Local culture says these two streams are husband and wife, and when they merge the city holds a huge festival honouring love and commitment. I also spent some time learning to cook traditional dishes and how to play traditional drums originating from the Northern region. It was rewarding to learn about another culture and to embrace it.

Yes, there is poverty in Ghana, often to a tragic point. But I choose to focus on the positive, and I found that Ghanaians are very generous, giving and resourceful people. There is so much beauty in Ghana, both in the landscapes and in the people. I feel like this trip will help me be more resourceful when I approach medicine, to challenge myself to think outside the box, and to trust that everything will work out when I am faced with stressful situations. Words cannot describe the impact this trip has made. It’s hard to believe it’s been a year since I have come back, but I feel like it’s just another day in my life, and that Ghana will always be a part of me.

Until next time,
Obroni – a.k.a. Miss Ghana

The Global Health Elective

Gregory Sawisky, MD candidate (2016), Faculty of Medicine and Dentistry, University of Alberta

We arrive at the hospital early on the first Monday morning, our bodies furiously adjusting to the time change, altitude and food. We are four of the hundreds of Canadian medical students who fan across the globe each summer for a Global Health Elective. We are excited, nervous, and overwhelmed, not dissimilar emotions to our first day of medical school two years earlier.

The hospital appears to be in a state of perpetual madness. We struggle through language barriers and unfamiliar territory to find our designated contact, occasionally catching each other’s eyes with a glance that asks, “What did we get ourselves into?” We eventually find preceptors to work under and adapt as best and as quickly as we can.

The days pass: some quickly, some slowly. We learn about the practice of medicine in this country. Other students generously translate for us when conversations with patients turn to the local language. We experience moments of shock at rudimentary procedures, sadness at the prevalence of preventable diseases, and awe at the ingenuity and resourcefulness that the physicians and interns are forced to display.

The month passes more quickly than we expect. As we draw close to our final days at the hospital, the experience begins to foment in our minds and we begin to understand that the purpose of coming to this country was not simply to learn about signs, symptoms or diagnoses, but to bear witness to the practice of medicine in another country. The purpose of coming here was to engender us with a profound humility about healthcare in a part of the world very foreign to us.

Though seeing suffering we would never see in Canada saddens us, we are deeply moved by the kindness and warmth of the people of this hospital every day: an eternally patient mother clutching her coughing child, staff who seek us out to guide us and assist us over our stay at their hospital.

Medical students are a privileged group. Many in our ranks come from families that have
the wealth to be able to support our pursuit of medical education. For some of us, our Global Health Elective may be the first time we witness the depth of poverty and disease that are found in this world.

As we pack our bags for the long journey home they are far lighter: no longer laden with gloves, sutures, masks and a host of other medical supplies, their precious cargo has been delivered to the hospital with far more need of supplies than any hospital at home. We experience a curious mixture of relief and melancholy as we wish our goodbyes. We are happy to be returning home to enjoy the luxuries of clean water, constant electricity and plentiful food that we took for granted only a few weeks prior, yet this place, this hospital and this city, grew on us in the short time we were here. The hustle and bustle, the noises, the smells – they became our world for these few short weeks and now, just as we are able to navigate the streets with relative ease, we are leaving; we are returning to our privileged lives.

To see healthcare practiced here has stirred in us a new appreciation for our system – despite its flaws – but I find I am also moved by how these physicians, when faced with few resources, adapt and strive to provide the best care they can. They often face daunting odds and, sadly, they often lose. Patients present too late, diseases have progressed too far. Stig mata of certain diseases prevent some patients from seeking help until they are carried in, unable to lift themselves to walk. Others die from a lack of resources, a lack of access, or a lack of money to be able to afford the journey into the city.

In the final lines of the poem “The Rime of the Ancient Mariner” the mariner’s tale of woe related to a passing wedding guest leaves him a “sadder and wiser man.” Perhaps that line of poetry represents the true purpose of the Global Health Elective: To imbue medical students with an awareness of medical care elsewhere and, perhaps as a result, leaving them somewhat sadder and wiser.

Three Cheers for Freedom

JoyAnne Krupa, MD Candidate (2015) University of Calgary

Ever been too far down the rabbit hole of one fraction of your mind? Med school turns out to be a bit cerebral. History of presenting illness, physical exam, investigations, laboratory tests, imaging, sensitivity and specificity, schemes, differentials, diagnosis, treatment, risks, prognosis. Next. Repeat. Geeking out is fabulous, but every so often, maybe while chomping down on a bland vegetable, I have a mini-existential crisis. I remember that I’ve been smushed into a single corner of my brain, and I need to stretch out the T-Rex arms.

There are few things in life that make me forget the strain in my hunched back for hours as I neglect all my bodily functions in an all-consuming project. If I dare pick up my paintbrush on the right day, it’s game over. I’m hypnotized by a mess of clouds and colour and contrast. A wet slop of blue, swirled, smeared, brushed into the emerging rock face. It’s wonderfully thoughtless.

It’s a big beautiful world out there! Now, back to the hole.

Second-year U of C medical student JoyAnne Krupa has been exploring art since she learned to wield a crayon. Her art education has been time spent with a paintbrush in hand. Beyond a playful hobby and emotional expression, art now serves many purposes in her life. Central to her learning strategy is illustration, as seen by her school notebook. She finds her visual spatial mind is most helpful for memory retrieval and understanding concepts and their interconnectedness.
The Art of Observation: Learning to See

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Step one, we are taught as first year medical students, is to observe the patient; inspect, palpate, percuss, auscultate: I.P.P.A. Subsequent years of training build on this basic approach to the physical exam. We are taught that the history and physical exam are the tenets of clinical medicine. William Osler (1926) writes, “Observe, record, tabulate, communicate. Use your five senses.” Step one, again, is to observe. Observation is a key skill for future clinicians to develop. This has been recognized by schools of medicine and nursing around the world currently developing and implementing curricula designed to hone the visual perceptual abilities of learners in the health professions. At the University of Alberta, the Arts & Humanities in Health & Medicine (AHHM) program is spearheading an innovative program for medical students to receive visual literacy training.

Literature supporting the value of visual observation training for clinical settings has blossomed in the past decade. John Debes first described the concept of “visual literacy” in 1969. Visual literacy, he writes, “refers to a group of vision-competencies... when developed, they enable a visually literate person to discriminate and interpret visible actions, objects, symbols, natural or manmade, that he encounters in his environment. Through the creative use of these competencies, he is able to communicate with others” (Debes, 1969). Visual literacy requires “the ability to decode and interpret (make meaning from) visual messages and also to be able to encode and compose meaningful visual communications” (Metros, 2008). It is a skill that equips the learner to understand and analyze the contextual, cultural, ethical, aesthetic, intellectual, and technical components of visual input (ACRL, 2011). The extension of this pedagogy to medical education has been described by many, including Shapiro, et al. (2006) who state that:

Clinical observation, including identification of key pieces of data, recognition of patterns in the data gathered, and interpretation and reinterpretation of both data and patterns, is a key component of medical decision making, the complex process by which clinicians gather data, arrive at conclusions, and decide upon management. (263)

The value of transforming a superficial approach to “look-ing” into a deeper “seeing” has been further supported in the research, with a rationale specific to medicine elaborated by Bleakley, et al. (2003), who describe “clinical expertise as a ‘con-noisseurship’ of informational images” (544). Shapiro, et al. concur: “seeing is not objective. Therefore, experts conclude that to break through the wall of usual seeing requires developing a way of seeing that is flexible, liquid” (264). Studies undertaken by medical and nursing schools across Europe and North America over the past decade suggest that visual arts training in medical education “improves both observational and empathetic skills in medical students and may be superior to standard teaching” (264). The bottom line: the skill of observation - of gaining and then utilizing visual literacy - is worth teaching to future clinicians.

At Harvard Medical School, educators recognized this opportunity and designed a novel pre-clinical course to “enhance medical students’ diagnostic acumen by expanding their visual skills” (Naghshineh et al., 2008). The Harvard program involved three main components: (1) close observation and guided discussion of visual art, (2) exploration of core artistic concepts, and (3) opportunity to apply these skills to the clinical assessment of patients with a broad range of disorders. In its first year, 58 medical students participated in the 9-week program. Both qualitative and quantitative findings from a study of the program suggest that “observation skills, including those directly relevant to clinical medicine, can be successfully acquired through active, structured study of works of art and medical imagery... an interdisciplinary course developing visual literacy can expand medical students’ observational acumen and diagnostic capabilities” (996). The Weill Cornell Medical College in New York City conducted a series of sessions at The Frick Collection art museum in which medical students developed skills in observation and description by examining portraits and then applying these skills when observing patients’ faces. Pre- and post-testing found that students’ comments shifted from external, objective features to being more precise, and emotionally referenced following the intervention (Bardes et. al, 2001). Around the same time, the Yale School of Medicine collaborated with the Yale Centre for British Art (YCBA) in organizing guided observation and description sessions for first year medical students. Randomized control findings over two years showed that students who participated in the YCBA sessions identified more details in photographs of patients with medical disorders (Dolev et. al, 2001). At the University of Cincinnati, medical student teaching sessions at the Cincinnati Art Museum were paired with sessions spent observing family physicians in their clinics in order to improve communication and observation skills used in the patient-doctor relationship. Themes from two-year follow-up surveys of participating students included: (1) enhanced awareness of physician biases and understanding of the doctor-patient relationship, and (2) improved observational, non-verbal, and verbal communication skills (Elder, et. al., 2006).

In 2010, a small group of medical students initiated the idea of organizing a tour of the Art Gallery of Alberta (AGA). They approached the faculty’s Arts & Humanities in Health & Medicine (AHHM) program, which agreed to sponsor the tour. Over the past four years, the AHHM program and AHHM student representatives have collaborated with museum educators at the AGA in developing an annual co-curricular visual literacy training program that combines structured teaching, a gallery tour, observation and drawing exercises, and group discussions aimed at enhancing visual literacy, interpretation, and communication over a 3-4 hour period. By design, the teaching approach is active, engaged and collaborative. Art educators teach participants the use of four “frames of looking” including:
The number of student participants has expanded from 10 participants to almost 30. For the past two years, enrolment has been limited to 30 participants, which has primarily included first and second year medical students who have participated in the visual literacy program as a 4-hour elective. Student feedback on the program has been very positive. When asked how they think the study of arts impacts their training as health professionals, students have offered the following comments:

**I think the questions some artists raise are important in appreciating the heterogeneity of patient values and experiences.** - 1st year medical student

**[The study of arts] helps me better understand the stories and social context of my patients.** - 3rd year medical student

In 2013 we conducted a scoping review of the literature on visual literacy training for students in the health professions as we considered different ways we might enhance this educational offering (Brett-MacLean, et al, 2013). This review, along with feedback offered by students from year to year, has offered ideas for future expansion. Suggestions we have considered have encompassed including more structured exercises focused on “training the eye” as well as including a clinical component, such as drawing patients after a clinical encounter. Our review of the literature has also suggested that a more indepth and longer program may be required in order to effect measurable skill development among participants. Several programs span the course of a few months, and have separate sessions or workshops with a particular skill, such as observation, description, or interpretation, being emphasized each session. The initial phase of this student-inspired educational offering has provided us with an opportunity to gain experience in visual thinking pedagogies. Based on our experience and review, we have developed an enhanced range of options (4-, 8- and 12-hours) for engaging in “The Art of Observation: Learning to See and ‘Rounding’ at the Art Gallery of Alberta” elective. This enhanced elective includes both required and optional arts-related experiences which provide a variety of opportunities for medical students to actively develop their appreciation of, and abilities related to, the visual interpretive dimensions of clinical medicine.

This elective has been organized to provide an opportunity for students to enhance their awareness of, and challenge, their habitual orientation and assumptions related to the visual domain that are relevant in medical contexts, including differences that exist between “looking” and processes of “seeing.” It is directed towards developing a heightened visual reflexivity that can lead to new ways of perceiving and interpreting visual information, and, as future health care practitioners, promote an “open and alert” approach to the needs of patients and their families.

As part of our expanded elective, students will attend a presentation on “Ways of Seeing” prior to attending the AGA visual literacy tour which will continue to include observation and drawing exercises. Students may also choose to complete one or both of the following optional elective components: 1) attend two lectures related to art, culture and the body, and participate in a follow-up group discussion (4 hours); and, or 2) draw a portrait of a patient when co-visiting with patients on the dialysis unit at the University of Alberta Hospital with an Artist on the Wards, write a short personal reflection on the experience, and participate in an individual or group debriefing discussion to reflect on the experience (4 hours).

With a strong body of literature supporting the value of visual literacy training for medical learners, and the emphasis on observation as a key aptitude for clinical encounters, it follows that an elective of this kind has a place in medical education at the University of Alberta. The Arts & Humanities in Health & Medicine Program continues to pioneer this initiative, in collaboration with students, working to ensure that current and future students have opportunities to access and engage in a rich and diverse range of learning opportunities as part of their undergraduate medical education.

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Navigating the Career Landscape: A Pilot Mentorship Program for Early Career Global Health Researchers

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ABSTRACT

**Background:** The multidisciplinary background of professionals in global health creates a complex career landscape. While established pathways for knowledge development exist, lack of support through mentorship and creation of safe spaces in helping navigate this landscape continues to present challenges to those starting their careers.

**Objective:** To evaluate the provision of group career mentorship on key areas relevant to academic careers for early career global health researchers, specifically postdoctoral fellows and junior faculty.

**Methods:** We conducted an email survey among potential participants seeking open-ended responses to questions regarding expectations, objectives and potential interest in a mentorship program. Based on topic interest and process preference, we designed a set of monthly, 1.5-hour sessions from January to June 2012 with topics of discussion on networking, ‘grantspersonship’, research implementation and management, writing, and career planning. All sessions were delivered face-to-face with exception of Skype participation by one mentor from Australia. We made notes during and after the sessions to capture verbal feedback. Additionally, we used surveys with a 5-point Likert scale (1=not helpful; 5=very helpful) and open-ended questions to gather post-session feedback on resources, presentation, facilitation, group process and closure.

**Results:** 15 needs assessment survey respondents expressed interest in the program. Across sessions, participation ranged from 6 to 9 persons; average attendance per participant was 3 sessions. Session notes and narrative feedback included overwhelmingly positive responses on “diversity in experiences”, “opportunity to form networks”, “getting inspired”, “being prompted to think differently” and “greatly learned from discussion of technical and practical tips”. Quantitative results revealed scores ranging from 2-5, with overall mean greater than 4 across all items.

**Conclusion:** This academic health sciences mentorship program not only responded to mentee needs for networking and guidance, but also addressed the need for social support. This work has implications for fostering innovative approaches to the challenges experienced by early career global health researchers.

**Keywords:** Mentorship, global health, researchers, early-career

INTRODUCTION

Training programs for early career global health researchers are often centered on the explicit goal of developing knowledge and skills in the field. Research completed as part of a graduate program can be a significant contributor to ones understanding of global health principles, especially when appropriate support is available to students choosing to pursue this discipline. This support is often provided in the form of education, research opportunities and funding that assists with expansion of capacities in knowledge translation, research and advocacy.

Mentorship, often overlooked, is a key-supporting tool that helps train early career global health researchers to excel in their careers within and beyond academia. Defined as a process designed to bridge gap between education and real world experience, mentorship provides pathway for individuals equipped with diverse skills, knowledge and capacities, to provide young adults with career enhancing functions. Delivered through coaching or sponsorship, it facilitates ones exposure and offers challenging work, all of which help the mentee to prepare for advancement. Studies on mentorship have shown that in addition to improved knowledge, professional connections and resources, mentoring results in an increase in scholarly productivity. This form of support hence, can particularly play a significant role in training post-doctoral fellows and junior faculty pursuing academic careers in global health.

Mentorship programs for early-career researchers conventionally come in two forms: 1) Structured/formal or 2) Unstructured/informal. The former type of mentorship involves formal pairing of a mentor and mentee based on learning interests and topic-centered discussions led by a mentor. Building this connection requires organized leadership, investment of resources, planned materials for execution and facilitation, and timely evaluation. The latter type of mentorship on the other hand, is frequently a result of chance or serendipity where the relationship largely goes unevaluated and anticipates success by shared standards.

While opportunities for unstructured mentorship, albeit concealed from scientific research, exists; development of structured global health mentorship opportunities is often hampered by several challenges. Given the heterogeneous nature of professionals pursuing this field, there is no one “recipe” for success in academia. Frequently, hurdles are subjective or limited to one’s institutional setting hindering provision of social support. Finally, lack of educational resources, trained faculty and institutional support prevents mentorship from advancing in the education curriculum. Recognizing these challenges and the role of mentoring in building research, leadership and sustainable capacity into training global health researchers, the Canadian Coalition of Global Health Research started the mentorship initiative promoting innovative approaches of mentoring in global health.
The Pilot Mentorship Program for Early Career Global Health Researchers at University of Toronto (UT) was developed as part of this initiative towards prioritizing leadership development in global health research. Specifically, this program presents an innovative approach to creating a structured mentorship in providing post-doctoral fellows and junior faculty with group career mentorship on key areas relevant to academic careers in global health. This paper will summarize the methods, tools and key results of the program.

MATERIALS AND METHODS

NEEDS ASSESSMENT

An email survey seeking open-ended, qualitative responses was conducted among potential participants (mentees) and senior or mid-career researchers for availability and interest in mentorship, who were recognized apriori through networking. In parallel to the needs assessment, we informally lobbied and recruited participation from within and beyond the Dalla Lana School of Public Health (ex-Department of Physical Therapy, Munk School of Global Affairs, George Institute at the University of Sydney etc). Most participants were recognized by Head of the Global Health Division at the DLSPH who is also an established educator and researcher, an informal mentor to doctoral students at the University of Toronto, and the supervising lead of the project. Others were referred by his contacts. The survey included questions regarding expectations, objectives, delivery and potential interest to the mentorship program (Figure 1). Additionally, survey respondents’ availabilities and time commitment to the program were obtained and they were made aware that participation in the program was voluntary with provision of no compensation.

SESSIONS AND CONSULTATIONS

Needs assessment quantitative results were aggregated using a spreadsheet. Session content input was analyzed for common themes, reflected in the final sessions chosen. For logistic aspects, we sought overlapping availabilities to design a set of monthly, 1.5 hour, late afternoon, face-to-face sessions from January to June 2012. The sessions were conducted at the Global Health Division, Dalla Lana School of Public Health, UT. Topics covered by the pilot program included networking, “grantspersonship”, research implementation and management, writing and, career planning. In addition to sessions, participants with technical learning needs were provided with one-on-one consultation under the leadership of a mentor on epidemiological design and statistical analysis.

LOGISTICS AND DELIVERY

Prior to session delivery, mentor speakers prepared a pre-session overview stating objectives, preparation (if applicable), an agenda and suggested resources on the topic. This overview was emailed out to all the participants.

The sessions were delivered face-to-face to facilitate active engagement and discussion. Given the nature of work in global health, accommodation for speakers and mentees joining from distance or in transit was made through Skype or teleconference. In addition to sporadic distance participation, one mentor joined via Skype from Australia throughout the duration of the program.

To allow for future reference, continued discussion and facilitated learning of those unable to join, all presentations, relevant documents and resources were shared with the group via DropBox.

FEEDBACK

Sessions were concluded with a 5-minute period allotted for gathering verbal feedback accessible to the mentor. Additionally, formal post-session feedback was obtained through forms distributed either as hard copy at the end of the session or electronically via Survey Monkey. The forms included 5-point Likert scale (1= Not helpful at all; 5= Very helpful to my learning) for rating the quality of resources, presentation, facilitation, group process and closure. Additionally, open-ended questions seeking thoughts on the program and suggestions for future direction were obtained. A copy of the Post-Session Feedback survey used in the program can be found in Figure 2. In addition to formal feedback, verbal feedback made during and after the sessions was recorded in notes to capture conversation trends.

RESULTS

15 participants responded to the mass disseminated email survey on needs assessment and expressed interest in the program, at the UT. Given the qualitative nature of open-ended questions, responses were diverse in length and content, and were analyzed by topic (Table 1).

Across sessions, participation rate ranged from 6 to 9 subjects, all affiliated with the University of Toronto with 3 post-doctoral fellows and 8 junior faculties. The multidisciplinary cohort of participants comprised of professionals from Medicine, Business, Epidemiology and Law with overlapping careers in global health, thus adding unique insights and experiences to discussions. For purposes of analysis, adequate participation was defined as at least 2/5 monthly sessions attended. Using this criterion, 3 out of 15 participants were removed from analysis. The average participation rate per participant was 3 sessions.

The results obtained through formal and verbal feedback were qualitative and quantitative in nature. The qualitative results obtained from open ended questions in the post-session survey showed overwhelmingly positive responses on “diversity in experiences”, “opportunity to form networks”, “getting inspired”, “be prompted to think differently” and “greatly learned from discussion of technical and practical tips”. The participants also expressed their interest in continuing the group mentorship process on a bimonthly basis following the program. Key qualitative results from the session notes and the feedback forms are summarized and presented in Table 2.

The quantitative results of the ratings consistently ranged from 2-5 across distinct sessions with an overall mean of 4.64 across all measures (Table 3). Participants highly rated the program sessions on facilitating group process (score = 4.78) followed by greater sense of closure and directions (score = 4.73). On the delivery front, participants rated quality of facilitation the highest (score = 4.67), followed by presentation (score = 4.44) and finally by prior resource materials (score = 4.17). These results were consistent with qualitative results.

DISCUSSION

There is an increasing interest among professionals to pursue research careers in global health. Tools necessary for research pursuits include advance degrees and training in epidemiology, biostatistics and ethics that may be obtained through graduate-level course work. Educational training however, does not alone adequately train early career researchers. Increase in academic rigor of programming, fostering sustainable site partnerships and, encouraging mentorship and reflection for the mentees are key to their career development. The pilot mentorship program in global health at UT in culmination with the formal learning opportunities, demonstrated these principles in action. Similar initiative in global health education echoed our findings that learning opportunities such as practical skills sessions, participatory and multidisciplinary teaching methods, and mentorship opportunities are particularly appreciated by the students. 


Despite positive findings, there were limitations in this program. Informal recruitment of participants through a common source could result in in-group bias. Additionally, existence of a prior mentorship relationship among some participants meant that results could be different than for a group of participants entirely unknown to each other. Finally, the frequency and duration of the sessions was primarily based on participant preferences and not, scientific evidence of the relative effectiveness of different durations.

CONCLUSION AND RECOMMENDATIONS
The literature review suggests that “complemen
tarity of needs solidifies a mentor relation
ship during the initiation phase, and propels
it forward to the cultivation phase when the
range of functions provided by the relation
ship expands to its maximum”.

This pilot program thus served as an initiation phase for this cohort of participants by providing platform for recognizing shared needs and for obtaining social support through facilitation of dialogue among peers and colleagues. Additionally, results support sustainability of the program and scope for further mentorship in additional seminar topics inspired (Table 2). The progression of relationships and ideas thus indicates bright prospects for development of mentorship into the cultivation phase. In summary, the group mentorship program shows promise as means of responding to the need for networking, guidance and support of early global health researchers. Further work could improve rigor through more fully resourced needs assessment and evaluation designs.

Although larger feedback data is required to obtain conclusive and generalizable results, the qualitative feedback indicated that smaller group size allowed for engaging conversations and fostered a safe space for social support. Innovative mentorship approaches capturing benefits of one-on-one consultation combined with that of group mentorship, as in our approach, show promise. However, they are an understudied approach and more work is required on these types of programs. There is scope for future work using more comparative study designs e.g. comparing post-mentorship program measures vs. pre-programme measures, or including a waitlist comparison group.

ACKNOWLEDGEMENTS
We would like to extend our sincere thanks to Elayna Fermes for her administrative assistance and Vic Neufield for his insightful and thoughtful support to this program. Finally, we thank all the participants for sharing their experiences, expertise and feedback.

References

Program took place at: Dalla Lana School of Public Health, University of Toronto, Global Health Division, Health Sciences Building, 155 College St. Toronto, ON M5T3M7
Correspondence to Shweta Dhawan: University of Alberta School of Public Health, 3-300 Edmonton Clinic Health Academy, 11405- 87 Ave, Edmonton, AB T6G 0X6, Canada; E-mail: s.dhawan@ualberta.ca
### Table 1: Summary of results from Needs Assessment

<table>
<thead>
<tr>
<th>Question Topic</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Areas of interest to be mentored in</td>
<td>• Networking and funding opportunities</td>
</tr>
<tr>
<td></td>
<td>• Developing grant proposals</td>
</tr>
<tr>
<td></td>
<td>• Time management</td>
</tr>
<tr>
<td></td>
<td>• Writing and operating grant applications</td>
</tr>
<tr>
<td></td>
<td>• Mentoring in advances statistics and epidemiology</td>
</tr>
<tr>
<td>Mentoring Objectives</td>
<td>• Getting tenured</td>
</tr>
<tr>
<td></td>
<td>• Improving methodology skills</td>
</tr>
<tr>
<td></td>
<td>• Building a career in global health</td>
</tr>
<tr>
<td></td>
<td>• Publishing peer reviewed papers</td>
</tr>
<tr>
<td></td>
<td>• Understanding workings of Canadian funding agencies</td>
</tr>
<tr>
<td>Helpful process in mentorship</td>
<td>• Topic oriented sessions</td>
</tr>
<tr>
<td></td>
<td>• Putting together a grant</td>
</tr>
<tr>
<td></td>
<td>• Peer review workshops</td>
</tr>
<tr>
<td>Helpful Resources</td>
<td>• Dropbox</td>
</tr>
<tr>
<td></td>
<td>• Skype</td>
</tr>
<tr>
<td></td>
<td>• Access to databases and full-text literature sources</td>
</tr>
<tr>
<td></td>
<td>• PDFs of articles for discussion</td>
</tr>
<tr>
<td>Logistics of the session</td>
<td>• Time span ranging from 60-90 minutes</td>
</tr>
<tr>
<td></td>
<td>• Monthly sessions</td>
</tr>
<tr>
<td></td>
<td>• Late afternoon or evenings</td>
</tr>
</tbody>
</table>

### Table 2: Summary of qualitative responses obtained from Post-Session Feedback Forms and Session Notes

<table>
<thead>
<tr>
<th>Session Topic</th>
<th>Feedback Summary</th>
<th>Additional Seminar Topics Inspired</th>
</tr>
</thead>
<tbody>
<tr>
<td>Networking</td>
<td>• Great discussion around networks and how networks form.</td>
<td>• Discuss Strategic Networking.</td>
</tr>
<tr>
<td></td>
<td>• Interesting to meet new people and get an opportunity to make networks.</td>
<td>• Overcoming barriers to working with others. Ex- lack of time to go to events.</td>
</tr>
<tr>
<td></td>
<td>• Enjoyed the “layout”.</td>
<td></td>
</tr>
<tr>
<td>Grantspersonship</td>
<td>• Great tips.</td>
<td>• An opportunity to discuss logistics of grants (funding, data etc.)</td>
</tr>
<tr>
<td></td>
<td>• Good to hear about other people’s “journeys”.</td>
<td>• Case discussions and mock grant review.</td>
</tr>
<tr>
<td></td>
<td>• Found information of CIHR helpful.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Enjoyed meeting other researchers.</td>
<td></td>
</tr>
<tr>
<td>Research Implementation and Management</td>
<td>• Really great discussion of technical aspects and tips re: practical settings</td>
<td>• Specific discussion re: program logic model development and use.</td>
</tr>
<tr>
<td></td>
<td>• Very well organized and practical</td>
<td>• Scheduling tips.</td>
</tr>
<tr>
<td>Writing and Publication</td>
<td>• Other people's opinions about publication planning</td>
<td>• Collaborative writing.</td>
</tr>
<tr>
<td></td>
<td>• H-index discussion, resources.</td>
<td>• Building teams.</td>
</tr>
<tr>
<td></td>
<td>• A reminder about keeping my eye on the prize i.e. publication.</td>
<td>• Pragmatic guidance on how to structure your week around writing</td>
</tr>
<tr>
<td>Career and Long Term Research Planning</td>
<td>• Good to hear about personal life stories.</td>
<td>• Continue conducting these sessions.</td>
</tr>
<tr>
<td></td>
<td>• Great tips on how to balance personal and professional life.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Interesting discussion about managing career transitions.</td>
<td></td>
</tr>
</tbody>
</table>
Table 3: Quantitative results from post-session feedback

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Prior resource materials</th>
<th>Presentation</th>
<th>Facilitation</th>
<th>Group-process</th>
<th>Closure and directions</th>
<th>Overall rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of responses</td>
<td>17</td>
<td>17</td>
<td>17</td>
<td>17</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>obtained</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average score (Likert scale 1, not helpful at all to 5, very helpful for my learning)</td>
<td>4.17</td>
<td>4.44</td>
<td>4.67</td>
<td>4.78</td>
<td>4.73</td>
<td>4.64</td>
</tr>
</tbody>
</table>

Figure 1: Email Survey for needs assessment

**University of Toronto Pilot Mentorship Program in Global Health**

*Needs Assessment Survey*

1. In what areas would you be interested in being mentored? E.g. networking with other Toronto or Canada based colleagues, making time to write, developing grant proposals.
2. Are there particular mentoring objectives you have?
3. What kind of process would be most helpful to you in this mentorship? E.g. topic oriented sessions, working project-paper oriented sessions.
4. What resources would be helpful for the above? E.g. PDFs of articles, websites, Skype conversation with resource people.
5. How long should sessions be? When is the best time of day? Any days to avoid?
6. Anything else that might help us plan?

FOR SENIOR FACULTY:

7. Any other potential mentors (and their contact information) that you would suggest?

Figure 2: Post-Session Feedback Survey Form

**Global Health Research UofToronto Mentorship Feedback Form**

1. In today’s session, what did you find interesting and helpful to your career development?

2. What would you like to see improved for future seminars?

3. In particular rate and comment upon each of the following using this scale for each of the presenters:
   - 1 - Not at all helpful
   - 3 - Equivocal
   - 5 - Very helpful to my learning

<table>
<thead>
<tr>
<th>Objectives (clarity, relevance...)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior resource materials (pertinence, rigour...)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presentation (clarity, detail, creativity, duration...)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilitation (clarity, detail, creativity, duration...)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Group process (supportive, engaged, critical insights shared...)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closure and directions (carried out, relevance...)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall rating</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Comments

4. What additional seminar topics has this session inspired?
The Application of Stigmatization and Fear Tactics in a Childhood Obesity Campaign: An Inappropriate Means to Prevention

Jillian L.S. Avis, BA. PhD Candidate, Department of Pediatrics, Faculty of Medicine & Dentistry, University of Alberta, Edmonton, AB

OBJECTIVE

Media is communicated through many forms (e.g., the Internet, print, radio, social media, television) and is used for a variety of purposes, including advertising, entertainment, and news. The media plays a particularly vital role in the distribution and uptake of health-related information as many individuals acquire this information from media sources. To understand and interpret educational health campaigns in the media, theoretical frameworks can be useful tools to apply. In this paper, communication theory will be used as an instrument to critically analyze a childhood obesity campaign, and theoretical components at both the micro- and macro-level will be explored.

THE ISSUE: CHILDHOOD OBESITY

Childhood obesity is an urgent public health issue. Approximately one-third of Canadian children are overweight or obese, and the proportion of children classified as such has more than doubled over the past twenty-five years. Due to the high likelihood that obesity will persist into adulthood, children with obesity are at increased risk for developing type 2 diabetes, coronary heart disease, hypertension, and other cardiometabolic illnesses. Additionally, childhood obesity has negative consequences in the short-term including physical functioning and psychosocial health.

Childhood obesity has a multifaceted etiology, and studies have highlighted the complex genetic, hormonal, perinatal, psychological, and social origins associated with the disease. Researchers have found both powerful predictors of childhood obesity, such as maternal obesity, and factors of less predictive strength including gestational weight gain, weight gain in early infancy, and maternal smoking during pregnancy. In addition to obesity's composite origins, several environmental factors are associated with obesity in children; in recent years, the proliferation of online technology coupled with the wide availability of inexpensive and highly palatable foods have contributed to an obesogenic environment that implicitly encourages sedentary behaviour whilst reinforcing unhealthy dietary habits in youth. Consistent with such pervasive environmental influences, it is not surprising that overweight and obese children exhibit sub-optimal lifestyle behaviours. Research has shown the majority of overweight children referred for pediatric weight management do not meet dietary or physical activity recommendations, with less than 15% of participants meeting guidelines for daily fruit and vegetable intake, and only 7% satisfying the daily threshold for moderate-to-vigorous activity.

Despite evidence which has chronicled obesity's complex etiology rooted in both biological and environmental origins, to date, the media has often portrayed childhood obesity in a biased manner. Contributing to this mis-representation of obesity is the depiction of stereotypical substandard lifestyle behaviours (e.g., lack of physical activity, overeating), an overemphasis on parental responsibility, and a reinforced association between social desirability and physical thinness. Consequently, many members in society believe that children with obesity just need to eat less and move more, an adage that undermines the complexity of obesity and is akin to suggesting a person with depression just needs to cheer up, which is the equivalent in terms of lack of understanding and empathy. Taken together, the media's biased representation of obesity has supported the perpetuation of an overly simplistic, subjective understanding of this complex disease.

GEORGIA'S CHILDHOOD OBESITY CAMPAIGN

According to the Centers for Disease Control and Prevention (CDC) based in the United States, approximately one-third of American children are overweight or obese, and the state of Georgia represents no exception. In 2011, in response to one of the highest rates of childhood obesity in North America, Georgia launched a multimillion dollar campaign entitled Strong4Life. A sample of messages from the campaign is shown in Figure 1; advertisements used billboard, print, and television. Target recipients of this campaign included caregivers, particularly parents, and the advertisements communicated various causes and consequences of childhood obesity whilst highlighting parent's responsibility for children's weight status. Messages of obesity causes related to children's suboptimal dietary habits, and messages of obesity consequences included adverse psychosocial impacts, risk of obesity in adulthood, risk of adverse events in the long-term (e.g., cardiovascular disease, diabetes, depression), and reduced lifespan and quality of life.

![Figure 1. A sample of messages from the Strong4Life campaign.](https://example.com/fig1)

**WARNING:**

…Chubby kids may not outlive their parents."

…Fat kids become fat adults."

…Big bones didn’t make me this way. Big meals did."

…He has his father’s eyes, his laugh, and maybe even his diabetes."

…Fat prevention begins at home and the buffet line."

…My fat may be funny to you but it’s killing me."

COMMUNICATION THEORY

Communication occurs via an array of media, and the twenty-first century has been characterized by an increasing use of innovative and online forms, especially for health information. Communication does not occur in isolation, and rather entails dynamic, complex processes at and between individuals, groups, organizations, and society. At all levels, the following components are pivotal to the communication process: the sender or information source (encodes and transmits information), the message (content), the medium or channel (means of message transmission), the audience (receives and decodes information), and the effect (impact and outcome of the message). Figure 2 demonstrates the Shannon-Weaver model of communication, which is used to represent this communication process. In this model, noise refers to factors that potentially interfere with accurate message dissemination (e.g., static on the radio), and in updated versions, feedback...
accounts for the adjustment of messages by producers and senders in response to receivers’ reactions and responses. Although the Shannon-Weaver model has formed the foundation of communication theories to date, limitations include its simplicity and lack of accountability for bidirectional influences.

Though no single, coherent models exist, frameworks in communication theory encapsulate the idea of information flow and interaction. Deriving concepts from political science, psychology, and sociology, such theories have framed analyses from “micro” to “macro” levels, representing small- (e.g., communication between individuals) to large-scale (e.g., communication between groups and organizations) processes, respectively. To date, research using both frameworks has investigated two main areas – message production, which refers to the production of media content as determined by societal and organizational factors, and its counterpart, media effects, which refers to the translation and dissemination of media, and how it affects individuals, groups, institutions, and/or communities. At the micro-level, theories (e.g., elaboration likelihood model and social cognitive theory) explain media effects on individual information processing and how this leads to behaviour change. At the macro-level, theories focus on implications to public health and social change, and include the knowledge gap (a model which addresses the unequal distribution of knowledge across the population), agenda setting (a mechanism which implies a strong correlation between salience of topics in the media and the importance society places on such topics), and cultivation analysis (the study of biased representations in the media and receiver’s perceptions of reality).

**THEMES OF ANALYSIS**

Message Production. Message producers are powerful actors in the communication process as they specify what information is brought to the public and encode and transmit this information, which is not often devoid of subjectivity. In Georgia’s campaign, advertisement messages would likely have differed dramatically if message producers were government officials or multidisciplinary healthcare clinicians; while message producers in government may have highlighted economic and societal consequences of childhood obesity, clinicians may have focused on children’s quality of life and long-term health outcomes. The Strong4Life campaign was developed by the Children’s Healthcare of Atlanta, led by business-oriented directors and multidisciplinary clinicians, the former consistent with the campaign’s focus on parental responsibility, and the latter with messages pertaining to long-term health outcomes and risk of premature mortality.

Modeled after conventional anti-smoking campaigns, using fear tactics and an aggressive, high-intensity fear appeal, Georgia’s anti-obesity campaign was not well-received by the public. Two factors contributed to the campaign’s fruitless message production: first, the message ignored childhood obesity factors not under volitional control (e.g., epigenetic influences, hormonal factors, genetic predispositions) which contributed to the shame and blame attitude toward parents of obese children. Second, producers of this message focused on only one lifestyle behaviour associated with childhood obesity (diet) and disregarded well-established obesity-related behaviours (e.g., physical activity, sedentary living, sleep). Such a heavy emphasis on dietary behaviour overshadows obesity’s multifaceted etiology despite that high-quality studies and reviews have demonstrated the complex biological, epigenetic, hormonal, psychological, and social origins of obesity. Taken together, although the campaign intended to communicate a pithy and powerful message, the result was a subjective and biased representation of obesity.

Framing. Framing refers to the processes by which message producers conceptualize an issue, in which positive outcomes are associated with either enacting a healthy behaviour or abstaining from an unhealthy behaviour; issues may be ‘gain-framed’, in which negative outcomes are associated with either enacting an unhealthy behaviour or abstaining from a healthy behaviour. Gain-framed messages are best suited to increase preventative behaviours (e.g., condom use, sunscreen use) and restorative behaviours (e.g., medication use), and loss-framed messages are most effective to motivate detection and screening (e.g., HIV testing, cancer screening). Georgia’s campaign utilized a loss-framed message, in which youth were depicted as at risk for a variety of imminent and long-term adverse events by enacting stereotypical obesogenic behaviours (e.g., overindulging at the buffet, eating big meals). Messages demonstrating the loss-frame include, “fat kids become fat adults”, “chubby kids may not outlive their parents”, and “obese kids are a good bet for type 2 diabetes” (Figure 1).

Georgia’s campaign highlighted the causes of childhood obesity using an individual and family responsibility frame, and in doing so, broader social-ecological influences of obesity were disregarded. Consequently, children’s overweight status was largely attributed to parental and family factors, implying that healthy behaviour change is controllable within the home environment. By framing in this manner, accountability is displaced away from society whilst reinforcing public misperception that childhood obesity is a shameful condition that arises due to lack of parental and individual discipline. In response, researchers have advocated for a shift toward shared responsibility of obesity. By reframing childhood obesity accordingly, public support for government-level interventions may be prompted.

In addition to the advertisement’s loss-frame, Georgia’s campaign did not provide parents with clear, explicit recommendations on how to improve children’s obesogenic lifestyle behaviours. Consistent with theories that emphasize emotions and coping responses (e.g., protection-motivation theory [PMT]), it is imperative for fear-appeal messages to provide recipients with clear guidance on how to plan or take action. According to Witte and Allen (2000), fear appeals tend to produce two effects amongst receivers – threat perception associated with a specific behaviour and...
perception of control to reduce this threat. Thus, in order to be effective, messages using fear appeals need to provide the receiver with explicit resources and direction to protect against the threat. Accompanied by a lack of clear recommendations for healthy behaviour change, fear appeal messages (e.g., “big bones didn’t make me this way, big meals did”) can potentially distress the receiver and produce maladaptive coping responses; when means to facilitate the coping response are not apparent, receivers may engage in activities that either exacerbate current behaviours (e.g., parents increase emotional eating, a behaviour potentially modeled by children) or reduce fear without actually addressing the specific threat (e.g., ignoring the adverse outcomes of obesity in children)\textsuperscript{32}.  

Media Effects at the Micro-Level. In considering media effects, which refers to the outcomes of media exposure on individuals, groups, organizations, and society, Georgia’s campaign created controversy and debate among parents and health experts alike. A preliminary analysis of the campaign reveals three factors that contributed to the campaign’s undesirable media effects at the micro-level: first, the advertisements portrayed unhappy, sullen, and lifeless-looking children, and unsurprisingly, parents did not respond favorably to such morose representations of children, particularly when marketed as a ‘warning’. Second, all advertisements were in black-and-white with colour used solely for red warning labels, ultimately facilitating receiver’s processing of this urgent, startling message. Lastly, the messages included negative, emotionally-charged words, such as fat, obese, and chubby, and research has shown that parents believe such terms stereotype their children\textsuperscript{33}; rather, parents prefer terminology that is neutral and non-judgmental (e.g., heavy or unhealthy weight)\textsuperscript{33}.  

MEDIA EFFECTS AT THE MACRO-LEVEL  
Knowledge Gap. To date, research has shown that public knowledge of different areas, such as healthy lifestyle behaviours for children, is not equally distributed across the population\textsuperscript{18}. Knowledge distribution and uptake across the population is positively associated with socioeconomic status (SES); according to the knowledge gap hypothesis\textsuperscript{34}, higher SES groups are more likely to benefit from the flow of information (Figure 2) in society in comparison to lower SES groups. In a recent study, Kim et al.\textsuperscript{35} found that of families with overweight or obese children in the lower-income bracket, mothers tended to be heavier and children tended to have lower self-esteem and more depressive symptoms compared to their middle- to high-income bracket counterparts. Furthermore, suboptimal lifestyle behaviours relating to diet and television watching were more prevalent among overweight children whose parents’ had lower levels of education and were in the lower income bracket\textsuperscript{35}. It is not surprising that such disparity is mimicked by parental misperceptions of children’s weight status (communicated by Georgia’s campaign video entitled, “Why am I fat?”); studies have found that lower parental education and household income are significantly correlated to parent’s underestimation of obese children’s weight status\textsuperscript{36,37}.  

Georgia’s campaign attempted to bring awareness to parental misperception of children’s weight status (“75% of Georgia parents with overweight kids don’t recognize the problem”). This printed message, however, may not have been interpreted and used by the group it intended to target, as groups that obtain information from printed mediums are more likely to have formal education in comparison to nonreaders\textsuperscript{18}. Additionally, lower SES groups are more likely to exhibit levels of motivation and interest in specific areas (e.g., improving lifestyle behaviours that is subpar to mid- and high-SES groups\textsuperscript{38}. Taken together, both reasons suggest that the advertisement might have reached a smaller proportion of lower SES parents in comparison to middle and high-SES parents, and of those parents reached, only a segment may have been sufficiently motivated to improve their children’s lifestyle behaviours. Theoretically, to attenuate the potentially low uptake of Georgia’s message by lower SES groups, the campaign should have provided information and strengthened receiver’s perceived ability, motivation, and self-efficacy\textsuperscript{39}. To strengthen self-efficacy and skill development, the campaign could have employed modeling or vicarious performance (e.g., self-instructed performance of a parent cooking a simple, healthy breakfast for their children), or measures to reduce emotional arousal (e.g., provide parents with resources to mitigate stress)\textsuperscript{40}.  

Agenda Setting & Cultivation Analysis. As the prevalence of childhood obesity has increased substantially over the past twenty-five years, media coverage of the causes and consequences of obesity has grown proportionately. Consistent with the agenda-setting theory\textsuperscript{21}, childhood obesity is a salient topic in the media and in turn, many have come to regard this topic as important and worth considering. To date, obesity advertisements contributing to this dominance in the media have used gain-frames, demonstrating the benefits of children’s healthy lifestyle behaviors. Despite this, childhood obesity rates have steadily increased. In response, Georgia’s campaign took an aggressive, loss-framed response to shock and attenuate complacency among message receivers, particularly parents. Arguably, such an approach halted the public’s habituation to positive-framed messages regarding childhood obesity; however, this extreme approach placed blame on parents while leaving them unarmed in the fight against childhood obesity.  

Along with salience in the media, stigmatization towards overweight and obese individuals is increasingly common\textsuperscript{41}. Results from an analysis of printed media revealed that attributing negative characteristics to overweight people, exhibiting extreme characteristics of individual cases, and holding individuals responsible for unsuccessful weight management have contributed to the stigmatization of obesity\textsuperscript{42}. The macro-level theory of cultivation analysis\textsuperscript{13} may help to explain why society tends to view obesity as a disease caused by overindulgence and lack of self-control. As media coverage tends to focus on individualistic obesogenic factors that contribute to childhood obesity, this fosters biased societal perceptions. As demonstrated by Georgia’s campaign, although communication of the consequences associated with childhood obesity was relatively accurate and encompassing, the campaign focused on only one contributor to obesity – diet – and disregarded hormonal, social, psychological, genetic, and epigenetic origins of obesity. Such a narrow focus on obesity aids in perpetuating a simplistic, subjective understanding of a complex disease.

CONCLUDING REMARKS  
Utilizing aggressive, loss-framed messages, Georgia’s childhood obesity campaign mimicked conventional, anti-smoking advertisements typically used to shock the receiver. Emotionally-charged messages were not accompanied by explicit recommendations for parents to feasibly improve children’s lifestyle behaviours, and efforts to strengthen receiver’s self-efficacy were not employed. Consistent with the public’s reaction to the advertisements, the campaign was unsuccessful in encouraging healthy behaviour change among Georgian families.  

Despite the increasing prevalence of childhood obesity across North America, message
producers need to be cognizant of empirically-supported factors that may facilitate parents in the uptake of healthy lifestyle behaviours for children. For example, in contrast to Georgia’s campaign, parents may have responded more favorably to non-judgmental advertisements with neutral terminology and a friendly aesthetic appeal. Although not recommended, if childhood obesity advertisements are loss-framed as opposed to gain-framed, it is crucial to provide receivers with information and clear recommendations and appropriate resources as to how the perceived threat can be reduced. Such messages also need to reinforce receiver’s self-efficacy to perform the behavior. Lastly, as the coverage of childhood obesity continues to increase in the media, a more holistic approach is warranted; a vast body of literature has demonstrated obesity’s composite origins, and message producers need to communicate this information in a more unbiased, objective manner via media accessible and available to a wide array of groups in the population.

References
Challenges and Strategies in the Recruitment of Participants for Qualitative Research

Mandy M. Archibald, RN, PhD Candidate. Faculty of Nursing, University of Alberta
Sarah E.P. Munce, MSc, PhD. Rehabilitation Sciences, University of Toronto

ABSTRACT
Participant recruitment for qualitative research is often the most challenging and resource-intensive aspect of a study. Despite this, recruitment is frequently left to inexperienced researchers and associated details are inconsistently reported in the health literature. This negatively impacts recruitment because few benchmarks exist to estimate resources required for successful participant recruitment. In response to these limitations, we identify (i) considerations in recruiting participants for qualitative research; (ii) strategies to facilitate recruitment, and (iii) suggest guidelines for reporting of recruitment efforts in qualitative research. We identify (i) characteristics of the recruiter; (ii) institutional and community gatekeeping; (iii) understanding participants, behaviours and differences; and (iv) determining the participant sample as four key considerations applicable to qualitative research and worthy of reporting. We offer useful strategies to improve research quality in relation to these themes. Essential elements for proper reporting of recruitment efforts in qualitative research are also provided. This discussion article is intended as a resource for researchers considering primary data collection and those teaching graduate students. Discussion of recruitment strategies is pertinent because trial-and-error approaches to recruitment are commonly employed. Further exploration of community gatekeeping phenomena and essential reporting elements are also warranted to optimize future recruitment efforts. In addition, we recommend that clear reporting of recruitment be assured for publications reporting qualitative research findings.

Keywords: recruitment; qualitative; gatekeeping; reporting

CHALLENGES AND STRATEGIES IN THE RECRUITMENT OF PARTICIPANTS FOR QUALITATIVE RESEARCH
Researchers frequently underestimate the time and resources required for participant recruitment, while overestimating available, willing and eligible participants. This misalignment persists in part because there are few benchmarks to estimate resources required for successful recruitment and recruitment efforts are under reported in qualitative research. The lack of attention to recruitment challenges and strategies is true of both research articles and foundational textbooks in the health sciences domains. For example, the popular textbooks Qualitative Research in Nursing: Advancing the Humanistic Perspective, and Qualitative Research & Evaluation Methods do not identify challenges or strategies in recruiting participants for qualitative research. Identifying these common challenges and associated strategies is particularly important as innovative domains for recruitment (e.g., social media), approaches to design (e.g., mixed methods research), and methodologies (e.g., secondary analysis of qualitative research) continue to rapidly evolve. Furthermore, failure to anticipate recruitment challenges and to devise strategies to address them may threaten the feasibility and quality of a research study. As such, it is imperative that researchers consider the impact of recruitment when designing and appraising qualitative research studies.

Although we recognize that researchers are challenged by word count limitations in reporting qualitative research, we contend that a lack of transparency in reporting recruitment challenges misrepresents the reality of conducting primary research. This is problematic for a variety of reasons: novice researchers may underestimate recruitment challenges, investigators are unable to learn strategies from previous research, sample composition may be affected, and innovative problem solving approaches to relationship building as well as participant access may be underreported. Despite the highly contextual nature of qualitative inquiry, we believe that particular challenges and strategies in participant recruitment transcend specific contexts. Such elements can be seen as common to all research contexts and merit consideration in research planning and reporting. Therefore, in response to concerns that researchers “do not discuss the strategies used to enhance accrual and retention in any substantive detail, and they seldom assess the utility of the strategies they do report” (p. 201), we identify four core recruitment challenges (characteristics of the recruiter; institutional and community gatekeeping; understanding participants, behaviours, and differences; determining the participant sample) and associated strategies related to qualitative research that we believe transcend contextual divides. We then offer elements to include when reporting recruitment efforts and summarize recruitment challenges and strategies in Table 1.

CHALLENGES AND SOLUTIONS RELATED TO PARTICIPANT RECRUITMENT

I. CHARACTERISTICS OF THE RECRUITER
Regardless of the population of interest, core characteristics of the researcher or recruiter are critical to recruitment efforts. For instance, familiarity, suitability of the recruiter, and existing relationships with participants or liaisons (e.g., hospital staff; community leaders) can act as facilitators or barriers to successful recruitment. Although interpersonal relationship building between study participants and researchers has long been identified as integral to the recruitment process, it is curious that these elements are more often than not absent from research reporting. Some strategies integral to participant recruitment have been identified such as regular follow up with prospective participants to inform them of the research study and building trusting relationships between prospective participants and the researcher. Recruiter characteristics such as enthusiasm and competency positively influence the recruitment process. Patel and colleagues further assert that qualities such as conscientiousness, care, compassion, integrity, respect, tolerance, tact, and approachability, serve the researcher well in the recruitment process. Strategies: An approach to recruiting participants is to assign a designated referral person who embodies the characteristics known to facilitate participant recruitment (e.g., enthusiasm). This individual could conduct initial participant screening, identify eligible participants, and inform participants about the research study. A clear advantage of this approach is that a designated individual would be devoted specifically to participant recruitment. Barriers to this approach are the associated cost and the availability of specialized researchers dedicated to recruitment. Authorship considerations associated with having a dedicated recruiter may also surface
and should be discussed prior to commencing recruitment. If resources allow, this approach could be strengthened through frequent communication with referral persons to avoid duplicate recruitment attempts and mitigate early challenges with recruitment.

II. INSTITUTIONAL AND COMMUNITY GATEKEEPING
The effects of gatekeeping have been insufficiently acknowledged in general qualitative research. As such, we briefly highlight core considerations related to gatekeeping that may then be targeted through practical strategies. A primary consideration is that when using individuals or organizations to assist in identifying potential participants for recruitment, these liaisons may encourage and refer only those individuals who are keen on participating in research. Relative ease in recruiting such individuals and beliefs that keen participants provide the most valuable information might influence these behaviours. As a result, “key informants” or “expert patients” with an above average understanding of the subject matter may be identified instead of participants with a more typical or average clinical profile or even more vulnerable participants (e.g., immigrants who are unfamiliar with a new setting and language and/or with limited health care access). At a minimum, this phenomenon should be identified as a limitation in the recruiting efforts for future studies. For example, if parent dyads are desired, recruiting may be particularly challenging as parents infrequently present to these settings. Furthermore, within the hospital environment, particularly within research-affiliated hospitals in large urban centres, there is a real possibility of participants being overburdened by such study requests. This can result in research fatigue or reluctance to participate in future research projects, thereby negatively impacting future recruitment success.

Strategies: Prolonged engagement with participants (e.g., individuals, community members, hospital staff) and long term engagement in a setting prior to attempting recruitment may increase success, improve data quality, and reduce negative perspectives on research (e.g., not partaking in ‘parachute’ research, where research “experts” take but do not give back to participants). If this is not possible, engaging with those familiar with the study setting is recommended. Long term engagement fostering meaningful and authentic collaboration with participants via an advisory panel or non-research related site visits might cultivate trust and aid in recruitment. However, the resource implications of prolonged engagement must be acknowledged and anticipated by the research team. Ensuring that liaisons (e.g., health care workers, community members) involved in the research study have a thorough understanding of the study purpose and eligibility criteria is essential. Meeting with liaisons to identify any recruitment concerns for qualitative research may assist in negotiating access and devising strategies. For example, understanding existing work processes and organizational flow in the clinical environment prior to initiating research can contribute to successful recruitment efforts. A combination of active and passive recruitment techniques has been found to effectively enhance recruitment. Velott and colleagues introduced a “triangular recruitment approach” (p. 222) involving both active (e.g., onsite) and passive techniques (e.g., information letter) when recruiting female participants from rural settings. In addition to using a variety of recruitment strategies, using multiple recruitment sites may facilitate participant recruitment for qualitative research. However, this decision should be influenced by factors beyond site access alone. For example, organizational stability, the number and characteristics of staff and key players for participant recruitment, existing relationships with potential gatekeepers and the volume of research being conducted at the site should be considered.

III. UNDERSTANDING PARTICIPANTS, BEHAVIOURS AND DIFFERENCES
Understanding how the behaviours of prospective participants align with the type of recruitment strategy and sample desired is useful. For instance, if parent dyads are desired, recruiting may be particularly challenging as parents infrequently present to these settings together. For example, in the first author’s previous work, it was unusual for both parents to attend a routine check-up or be present for an unplanned ED for asthma exacerbation, decreasing the likelihood of recruiting more than one parent for this research study. Recruiting one parent was challenging due to pre-existing commitments and providing care for the child. Whereas recruitment difficulties exist in single participant recruitment, recruiting dyads or pairs for participation in qualitative research compounds existing difficulties. Feasibility issues, such as scheduling time for data collection, contribute to the challenges. The selected recruitment site(s) can greatly influence the researcher’s ease of access to multiple participants.

Gender differences in recruitment may also exist and has been previously demonstrated with the underrepresentation of male caregivers (e.g., fathers, male partners). This phenomenon may be attributed to the predominance of female primary caregivers but should be considered a-priori. Strategies should be identified to facilitate gender-equal recruitment (e.g., purposive sampling) if this is recognized as necessary to the integrity of the research project to address the research question(s) of interest. As such, congruence between recruitment approaches and the sampling frame is imperative. Attention to terminology used to describe research projects can also influence participant recruitment. Words such as “study”, for example, have been found to provoke less fear in potential participants than their more technical counterparts of ‘investigation’ or ‘research’. Representativeness of study participants should be reflected in the study title and revised to accurately reflect the participant population. For example, the term ‘parents’ may inaccurately represent a study population where only one father participated. Although this is predominantly a design consideration, thoughtful attention should surround the terms used to describe both the research study and participants at all stages of the research process.

Strategies: Employing a recruitment protocol with clearly defined terms may be useful for recruiting pairs (e.g., parents). This may be particularly important when recruiting multiple family members because of the ambiguous nature of some terminology, such as the meanings of family and caregiver for instance. In the case of studies on parents, inclusion/exclusion criteria contained in the consent package/information sheet could specify that both parents need to attend study sessions in order to be included in the study. The implications of this requirement to sample size versus meeting the specific objectives of the study (i.e., to obtain both parents’ views versus mothers’ views) should be carefully considered. Furthermore, planning could be improved by discussing participant behaviours in relation to the sampling frame with recruiters prior to commencing recruitment. For example, when designing sequential studies, supplemental data could be collected on participants (e.g., time-to-triage) that may aid in the recruiting efforts for future studies.

There is utility in understanding participants’ perspectives on costs and benefits related to research participation as these may illuminate facilitators and barriers to recruitment. For example, time required to participate is a major foreseeable factor in the participant’s decision to partake in qualitative research, particularly in specific populations (e.g., vulnerable populations).
and frequency are commonly identified factors influencing recruitment. Data collection strategies can be amended to enhance recruitment; for instance, interviews can be divided into separate but shorter segments to accommodate participants’ existing schedules. The perceived benefit of qualitative research can also be enhanced through incentives. For instance, Mkandawire-Valhmu and colleagues suggest that care should be taken to avoid unintentionally minimizing the value of the participants’ time or contribution by offering too little of an incentive. When classified according to their purpose, incentives can be material, financial, moral or natural (e.g., curiosity). When using remunerative incentives, it is generally acceptable that the incentive offsets the cost or inconvenience of partaking in the study. For example, researchers may cover the cost of parking or childcare incurred during an interview. Notably, the cost of inconvenience is not always clear but is dependent on the value ascribed to it by an individual. This may correspond to participant’s financial status. For example, a mother of lower socioeconomic status and a practicing pediatrician might associate different costs with their time. For this reason, the line between incentive and coercion can become unclear. Although few guidelines exist to assess compensation efforts, Gross and Fogg have advised that compensation “should be sufficiently high so as to encourage participation but not so high as to be coercive” (p. 532).

IV. DETERMINING THE PARTICIPANT SAMPLE

It is difficult to discuss recruitment in qualitative research without some attention to data analysis. No definitive rules exist for determining sample sizes in qualitative research in part because of the iterative relationship between sampling and data analysis. Often, recruitment criteria changes in response to emerging data such as identified themes or participants characteristics. For instance, in the first authors’ research, it was identified during analysis that additional parents of children newly diagnosed with asthma were needed to better understand variations in parents’ asthma related information needs. Reflecting and reporting on aspects of this process promotes transparency and is often integral to the relevancy and quality of the data attained. Accordingly, the sample size in qualitative research is frequently guided by data saturation. This concept may be less familiar to those with an exclusively quantitative orientation.

Strategies: Identifying how participants contributed to the sampling frame in purposive sampling would add depth to readers’ understanding. Considerations may include: whether additional participants were sought to confirm or disconfirm emerging themes, as in typical or negative case analysis; whether participants from particular settings were recruited to enable cross-comparison of data between participants from different contexts; and how the researcher attended to potential participants who were not recruited despite their willingness, due to the absence of desirable demographic or other characteristics. Reporting on qualitative studies should emphasize that recruitment ceased (and a final sample size was reached) upon saturation of themes or some other reflexive and iterative notion appropriate for the methodological approach employed. This is important for transparency (i.e., that the sample size was not based on a premeditated approach) and the readers’ (as well as reviewers’) understanding of determining sample size in qualitative research. These considerations can assist in planning for future research studies and guide the reader through the researchers’ analytic process. A summary of recruitment considerations and potential strategies are provided in Table 1

CONCLUSION AND CALL FOR CLEARER REPORTING OF RECRUITMENT EFFORTS

In this paper, we have summarized pertinent challenges and associated strategies in recruiting participants for qualitative research and advocated for greater reporting transparency. Our discussion is well aligned with previous calls emphasizing the need for reporting of particular aspects of the recruitment process (e.g., response rates). Overall, we recognize that clear and comprehensive reporting is essential to developing effective recruitment strategies in qualitative research. Thorough reporting may better equip researchers in planning resources for participant recruitment, help attain desired sample composition, and facilitate future success in recruiting participants for qualitative research. In light of this, we offer reporting suggestions (Table 1) that correspond with the recruitment challenges and strategies discussed. Recognizing recruitment challenges and the need for transparent reporting may improve the planning and execution of this resource intensive activity, thereby facilitating effective recruitment in qualitative health research.

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12. Clark T. “We’re over-researched here!” Exploring accounts of research fatigue within qualitative research engagements. Sociology; 2008: 42(5): 953-970

Table 1 Recruitment Challenges, Strategies and Reporting

<table>
<thead>
<tr>
<th>Consideration</th>
<th>Potential Strategies</th>
<th>Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Characteristics of the Recruiter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Familiarity</td>
<td>I. Underscore desirable characteristics associated with successful recruitment (e.g., enthusiasm and professionalism) to the assigned recruiter the researcher should adopt these characteristics.</td>
<td>Description of attributes, qualifications, existing relationships and efforts to cultivate relationships</td>
</tr>
<tr>
<td>- Fit</td>
<td>II. Enlist a referral person who possesses the desirable characteristics</td>
<td></td>
</tr>
<tr>
<td>- Existing relationships</td>
<td></td>
<td></td>
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<tr>
<td>- Competency</td>
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<td></td>
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<tr>
<td>- Personal qualities (e.g., compassion, approachability)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>II. Prolonged engagement with participants</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Key informants</td>
<td>Identify limitations of using key informants or expert patients</td>
</tr>
<tr>
<td></td>
<td>- Burden of participant pool</td>
<td>Combination of strategies used by site</td>
</tr>
<tr>
<td>II. Institutional and Community Gatekeeping</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>III. Identify and address concerns of individuals involved in recruitment (including implications of study recruitment to work flow)</td>
<td>Description of media used e.g., number of brochures/ ads e.g., word count, reading level, use of graphics in print media e.g., reach statistics for web-based media</td>
</tr>
<tr>
<td></td>
<td>IV. Commitment to the study prior to its commencement and then periodically throughout the study duration.</td>
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<tr>
<td></td>
<td>V. Multi-faceted approach (active and passive recruitment techniques)</td>
<td></td>
</tr>
<tr>
<td>III. Understanding Participants, Behaviors &amp; Differences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Aligning strategies with desired participant sample</td>
<td>I. Recruitment protocol with clear terms</td>
<td>Details of recruitment protocol</td>
</tr>
<tr>
<td>- Compounding challenges with dyads</td>
<td>II. Include clauses in recruitment package to encourage participant presentation (e.g., both parents)</td>
<td>Number of participants contacted, eligible, and refused</td>
</tr>
<tr>
<td>- Gender differences</td>
<td>III. Operationalize terms (e.g., caregiver) to provide clarity to the participants and to provide greater specificity on the aim of the study.</td>
<td>Time frame</td>
</tr>
<tr>
<td>- Use of terminology</td>
<td>IV. Identify participants’ cost-benefit perspectives</td>
<td>Report how key terms were operationalized (e.g., caregiver)</td>
</tr>
<tr>
<td></td>
<td>V. Identify situational factors that may facilitate recruitment and optimize convenience in study participation (e.g., site selection; accommodations to data collection including the elimination of probes from the interview guide if time is an issue).</td>
<td>Details of incentives used</td>
</tr>
<tr>
<td></td>
<td>VI. Consider Incentives (e.g., remunerative, financial, moral, natural)</td>
<td></td>
</tr>
<tr>
<td>IV. Determining the Participant Sample</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Aligning recruiting with data analysis</td>
<td>Consider whether and how: I. Participants’ data confirms or disconfirms themes and is guided by saturation</td>
<td>How participants contributed to sampling frame</td>
</tr>
<tr>
<td></td>
<td>II. Cross-comparison can be facilitated through recruiting diverse participants</td>
<td></td>
</tr>
<tr>
<td></td>
<td>III. To attend to willing participants who weren’t recruited</td>
<td></td>
</tr>
</tbody>
</table>
Edmonton Healthcare Improvement Network Engaging Future Healthcare Professionals in Quality Improvement and Patient Safety Initiatives

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Youness El Khalidy, BSc, MD Candidate 2017. Faculty of Medicine and Dentistry. University of Alberta

ABSTRACT

Background: Quality improvement (QI) and patient safety (PS) are fundamental to healthcare practice yet education in these topics are lacking creating a critical education-practice void for future healthcare professionals. The Edmonton Healthcare Improvement Network (EHIN) is a student led interdisciplinary group at the University of Alberta that aims to narrow this education-practice gap by providing informal educational opportunities in an interprofessional setting.

Methods: EHIN’s mission is to engage students in learning about the principles, methods, and tools of QI through education and practice opportunities. We facilitate interdisciplinary collaborative learning between students, health care administrations, QI organizations, and university faculty. To implement our goals we held four large educational events focused on understanding the Canadian healthcare system, QI and PS initiatives in Alberta, and a QI conference.

Results: There is a high level of interest for PS and QI education among students at the University of Alberta. We had an average of 50 attendees per event with a high satisfaction rate (median 4/5) at our events.

Conclusions: Through informal and formal educational opportunities, EHIN promises great potential for future interdisciplinary collaborative learning and implementation of quality improvement projects. Going forward, we will be working towards translating our learning to current healthcare improvement projects and continue working on integrating QI and PS into the formal educational curricula.

Key words: Quality Improvement, Patient Safety, Inter-professional education

BACKGROUND

Recent changes in technology, patient demographics and economic factors all contribute to the rapidly shifting healthcare environment in Canada. Indeed, since 1975, government spending on healthcare has grown faster (~8.1% annually) than GDP (~6.7% annually). Yet concerns about timely access to medical services, diagnostic tests and specialized treatment result in an overburdened system that currently ranks 30th in the world according to the World Health Organization. In addition, recent research suggests that, counter to popular belief, most medical errors occur because of system failures rather than individual lapses. Such concerns bring into question the sustainability of current healthcare models and their ability to meet the evolving medical needs of Canadians. Although QI initiatives range in terms of success, Hughes (2008) suggests that efficacious QI initiatives are able to well define a current health care problem, involved stake holders (usually patients, healthcare workers or health administration), test their impact on change as well as allow for continuous monitoring to assure sustained change and promote a culture of safety. In order to bridge the gap in cost and treatment availability, Quality Improvement (QI) initiatives explore ways to better manage resources so as to minimize patient errors and increase patient satisfaction. In order to address the increasing need for a safe and efficient healthcare system we started the Edmonton Healthcare Improvement Network (EHIN) in 2012.

The mission of EHIN is to engage students early in learning about the principles, methods, and tools of QI through education and practice opportunities. The goals of EHIN are threefold:

1. To bring together students and faculty from health related disciplines across University of Alberta to learn about healthcare systems, QI measures, and Patient Safety (PS) and facilitate the incorporation of healthcare improvement training into the formal curriculum.
2. To facilitate collaboration between interested students, community organizations, and university faculty associated with healthcare improvement.
3. To empower students to engage in the implementation of QI projects.

Fig 1: Figure showing activities used to implement EHIN’s goals.
In order to fulfill the practice-learning gap in QI and PS education, we connected with industry partners to organize extra curricular learning opportunities that would achieve our outlined goals. In this paper we will present our partnerships, describe our first year’s educational activities, present data on student reception of events, and future directions of EHIN in order to provide a model that can be replicated at other universities to address the gap in PS and QI education.

METHODS

EHIN PARTNERS

In order to bridge the practice-learning gap in QI we started by creating a network of industry partners who could share real world experiences with students. Our current partners include healthcare administrators such as Alberta Health Services, QI organizations such as the Alberta AIM (Access, Improvement, Measures) and Health Quality Council of Alberta, University of Alberta health related faculties, and Institute for Healthcare Improvement (IHI) student groups at other universities. By engaging these partners we bring together current change agents to students and faculty so that practical education that reflects current healthcare problems can be offered to future healthcare professionals. Furthermore, it sets the stage for our future goals by providing the connections necessary for interested students to lead QI and PS projects in the future.

EHIN ACTIVITIES

In our first year of operation we organized four large educational events which enabled participants to get an understanding of the following four topics: basic introduction to the challenges faced by the Canadian healthcare system, current QI initiatives in Alberta, understanding PS concerns in Alberta and learn the basic principles of QI through simulated activities.

- Understanding the Canadian Healthcare System: We screened “Escape Fire”, a documentary focused on the challenges faced by the American healthcare system. The documentary was then tied back to the Canadian healthcare system by a panel of leaders in the Canadian healthcare system. Our panel included prominent leaders from political and health administration backgrounds, including Dr. Raj Sherman, Alberta Liberal Opposition Leader; Dr. Dawn S. Hartfield, Zone Clinical Section Chief of Pediatric Inpatient Care at the Stollery Children’s Hospital; and Steven Clelland, Director of Alberta AIM. The discussions focused on the major challenges in the Canadian healthcare system created by an aging population and increasing chronic diseases including obesity, diabetes and cardiovascular diseases. The panel identified barriers to addressing these problems because of the focus of our healthcare system on managing acute problems rather than focusing on long-term preventative programs, due to the short-term nature of political cycles and the difficulty in assessing outcomes of preventative programs.

- QI in Alberta Health Services: We organized a guest lecture with Carolyn Hoffman, Acting Senior Vice President of Quality and Healthcare Improvement for Alberta Health Services. Her lecture provided students with an introduction to AHS’s approach to QI projects in Alberta. She introduced students to the 6 dimensions (accessibility, acceptability, effectiveness, efficiency, safety and appropriateness) used by AHS to evaluate QI projects and provided an approach to QI with the real world example of how AHS improved emergency department outcomes.

- QI and PS in Alberta: The goal of our event was to create awareness of and generate ideas pertaining to potential areas of healthcare QI based on PS concerns. To this end, we kicked-off with a viewing of the TEDx presentation ‘Transparency, Compassion, and Truth in Medical Errors’ by Leilani Schweitzer, followed by an interdisciplinary panel comprised of our partners to discuss how QI initiatives can be used to minimize patient errors. Our panel included Dr. Ann Colbourne, Senior Medical Director Quality & Transformation, Alberta Health Services; Carole Estabrooks, Professor of Nursing and Canada Research Chair in Knowledge Translation, University of Alberta; Carolyn Hoffman, Senior VP Quality & Healthcare Improvement, Alberta Health Services; Dr. Richard Lewanczuk, Physician and Senior Medical Director for Primary Care and Chronic Disease Management, Alberta Health Services; and Dr. Kevin Hall, Professor at Faculty of Pharmacy, University of Alberta. The discussion brought out many important points including the need for a culture shift in healthcare which promotes transparency and a system based approach to solving medical errors rather than a blame and shame approach to medical errors. The panel also identified that our healthcare system is slow to change primarily due to the siloes in our health system and lack of adequate data. In addition, the panel highlighted some of the successes including improvements in hand washing and the ability of AHS to track and address patient errors from a system perspective.

- Lean and Clean QI Conference: In collaboration with Alberta Health Services and Alberta AIM we engaged students in a hands on, interactive conference that educated
participants on the basic principles of QI (Plan, Do, Study, Action cycles and Lean QI principles). Lean QI principles, which focus on reducing wastes in the system and identify value added processes, were taught to students using a simulated emergency department. The keynote speaker Dr. Kijewski tied these concepts by illustrating how she used these principles to improve the safety and efficiency of her family practice.

RESULTS

STUDENT RECEPTION

We have over 252 members from over 11 faculties on EHIN’s member list. Our events were consistently attended by over 50 students, allowing towards the keen interest demonstrated by students in learning about principles of QI and PS. Students were then asked to rate their satisfaction with our presentations on a scale of 1-5, with 1 being highly satisfied, and 5 being not satisfied at all. Results from all events demonstrates Table 1 consistent student attendance at our events and their high rate of satisfaction (median satisfaction of 4/5).

Table 1: Summary of the attendance and rating of the quality of our informal education events.

<table>
<thead>
<tr>
<th>Event Name</th>
<th>Event Description</th>
<th>Total Attendance</th>
<th>Medicine &amp; Dental (#)</th>
<th>Nursing (#)</th>
<th>Pharmacy (#)</th>
<th>Rehabilitation Science (#)</th>
<th>Medical Lab Science (#)</th>
<th>Public Health (#)</th>
<th>Other Students (#)</th>
<th>Other Faculty, Professiona ls, etc</th>
<th>Overall Event Satisfaction (# out of 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Canadian Healthcare System</td>
<td>Escape Fire documentary + Panel of experts on the Canadian healthcare system</td>
<td>110</td>
<td>47</td>
<td>32</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>23</td>
<td>-</td>
<td>3.68 (2.96-4.39); 17</td>
</tr>
<tr>
<td>Quality Improvement in Alberta Health Services</td>
<td>Lunch talk from Carolyn Hoffman: QI presentation from AHS</td>
<td>56</td>
<td>11</td>
<td>11</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>Data not collected</td>
</tr>
<tr>
<td>Quality Improvement and Patient Safety in Alberta</td>
<td>Patient Safety Video + Panel of PS and QI experts</td>
<td>57</td>
<td>31</td>
<td>14</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>4.00 (3.21-4.79); 8</td>
</tr>
<tr>
<td>Lean and Clean Quality Improvement Conference</td>
<td>Full day conference with interactive, small group session incl. a simulation applying the principles of AHS Improvement Way and PDSA education from Alberta AHS</td>
<td>31</td>
<td>11</td>
<td>11</td>
<td>7</td>
<td>5</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4.00 (3.73 - 4.27); 21</td>
</tr>
</tbody>
</table>

We asked our members whether QI and PS education was adequately integrated in the formal education curriculum. Students (n=27) felt our current PS and QI education was poor (average rating of 2.37 (1.95-2.79) out of 5) and felt that PS and QI education was really important (average rating of 3.68 (2.96-4.39) out of 5).

CONCLUSIONS AND FUTURE DIRECTIONS

By informing students of current directions in healthcare and promoting networking between different faculties and QI organizations, we hope to better prepare students for their future interdisciplinary careers. Going forward, we are working with our external partners to promote QI projects and to engage future healthcare professionals in hospital and faculty QI projects. Involvement in hands-on QI projects will provide students with real life experience implementing QI in clinical practice, as well as provide students the opportunity to apply the knowledge they have developed through EHIN’s educational session to practical QI projects. Furthermore, in order to address the deficit in the formal curriculum, we hope to collaborate with healthcare faculties to advocate for further education on PS and QI. Since, current improvements will be most relevant to students entering the workforce, involving students in the QI discussion early on will facilitate a shift in the culture of our healthcare system to one that prioritizes healthcare QI and PS.

ACKNOWLEDGEMENTS

1. We would like to thank the rest of the EHIN Executive members (Benjamin Pi, Kirsten Sjonnese, Marvi Cheema, Jenny Shi, Elliot Pittman, and Jeremiah Bolstad for their continued commitment to bringing innovative QI and PS initiatives to our members.
2. We would also like to thank Dr. David Moores and Dr. Dawn Hartfield for their continued support as faculty advisors of EHIN.
3. We would also like to thank all our external partners for their support with our activities.

References:
The Calgary Guide to Understanding Disease: Our Role in Medical Education

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ABSTRACT

The Calgary Guide to Understanding Disease (TCGUD) is a self-study online resource (www.thecalgaryguide.com) providing medical students, clerks, residents, physicians and other interested professionals with simple, concise, and coherent explanations necessary to fundamentally comprehend disease processes in the context of clinical presentation. Herein described is how TCGUD was created, how it operates, its working philosophy, the impact it has had on medical education, and its future developments and goals. Content consists entirely of logically organized flow schemes delineating pathophysiology in a comprehensive and step-by-step manner, thereby minimizing confusion. A team of over 50 Calgary medical students authored all content, using language understandable to most students with a basic science background. Over 30 University of Calgary faculty members were involved in the review of content to ensure accuracy prior to online publication. Creative Commons licensing ensures content is free to all those wishing to access it. Since content was initially published online in August 2012, www.thecalgaryguide.com has served over 100 countries and its content has been downloaded over 100,000 times. In nearly two years, a growing repository of over 290 peer and faculty reviewed topics ranging from neurology to hematology has been created. It is readily apparent that TCGUD has established itself as a permanent, living, and engaging online resource for medical students and other professionals across the world, and will likely continue to experience growth in the years to come.

Keywords: medical innovation, e-learning, medical education

INTRODUCTION

Canadian medical schools are progressively changing their methods of teaching, with an increased focus on clinically-practical material in addition to scholarly rigour. This shift in focus reflects an emphasis on ensuring medical students can transition from the classroom to the clinic and are adequately prepared for clerkship and residency. Accompanying this change, however, is that medical students often remain limited in their medical knowledge of the basic pathophysiology of disease. The insidious task of learning through pure rote memorization is common, as diseases are being taught through lists — signs, symptoms, complications and differential diagnoses. Ultimately, learning the pathophysiology behind the clinical manifestations of diseases allows for a more comprehensive understanding of medical conditions.

This need in medical education was addressed in August 2012, when The Calgary Guide to Understanding Disease (TCGUD) was founded as an online resource for medical students to solidify their medical knowledge. At its core were the following principles:

Student authorship and faculty review: Undergraduate medical students author all content so that the material is, firstly, worded at the right level for medical students, and secondly, only includes material germane to success as a clerk and pre-clerk. As well, University of Calgary faculty members review all slides before publication.

Emphasizing the why: Illustrating the connections between pathophysiology with disease manifestation is the ultimate goal of any content in TCGUD. A slide should not be regarded as just a flashcard, but rather a concise yet comprehensive supplement and substitute for an entire chapter in a medical text.

Function follows form: Flow schemes composed of colour-coded boxes and constructed as slides use succinct, minimal text to illustrate why the disease presents the way it does in a logical, organized manner. Figure 1 demonstrates an example of a Calgary Guide slide.

Figure 1. An example of a slide from TCGUD. All slides follow the same overarching form of colour-coding elements of disease into a logically organized flow scheme.

Lower Urinary Tract Infection (LUTI): Pathogenesis and clinical findings

**Predisposing Factors:**
- Immunocompromised state (diabetes, elderly, female; short urethra), stagnant urine (anatomical variant, obstruction, neuropathic bladder, urinary reflux)
- Bacterial entry (less common): indwelling catheter, surgical inoculation, hematogenous spread, trauma (Staphylococcus, Enterococcus, Candida)
- Portal of entry bypasses body’s natural defenses (gravity and repetitive outward urine flow)

**Bacterial entry (less common):**
- Indwelling catheter, surgical inoculation, hematogenous spread, trauma (Staphylococcus, Enterococcus, Candida)

**Impairment of body’s natural defense systems, or stagnant urine, allow for bacterial accumulation**

**Bacterial entry, portal of entry, and impairment of body’s natural defense systems lead to bacterial infection and cause symptoms**

**Pathogens use enzymes to reduce nitrate to nitrite**

**Pathogens use enzymes to reduce nitrate to nitrite**

**Stimulation of inflammatory response**

**Urine findings:**
- Colony count (>10⁵ CFU/mL)
- WBC (>5000 WBC/mL)
- Proteinuria
- Hematuria (rare)

**Table 1.** A summary of the pathophysiology, mechanism, signs/symptoms, lab findings, and complications of LUTI.

Table 1. Pathophysiology, Mechanism, Signs/Symptoms/Lab Finding, Complications

Legend: Pathophysiology, Mechanism, Signs/Symptoms/Lab Finding, Complications

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Brevity & simplicity: Only the simplest possible terms are used, following clear sentence structure and providing definitions when appropriate in order to maximize coherence for new medical learners.

Divide & conquer: Complex topics (e.g., pathogenesis of myocardial infarction, clinical findings of nephrotic syndrome, etc.) are decomposed into their various essential aspects (e.g., pathological mechanisms, symptomatology, etc.) and visually organized to avoid overwhelming students.

Universal accessibility: TCGUD distributes its resources online under Creative Commons licensing; thus it is freely accessible for anyone with an internet connection.

Since inception, TCGUD has expanded to become a hub for many medical students across the world. By introducing a resource that links the first principles of pathophysiology to the disease manifestations they cause, TCGUD brings about greater retention of information, equipping both future and current professionals with a superior degree of mastery over the science and art of medicine.

MATERIALS AND METHODS
The basic mechanics of TCGUD are firstly, to create slides; secondly, to publish and distribute content; thirdly, to analyze impact; and fourthly, to maintain accountability. Every slide was crafted through a comprehensive, systematic, and accountable process. Microsoft PowerPoint was used to design slides, which was selected because it is nearly ubiquitous on all computer systems and nearly all authors have experience with its use. All authors were medical students that expressed keen interest in the topic they pursued.

Content Planning: Any team member can suggest topics, and these suggestions are selected from by the editors based on several criteria. Firstly, the topic must have a clearly defined learning objective. For example, “Diabetes Mellitus: Complications” contains a wide spectrum of different pathophysiologies, whereas “Diabetic Polyneuropathy: Pathogenesis and Clinical Findings” is more targeted. This serves a few purposes; the reader will have an intuition as to what to expect from the slide’s contents and furthermore, a specific topic will allow the author to comprehensively delve into the subject matter without risk of being too scattered and superficial, or run out of space. Secondly, the goal of the topic should be amenable to focusing on the mechanisms of disease (pathogenesis and pathophysiology), rather than, for example, treatment objectives or the differential diagnosis. While understanding treatment and diagnosis of disease are certainly essential components of a robust medical education, the goal of TCGUD has always been to explain primarily the underlying processes of disease, so that this information can be integrated into the clinical management which is already handled by the core curriculum. In addition, evidence-based guidelines on diagnosis and treatment are subject to more frequent change than understanding of pathophysiology, which in contrast is better preserved over time and would require less maintenance to stay consistent with the literature. In summary, an ideal topic is targeted and self-explanatory and amenable to pathophysiology-oriented content.

Authorship: Authors select from a centralized list of slide topics, which were carefully curated by the entire team, including authors, editors, and faculty. Upon committing to produce a slide, the author creates their first draft using a template following form guidelines that have been established and canonized. Each author determines which essential elements of disease processes should be included, and classifies and colour-codes them as Pathophysiology (the natural history state of disease), Mechanism (a causative process), Sign / Symptom / Lab Finding (a clinical point of evidence), or Complication (an end-stage outcome). This basic architecture remains constant for each and every slide that is created. In doing so, it ensures a slide incorporates only the salient points of a disease process, building from the foundations of basic physiology, but also excluding unnecessary elements. Determining which learning points should be included and which should be excluded is a trying and pedantic process, and becomes one of the author’s principle struggles. Nevertheless, the first draft is created then begins its editing and review phase.

Editing & Review: Two peer reviews are made to ensure that the majority of content is correct, phrasing is succinct, and overarching form is amenable to learning. From here, the slide is sent to an involved faculty member, a medical doctor whose practice encompasses the topic and so has intimate knowledge of it, legitimizing the content of the slide. Authors work with the editors until consensus is reached. The final pass belongs to the Editors-in-Chief, who polish the slide for any fine details and formatting errors. The slide is then completed and ready for publication.

Publication & Distribution: Published slides are distributed freely online under a Creative Commons license, hosted through a University of Calgary owned server. Thus, essentially anyone with an internet connection has free access. Slides can be downloaded as high-resolution, compressed images, whether this is for adding to their existing notes, or to a lecture or presentation, citing TCGUD when appropriate.

Analysis: Since launching the website in August 2012, Google Analytics has tracked TCGUD website visits to monitor its growth. End-user information such as demographics, website hits, and time spent viewing slides were monitored. Thresholds were used to limit noise generated through internet bots and other source of spurious hits. A country is discounted as a user of TCGUD if its average time spent per session is below 30 seconds.

Maintaining Accountability: Ensuring that content is correct and reflects current understanding is maintained through several means. Firstly, only faculty-reviewed material is published. Moreover, if the student author used a substantial portion of a professor’s lecture (in terms of wording, structure, presentation, or other aspects of content or organization), the faculty member is by default listed as a co-author (with their permission). All contributors were thus fairly and rightly credited, avoiding issues with intellectual property. Users are able to contact TCGUD online to report errors and give suggestions, as well as any other requests, maintaining transparency between the creators and consumers of content.

RESULTS
In May 2013, www.thecalgaryguide.com had a total of 160 slides, with TCGUD content being accessed in over 50 countries and content downloaded over 22,000 times. As of the time of publication, the TCGUD slide count currently sits at over 290, and the website has been visited in over 100 countries, with TCGUD content downloaded over 100,000 times.

At the time of publication, over 50 medical students and 30 medical doctors have contributed to the project as authors, reviewers, and editors. In addition, there has been an increasing desire to become involved with the project, with an expanding author base as well as collaboration with other institutions, notably medical students from McMaster University.

DISCUSSION
While analysis of usage through website traffic is still in its infancy, it is clear that The Calgary Guide to Understanding Disease has appreciated a profound rise in viewership throughout its development, with increasing global outreach with both amount and diversity of content.

Furthermore, TCGUD is increasingly comprehensive in its content range and there has been concurrent expansion through the creation of pharmacology and family-medicine sections. Lastly, TCGUD has accomplished a rise in distinction through presentations and conferences nationwide.

Future developments of the project include a remodeled website to better suit its expanding content and improve accessibility across electronic devices, increased collaboration with other medical institutions, and increased integration with the core curriculum of medical education. Despite its expansion, TCGUD retains its core philosophy of making medical education accessible, clear, and comprehensive.

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References


Exploring imaging biomarkers for diagnosis and prognosis in amyotrophic lateral sclerosis

Roger Croutze MSc, Kevin Yang MD, Sanjay Kalra MD

INTRODUCTION
Amyotrophic lateral sclerosis (ALS) is a chronic, debilitating disease marked by progressive neuromuscular decay manifesting in limb, speech and swallowing paralysis. Average survival is a mere 2-5 years from the time of clinical diagnosis. An early method of detecting physical or metabolic changes in ALS, or a means of stratifying prognostic groups is of great importance. We previously showed that magnetic resonance spectroscopy (MRS) is a powerful method to distinguish between ALS patients and controls, based on the quantification of neuronal metabolites n-acetylaspartate (NAA), creatine (Cr) and choline (Cho) in the motor cortex. Recent work indicates that measurement of cortical thickness is another potential imaging biomarker of cerebral degeneration in ALS. The purpose of our study was two-fold: to explore differences in cortical thickness between patients with ALS and controls, and to examine whether MRS or cortical thickness is a superior indicator of disease state in ALS.

METHODS
Structural 1.5T MRI and MRS data were acquired for 26 patients fitting the El Escorial criteria for probable or definite ALS, and 12 healthy age-matched controls. Cortical thickness was measured for all participants using FreeSurfer which, briefly, registers images to a common space and segments anatomical features, while defining borders of white and gray matter. Cortical thickness was calculated as the distance between white and gray matter. Cerebral MRS data was extracted from 3D voxels in the motor cortex using LCModel. Statistical analysis was conducted by one-way ANOVA, receiver operator characteristic (ROC) curve and Pearson correlation coefficient.

RESULTS
There was no statistically significant difference in 1.5T MRI-derived cortical thickness of the motor cortex or mean cortical thickness, bilaterally, between 26 patients with ALS and 12 healthy age-matched controls (p > 0.05). ROC curve analysis showed that MRS Naa/Cr ratio (left: sens 68.0%, spec 87.5%; right: sens 76.0%, spec 100.0%) was a more sensitive and specific diagnostic tool than cortical thickness to differentiate between ALS and controls.

CONCLUSIONS
There was no significant difference in cortical thickness of the motor cortex in patients with ALS compared to healthy controls. Magnetic resonance spectroscopy was a more sensitive and specific diagnostic method than cortical thickness to differentiate between ALS and controls.

SUPERVISOR
Dr. Sanjay Kalra, Department of Medicine / Neurology /Neuroscience and Mental Health Institute Stipend Support for Roger Croutze provided by Alberta Innovates Health Solutions (AIHS) Summer Studentship Award
2-Methoxyestradiol: A Hormonal Immunomodulatory Agent That Promotes Pulmonary Microvascular Endothelial Integrity for Ex-Vivo Lung Perfusion

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4 Alberta Transplant Institute.
5 Canadian National Transplant Research Program.

INTRODUCTION
Lung injury is characterized by lung edema and is associated with an increased risk of acute rejection post-transplantation. Ex-vivo lung perfusion (EVLP) has emerged as a platform for targeted therapies where the pulmonary graft can be modulated with pharmacologic agents. As pregnancy has been shown to prolong transplant allograft survival in rat models, we investigated the use of 2-Methoxyestradiol (2ME2), an anti-cancer metabolite of estrogen that is upregulated significantly during pregnancy in an in-vitro model of rejection and pulmonary microvascular endothelial dysfunction.

METHODS
Human peripheral blood mononuclear cells (PBMCs) were cultured and pre-treated with 2ME2 before activation. Cultured medium and cells were collected for protein analysis. Proliferation and apoptosis assays were performed and analyzed by flow-cytometry. The permeability of human pulmonary microvascular endothelial cells (EC) was assessed using the Transwell culture assay.

RESULTS
TNF-α and IFN-γ cytokine production in 2ME2 treated activated PBMCs were modestly reduced relative to controls. T-cell proliferation was significantly blunted upon treatment with 2ME2 and a decrease in apoptosis correlated with a decrease in caspase-9 activity. 2ME2 was able to block the induction of stress-induced senescence caused by activation of T-cells and was beneficial in reducing TNF-α induced EC permeability.

CONCLUSIONS
Our results show that 2ME2 has an immunomodulatory effect that could be exploited in the setting of cellular rejection by blunting activated T-cell proliferation, without causing apoptosis or stress induced senescence. Additionally, 2ME2 is able to block TNF-α induced EC permeability. Taken together, 2ME2 is a promising anti-inflammatory and endothelial targeted therapeutic that may be added to the EVLP circuit to reduce pulmonary edema and inhibit the immune response in donor lungs.

SUPERVISOR
Dr. Jayan Nagendran and Dr. Darren H Freed

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