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Methadone Treatment in Rural BC

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Inaugural

Canadian Conference ON PHYSICIAN HEALTH

Building Resilient Medical Communities

15–16 October 2009

Marriott Pinnacle Downtown

Vancouver, British Columbia

Opening keynote address by

Richard Gunderman, MD, PhD

Vice-Chair, Radiology; Professor, Radiology, Pediatrics,
Medical Education Philosophy, Liberal Arts, Philanthropy, Indiana University

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- Opening keynote address: Wellsprings of Resilience, Dr. Richard Gunderman
- 2 full days of interactive workshops
- A thought-provoking debate — Physician privacy and public protection: Priorities in ensuring fitness to practice
- Social networking including lunch with the experts and Canadian Medical Foundation cocktail reception
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- SURPRISE closing event
- A special opportunity to attend the closing gala of the Vancouver International Film Festival

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On the cover
Winning submission in the 2009 Heartfelt Images contest by Alexandra Otto, Island Medical Program 2012. See page 34 for more about Heartfelt Images.

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Academic Discourse and the Modern-Day Health Science Student

The value of publication and the development of the UBC Medical Journal

L to R: Pamela Verma, Diane Wu

The importance of academic journals for dialogue in medicine and health science cannot be overestimated. Journals are the cornerstone for communication, acting as the fundamental vehicle for transmitting the vibrant social and scientific discourse that makes the field of medicine so enthralling. Academic journals are the forum in which world-altering treatises are recorded in history: from the purification of insulin in the Journal of Biological Chemistry[1], to the discovery of DNA in Nature[2], to the development of site-directed mutagenesis by UBC's own Nobel prize winner, Dr. Michael Smith[3]. Journals are the foundation on which our repertoire of scientific and medical knowledge is built. They act as the collective voice of academia and provide the foundation for evidence-based clinical practice.

With the establishment of the *UBC Medical Journal*, we hope to contribute to this exciting field of medical dialogue. Believing strongly in the strength of students' ideas within the medical community, we seek to provide a forum for students to showcase their talents in scientific research and social thought, and to allow free and open discussion on the rapidly evolving trends that form the framework of healthcare today. In the past, student academic journals have provided an important platform for communication and leadership- many leaders honed their skills in student academic journals- and we hope to provide this opportunity to strengthen the capacity of students for their journey into the professional world.

> "...throughout the development of the *UBCMJ*, we have worked with the philosophy that academic dialogue extends beyond the publication of the article itself.

We realized that UBC medical students needed a journal that provided a place where the unique experience of being a student in North America's first distributed medical program and the diverse health care issues facing Western Canada could be represented and documented. The overwhelming response from students as editors, authors, and reviewers indicated that this indeed was a gap that needed filling. The tone of this first issue is distinctly British Columbian. Connors reports on methadone treatment in rural BC (pg.9), Rose *et al.* present a novel medical treatment for adhesive capsuilitis (frozen shoulder) developed in BC (p.30), Rendall *et al.* captivate us with a successful inner city youth clinic developed by medical students (p.21), and Read tackles a health care issue at the forefront of political debates, psychiatric de-institutionalization (p.25).

Too often, students are at first unfamiliar with the process of publication: a great disadvantage when the style and format of manuscripts can be a barrier to acceptance. The *UBC Medical Journal* provides students the opportunity to become introduced to this world of academic publishing in a supported way. In addition, we pride the content of the *UBC Medical Journal* on being completely student-generated: everything from the management, content, design and the cover art. Editorial decisions are made by students. Our peer review process includes reviews from both faculty and students with expertise in the topic area, providing more educational opportunities. We are grateful for the mentorship and expertise of faculty members who serve as article reviewers and advisors.

Student submissions are put through a rigorous peer review process to ensure that authors, reviewers, and editors alike gain experience within the important process of academic publication. In the *UBC Medical Journal*, each article is reviewed by one to two students and one faculty member, all with relevant credentials. This helps to ensure both accuracy of content as well as accessibility of the articles to a medical student audience. Our editorial staff are highly experienced, many of whom are published scholars, who provide support to new and emerging writers and reviewers.

While developing this journal, we stumbled upon an original version of the *UBCMJ* that existed from 1962-1968 (these archives are now available on the *UBCMJ* website). Finding this

record of medical students left a lasting impression on us, in terms of the vibrancy of the discourse within the pages and the quality of student work.

Our new journal, however, is adapted for the present day - throughout the development of the *UBCMJ*, we have worked with the philosophy that academic dialogue extends beyond the publication of the article itself. We have enhanced the level of engagement through the use of New Media. Using online tools, students can respond to information put before them, network with each other, and exchange novel ideas. The management of the journal is paralleled by interactive online wiki to democratise the process of knowledge generation. In this way, the interface of the *UBCMJ* is interactive, and we hope that this will allow for greater participation and transparency within publication.

We also stand behind the concept of open access, which we believe is truly the direction academic publishing will evolve in the next decade, and are continually looking for ways to incorporate this into our framework and functions. We are one of the only Canadian medical student journals that incorporates public domain software along the lines of the Public Library of Science (PloS). Through a partnership with the Public Knowledge Project[4], we have a new online interface that allows for collaboration among students wherever they may be training to submit, read, review, and discuss articles. We are also committed to being socially and environmentally responsible. Our internal administration is completely paperless and we have a requirement of all editors to sign the UBC Sustainability Pledge[5] as part of their job requirements to maintain a consciousness of their ecological footprint while participating in the publication process.

The *UBCMJ* came to fruition through the invaluable support of the UBC Faculty of Medicine, the *British Columbia Medical Journal*, the BCMA, and the CMA; the mentorship of patient and talented people within UBC and elsewhere; and the hard work of nearly 100 students and faculty across the province. To us, the support and welcome attitude with which this idea was received along each step of the way was instrumental to us being able to bring this project into being, and within such a short time period. We are truly grateful to everyone who has provided support.

Medical communication is an essential component of the development of our competency as physicians, and we hope that the *UBCMJ* will contribute to the education of medical students in this important sphere. We now open our pages to fellow health science students internationally and encourage submissions, comments and questions to med.journal@ubc.ca.

Diane Wu, BSc Hons, Vancouver Fraser Medical Program 2012
Pamela Verma, BSc Hons, Vancouver Fraser Medical Program 2012

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FACULTY OF MEDICINE

Dear UBC Medical Journal,

It is with pride that I look upon the launch of this publication. The work that students have invested in the journal this past year is evident in every page, and provides a window to the impressive and vibrant body of knowledge that is being generated by medical students in our Faculty.

The University of British Columbia has long been a leader in medicine and research. Members of the Faculty of Medicine are paving the road for development and innovation on local, national, and international stages. For their part, medical students make a valuable contribution to the pool of knowledge and success of UBC on the world stage as a leading research university.

Since the creation of the first UBC Medical Journal back in 1962, student interest in research has grown tremendously. Our medical students have expanded their interest and curiosity in medicine beyond the curriculum and now have a stellar record of publication even prior to entering medical school. This interest in research has for years anticipated the renewal of a student-run, peer-reviewed journal, and we welcome the long-awaited addition of the UBCMJ to our school's fine record of medical communication.

Congratulations once again on the establishment of this fine publication; the talent and hard work of the editors, reviewers, and writers is evident in the quality of the material, and will be a vital contributor to the Faculty of Medicine's goals of fostering communication within the distributed medical program and throughout Canada. The UBC Faculty of Medicine is proud of the work of the UBC Medical Journal and looks forward to seeing the publication grow for years to come.

Yours sincerely,

Gavin Stuart, MD, FRCSC
Dean

FROM THE BC MINISTER OF HEALTH SERVICES

Congratulations on the publication of the first issue of the University of British Columbia Medical Journal, created by students, for students.

I am honoured to be a part of this historic issue – the first medical student journal in Western Canada – and I know that this will be the first of many successful issues.

Each year, bright, motivated young British Columbians like you begin along the long and often difficult road to a career dedicated to helping others. As the Minister of Health Services, I want to take this opportunity to personally thank you for your commitment to improving the lives of your communities. We recognize the hard work that this journey takes, and deeply appreciate your efforts.

British Columbians need you now, more than ever. As our population grows and ages, each of you will be crucial to our efforts to keep B.C. as the healthiest province in Canada. As you continue in your education, I hope that you will consider the opportunities available in communities across the province, where each of you, as highly-trained medical professionals, is in great demand.

We remain committed to investing in your education and the education of future doctors. That is why we have doubled the number of doctor training spaces, expanded post-graduate opportunities and created additional campuses in Victoria and Prince George, with a fourth currently in development in Kelowna. In fact, we are proud that UBC has the highest number of seats of any English-speaking medical school in Canada.

So again, congratulations on the publication of this inaugural issue of the UBC Medical Journal, and, on behalf of all British Columbians, thank you.

Yours truly,

Kevin Falcon
Minister of Health Services

RESEARCH LETTER

Methadone Maintenance Treatment: A Study of Patients' Perspectives in Prince George, British Columbia

William JA Connors, B.Sc.[a]

KEYWORDS: *satisfaction with treatment; methadone maintenance treatment; opioid dependence; survey; Prince George*

INTRODUCTION

The concept of "patient satisfaction", defined as the subjective result of expectations and experiences within health systems, has gained prominence over the past several decades[1] and is now recognized as a central component to effective addiction treatment models.[2] Despite this acknowledgement, validated assessment instruments remain limited, particularly in the area of community-based services.[3,4] This is uniquely relevant to methadone maintenance therapy (MMT) because research has shown that both patients and health care providers display significant ambivalence towards therapy,[5] despite results suggesting a correlation between patient satisfaction and treatment outcomes.[6]

Methadone maintenance therapy, which involves the administration of regular controlled doses of methadone, reduces the morbidity and mortality associated with heroin and other illicit drug use. Having both good oral bioavailability and a long duration of action, properly dosed methadone can effectively prevent withdrawal symptoms, reduce cravings, and block the euphoric effects of short-acting opioids. MMT for patients with substance dependence disorders is a research-validated therapeutic intervention[7] endorsed at both the federal and provincial levels in Canada.[8,9] Over the past two decades, British Columbia's provincial MMT program has seen a dramatic increase in size from an estimated 1,221 patients in 1991 to 8,985 in 2007.[7-9] In light of BC's expanding MMT program and the growing body of research in the field of patient satisfaction, the objective of this study was to assess patient satisfaction within a provincially funded MMT program in the rural city of Prince George, British Columbia.

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METHODS

Patient satisfaction was assessed using the Verona Service Satisfaction Scale for Methadone Therapy (VSSS-MT), a multi-dimensional instrument designed and validated for MMT.[4] Next, the study investigated whether a participant's satisfaction with MMT treatment is associated with specific participant characteristics. Subjects were recruited at the Nechako Centre, a regional addiction treatment facility that operates a conventional outpatient MMT program. This centre includes a staff of two physicians, an addictions counselor, and a program assistant. The program operates five half-days per week and does not dispense methadone on site. Ethics approval for this research was obtained from the Behavioural Ethics Research Board of the University of British Columbia (H07-02294 issued Jan 31/08; extension granted Jan 2009), as well as the Northern Health Authority (File #RRC-2007-0037 issued Feb 6/08). Informed consent was obtained from all participants.

> "This study is important for being the first of its kind in North America to use a scale specifically developed to assess satisfaction with methadone maintenance treatment.

Study participants were asked to complete the VSSS-MT, a self-reported 27-item scale comprised of four subscales: basic interventions, specific interventions, social worker skills, and psychologist skills. Scale items were designed to assess patient satisfaction with program structure, as well as the professional manner of specific program staff. Responses were recorded on a five-point Likert scale (1 = terrible, 2

= mostly dissatisfied, 3 = mixed, 4 = mostly satisfied, 5 = excellent). In order to assess perceived/actual availability of services, for items relating to specific professional manner or activities, an additional response option of 'not applicable' (score = 8) was offered. For questions addressing specific interventions, participants were asked to identify if they had received a particular service. If the response was 'yes', satisfaction was rated as described above; if the response was 'no', the desired availability of the service was assessed (6 = no, 7 = yes, 8 = not applicable, 9 = do not know). This design allowed the assessment of satisfaction or dissatisfaction with received services as well as the desired availability of services not provided.

RESULTS

Of 83 patients enrolled in the Nechako Centre MMT program and invited to participate in this study, 28 (33.7%) completed the survey and necessary consent forms. These study participants ranged from 22 to 61 years of age, with a mean age of 41.8 (SD = 10). Women accounted for 53.6% of the sample. The participants were more often single (66.7%) and the majority (60%) had not completed high school. Study participants on average took a methadone dose of 75.3 mg/day (SD = 50.4), had been enrolled for 23.4 weeks (SD = 18.4), and had an average length between appointments/urine samples of 2.9 weeks (SD = 2). T-test and χ^2 analysis were performed for both continuous and categorical variables respectively, and the results showed similarities in patient features between the study participants (n = 28) and non-participants (n = 55, enrolled in the MMT program but not participating in study; characteristics of this sample were obtained from record review). This suggests that the findings may be representative of the Nechako Centre MMT patient population. The only identified significant difference between these groups was a greater prevalence of prior use of marijuana (18.9% versus 50%; $\chi^2(1) = 8.52$, p = 0.004) and cocaine use (54.7% versus 85.7%; χ^2 (1) = 7.78, p = 0.005) amongst participants.

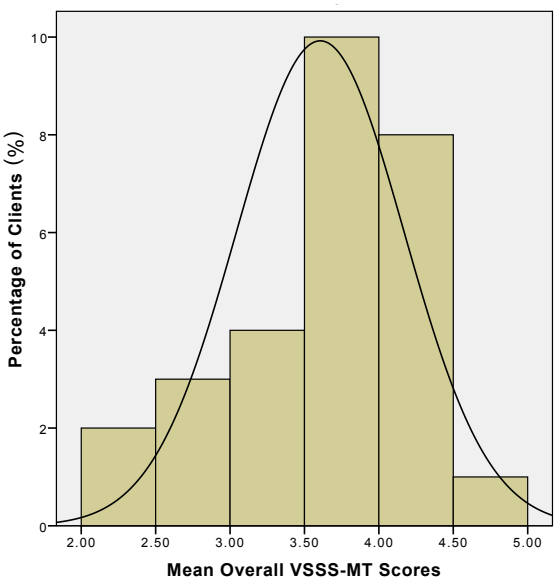

Figure 1. Left asymmetry (index = -0.431) in the distribution of the mean overall scores on the Verona Service Satisfaction Scale for Methadone Therapy (VSSS-MT)

The mean overall satisfaction with the MMT program amongst study participants was 3.61 (SD = 1.1) on a five-point Likert scale. Figure 1 shows the distribution of overall mean satisfaction scores. The percentage of patients who felt dissatisfied (score < 3) and satisfied (score > 3), by category, were: overall, 15.8% dissatisfied vs. 49.4% satisfied; basic interventions, 10.7% vs. 63.1%; specific interventions, 31.2% vs. 33.9%; social worker skills, 8.1% vs. 42.0%; psychologist skills, 3.6% vs. 28.6%. Sample sizes reflected total number of participants who answered questions within each subscale, excluding those left blank or with all subscale questions answered 'not applicable'. Totals did not sum to 100% because of excluded, mixed responses (score=3), or unanswered items.

Table 1. Satisfaction with non-provision of services included in VSSS-MT specific intervention subscale

Services Not Provided	Sample Size (n)[a]	'Would you desire to receive this service?'[b]	
		Yes (%)	No (%)
Individual social assistance	27	22.2	7.4
Individual psychotherapy	27	33.3	7.4
Family psychotherapy	25	28.0	36.0
Organized recreational activity at MT centre	25	40.0	24.0
Group psychotherapy	25	32.0	40.0
Connection with steady work	24	16.7	16.7
Home assistance	27	14.8	37.0
Leisure activities away from MT centre	27	55.6	18.5

[a]Sample sizes represent the number of participants who completed each specific intervention question (total study sample N = 28).
[b]Since items answered 'do not know' and 'not applicable' are not presented, percentages do not sum to 100%.

Further analysis of the specific intervention subscale provides insight into desirable features of a MMT program. The specific intervention subscale presented items regarding non-essential services in a manner that suggested they would be available in ideal circumstances. In this way, responses to these items allowed for the assessment of perceived unmet needs, which are potential targets for reform. Upon reviewing responses to these items, socially intrusive services (i.e. 'family psychotherapy', 'group psychotherapy', and 'home assistance') were more often considered undesirable whereas individual and recreational services (i.e. 'social assistance', 'individual psychotherapy', 'MMT program organized recreational activities', and 'assistance with non-MMT program leisure activities') were more often identified as desirable. These findings are quantified in Table 1. Although these differences were not statistically significant due to a small sample size (Fisher's exact/ χ^2 tests, $p > 0.05$), the findings regarding less desirable services are in agreement with existing research on participant-defined ideal methadone programs.[10,11]

Despite only representing a minority of patients from Prince George's largest centralized methadone treatment program, this study is important for being the first of its kind in North America to use a scale specifically developed to assess satisfaction with methadone maintenance treatment (VSSS-MT). This was determined by reviewing PubMed articles resulting from a search using the MeSH terms: "Methadone" AND "Patient Satisfaction" OR "Consumer Satisfaction" AND "Substance Abuse Treatment Centers". Similar to the findings of the Spanish team who designed the VSSS-MT,[11] this sample of patients was overall slightly satisfied with MMT (mean overall score of 3.61 on the VSSS-MT). The findings of this current study suggest that improvement in overall satisfaction may lie in the further development of individual and recreational services. However, this study was unable to identify any specific MMT or patient variables that had a statistically significant influence on overall satisfaction. Low response rate and the small sample size limited the statistical significance of these findings. Future research would likely benefit from greater pre-study sensitization and focus group feedback on study design in order to address this challenge of low participation. Clearly, as British Columbia's MMT program continues to expand, further research in this field will be needed to ensure both efficient resource allocation and continued advancement in the area of substance abuse treatment.

ACKNOWLEDGEMENTS

The UBC Faculty of Medicine and the Northern Health Authority supported this research. This research was made possible by the gracious translation and sharing of the VSSS-MT research tool by Jose Perez de los Cobos, MD with the University of Barcelona Medical School; the guidance and support of Gary Poole, PhD of UBC Healthcare and Epidemiology; and Lawrence Fredeen, MD of UBC Family Medicine. The author is grateful to the Central Interior Native Health Society staff for their support; to Audrey Fillion and Margaret Grover with the Nechako Centre for their assistance in gathering data; to Brendan Connors, PhD candidate with the Behavioural Ecology Research Group at Simon Fraser University for his technical assistance; and to Joseph Connors, MD for his editorial guidance. This paper is dedicated to the memory of Cecil.

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REVIEW

Vocal Cord Dysfunction: Current Understanding and Approach to Disease

Sandy D Shamon, BHSc[a]

ABSTRACT

Vocal Cord Dysfunction (VCD) is a serious disorder of the vocal cords and laryngeal muscles that mimics asthma and can seriously affect the patient, both physically and emotionally. Patients with this condition are often misdiagnosed and treated inappropriately due to lack of systematic knowledge concerning diagnosis and therapy. The aetiology remains a topic of research; in fact, most experts now agree that vocal cord dysfunction is a group of conditions, or that it has multiple aetiologies. This is appreciated by the extensive number of terms that have been used to describe it. Epidemiological data is also limited, but preliminary investigations suggest that its incidence is higher than initially appreciated. This review summarizes the current existing knowledge and aims to help the reader recognize and develop a management approach to vocal cord dysfunction.

INTRODUCTION

Located in the center of the voice-production apparatus, in the gateway to the lungs, the vocal cords are critical in two fundamental aspects of human physiology: breathing and speech. First described in 1842 by Dunglison,[1] visualized by Mackenzie in 1869[2] and later described clinically by Sir William Osler in 1902,[3] aetiologies of disorders of the vocal cord and associated laryngeal muscles remain an active topic of research. Vocal Cord Dysfunction (VCD) is a disorder that has been described under many names including "Paradoxical Vocal Cord Motion (PVCM)", "Episodic Laryngospasms", "Functional Upper Airway Obstruction", and more recently, "Irritable Larynx Syndrome (ILS)".[4,5] Historically, psychiatric conditions, such as hysteria and Munchausen's stridor, have dominated the aetiological explanations.[1] The term 'Vocal Cord Dysfunction' emerged in the 1980s as an umbrella term to describe a group of ill-defined abnormalities of the vocal cords.[6] The symptoms caused by these conditions include inspiratory stridor or wheeze, dysphonia, globus, chronic cough, laryngeal spasms, and in some cases, severe airway obstruction (Table 1).[4] Given these symptoms, many of these patients are diagnosed with asthma and treated with high dose steroids while their symptoms persist.[5,6] In many patients, this has led to unnecessary hospitalization and tracheostomy.[7] Despite this, asthma is still an important differential diagnosis that must be ruled out.

Despite research efforts, the epidemiology of VCD remains poorly understood. Various investigations reported incidence rates that vary widely between 2% and 30% in patients with asthma[8,9] to 15% in the general population.[10] However, the incidence is estimated to be higher than generally expected.

The term VCD is thought to be too broad by some experts and terms such as ILS and PVCM, which are more descriptive of the underlying pathology, are preferred.[4,11] ILS, proposed by Morrison and colleagues, is used particularly when the causative trigger or stimulus is known.[4] This review will employ the term VCD to refer to all forms described, as the purpose is to provide an overview to non-expert health care professionals and medical students who may encounter patients with the described symptoms in primary care or hospital settings.

Table 1. Symptoms of VCD and differential diagnosis

Symptoms
• Inspiratory stridor/wheeze
• Tightness of throat
• Shortness of breath/dyspnea
• Laryngeal spasm
• Dysphonia
• Cough
• Choking sensations

Differential Diagnosis
CONGENITAL
• Subglottic stenosis
• Laryngeal web
ACQUIRED
• Asthma
• Foreign body
• GERD
• Infection
• Neoplasm
• Trauma
• Munchausen's/Anxiety

GERD = Gastroesophageal Reflux Disease

ANATOMY AND PHYSIOLOGY OF THE VOCAL CORDS

The vocal cords are located in the larynx. The false vocal cords are located superior to the true vocal cords and it is the dynamic true vocal cords or simply "vocal cords" which play a role in phonation, since the false cords are fixed. Abduction and adduction of the vocal cords are controlled by contraction of the posterior cricoarytenoid (PCA) and lateral cricoarytenoid (LCA) muscles, respectively.[11] The recurrent laryngeal nerve, a branch of the vagus nerve, innervates these muscles to control the space between the vocal cords referred to as the rima glottidis (Figure 1).[12] The width of this space regulates the amount of air flowing into and out of the lungs.[10] The tone of these muscles is rhythmic with the respiratory cycle as it is driven by the respiration center in the medulla.[10,11]

During inspiration, contraction of the PCA muscle leads to

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abduction of the vocal cords and opening of the glottidis. During expiration, the glottidis narrows partially.[10] Thus, the glottidis is usually open during breathing and changes width during speech to produce phonation (Figure 1).[11,13] The glottis also plays an important role in protecting the airways against noxious stimuli, through the mechanism of coughing.[10]

THE VOCAL CORDS IN VCD

In VCD, the vocal cords paradoxically close during inspiration. The posterior diamond-shaped gap, referred to as the 'glottis chink', represents a characteristic pattern seen in laryngoscopy during an acute attack (Figure 2).[10,14] This is considered the gold standard diagnostic criterion and causes extrathoracic upper airway obstruction leading to potentially severe dyspnea and wheezing. Episodic closure, which takes place during speech, can also result in dysphonia. Some patients may also experience cough and the sensation of choking.[10]

DIAGNOSIS OF VCD

The presenting symptoms of patients with VCD, as well as any existing co-morbidities, have helped to shed some light on the possible causes. Many criteria have been proposed in the diagnosis of VCD. It is important to start with a thorough history to illicit the symptoms, triggers and co-existing risk factors, such as reflux disease or emotional distress (Table 1). The role of a physical exam is limited to noting any spasm or tension in the laryngeal muscles or signs that suggest an alternative diagnosis, such as cyanosis and eczema in asthma. Pulmonary function tests and oxygen status, along with visualizing the paradoxical closure, are recommended as gold standards.[10,11,14] Spirometry typically exhibits a pattern of extrathoracic airway obstruction during inspiration.[5,10,13] Three criteria seem to be emphasized in the diagnosis of VCD: 1) adduction of the true vocal cords during inspiration or during both inspiration and expiration; 2) presence of posterior open glottis chink during adduction (Figure 2), and; 3) absense of gagging or coughing during laryngoscopy, since these cause closure of the cords even in absence of VCD.[15] Palpable or visualized laryngeal tension in the presence of a known stimulus, ranging from odours to psychogenic phenomena, are emphasized in the diagnosis of ILS.[4] Other helpful indicators include a lack of significant improvement in response to bronchodilators or corticosteroids, which is usually observed in asthma. In reality, all of these steps are important to rule out other causes and better characterize the diagnosis (Table 2).[5,11] Due to the lack of systematic diagnostic and interventional protocols, a patient with high suspicion of having VCD should be referred to a specialist such as a laryngologist or respirologist. This also highlights the importance of educating primary health care professionals and trainees about VCD because it is often misdiagnosed as asthma due to their similar clinical presentations. In complex cases, VCD can co-exist with asthma, therefore a detailed multi-disciplinary assessment and supervision of therapy must be present.[15]

Table 2. Recommended elements in diagnosing VCD

Diagnostic Approach
History
• Triggers (e.g. GERD, allergy, anxiety) • Episode duration • Symptoms (e.g. dysphonia, feeling of choking, cough) • Medical and psychiatric conditions
Physical
• Laryngeal tension • Signs of asthma (e.g. cyanosis, eczema)
Tests
• Oxygen saturation • Laryngoscopy during attack (posterior chink visualization) • Pulmonary function test (noting inspiratory extrathoracic obstruction)

AETIOLOGY

Although the definite pathophysiology of VCD remains unknown, theories that explain both the presenting complaints and the success of certain interventions have been proposed. Psychogenic conditions were dominant explanations when the symptoms of VCD were first described. Cases of 'hysteric croup', 'Munchausen's stridor', and conversion disorders have all been reported.[1,7,16] Although these have not been proven, psychogenic and emotional disturbances seem to act as triggers in some patients.[15,17] More recent investigations found the aetiology of this group of syndromes to be more complex. Bucca and colleagues

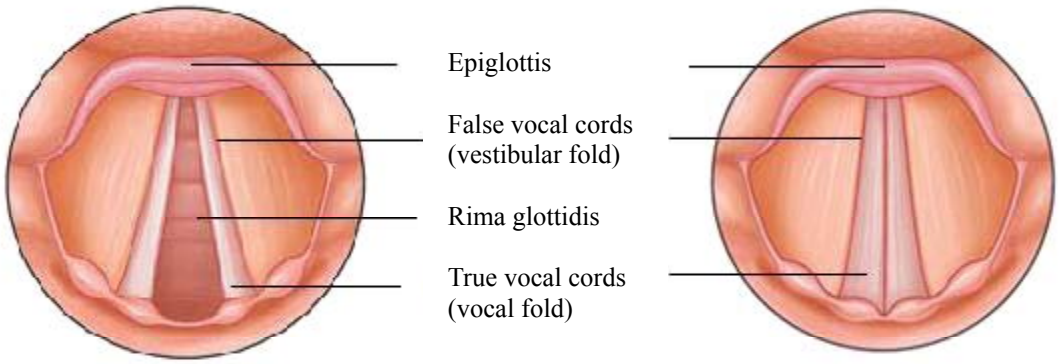

Figure 1. Vocal cords during: inspiration (left) and phonation (speaking) (right).

Adapted from Drake R, Vogl, W Mitchell AWM. Gray's anatomy for students. 1st ed. Philadelphia: Elsevier; 2005: 960; with permission.

hypothesize that laryngeal hyper-responsiveness and bronchial hypersensitivity are due to local inflammatory processes that lead to enhanced reflexes and glottis closure.[18] Ayers and Gabbott put forward the 'altered autonomic response' hypothesis in 2002, which states that areas of the brain with autonomic functions, such as the midbrain, the medulla and prefrontal cortex, have polysynaptic connections with the larynx.[19] They propose that in VCD, an initial inflammatory episode results in adaptation of the local irritant receptors in the larynx, leading to an exaggerated protective reflex by the pharynx at the central level.[19]

Morrison and colleagues (1999), who cointed the term ILS, also suggested a hypothesis that encompasses hypersensitivity and some form of altered central nervous system circuitry.[4] Therefore, their theory will be elaborated upon here. Because a known stimulus is an important criterion in ILS, they studied various triggers in 39 VCD patients. Their neural plasticity hypothesis explains that these stimuli alter the way the central nervous system (CNS) responds to sensory afferent input, which can be a range of sensations or psychogenic thoughts. There are two proposed mechanisms for how this happens: 1) death of original connections leading to sprouting of other adjacent connections to the laryngeal motor system or 2) continuous noxious stimulation leading to enhanced neurotransmitter release and altered genetic expression in the neuron.[4] This altered neuronal physiology leads to a hypersensitive response in the case of ILS. This theory is consistent with the physiological changes that take place in chronic pain, which include decreased action potential firing threshold of the neurons and central sensitization. Furthermore, they suggest an area in the brain might be responsible called the periaquaductal gray (PAG). Plasticity occurs here since this area receives both sensory and emotional input and is involved in vocal and laryngeal motor output.[4,20]

The co-morbidities that tend to exist in VCD patients point towards a common underlying mechanism consistent with a continuous trigger leading to central sensitization. Andrianopoulos and colleagues showed that after asthma symptoms, gastrointestinal (GI) symptoms and conditions, including GERD (gastroesophageal reflux disease), were the most common medical complaints in patients with VCD.[21] Amongst the rest were various other inflammatory and psychogenic conditions such as allergies and anxiety. GERD is an important trigger being further investigated since GI secretions seem to provoke laryngospasm in canine models and lead to sensitization of mucosal chemoreceptors and vagal-mediated neuronal networks.[22,23] When asked about triggers, reflux and emotions are highly reported by patients along with other various stimuli.[4]

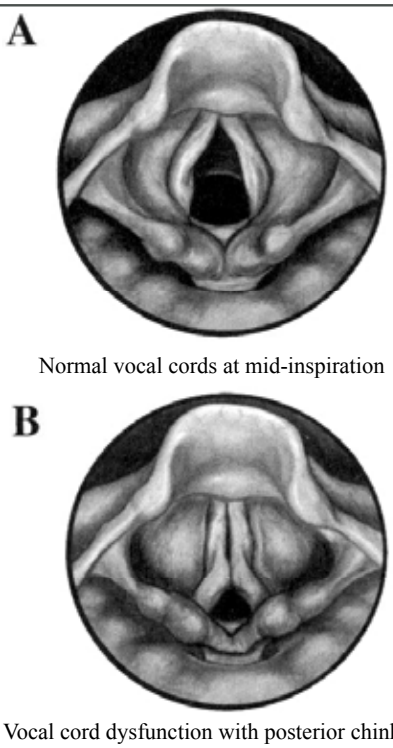

Figure 2. The appearance of the vocal cords during (A) inspiration in a healthy patient and (B) during inspiration in a patient with VCD, showing the adduction of the vocal cords with the characteristic posterior "chink" opening.

Illustration by Leigh Landskroner. Adapted from Perkner JJ, Fennelly KP, Balkissoon R, et al. Irritant-associated vocal cord dysfunction. J Occup Environ Med 1998; 40:136–43; with permission (Lic.:2158381124834).

TREATMENT

Chronic Management

The diversity of treatment options used in VCD reflects the multiple aetiologies and triggers potentially implicated. Education is an important step in teaching patients to recognize triggers and be aware of treatment options for this rare condition.[17,21] VCD is a good example to highlight the importance of a multidisciplinary approach, which is becoming increasingly favourable in medicine. In fact, much research and clinical interventions in VCD have been formulated by speech-language pathologists.[5,17,24] They can train patients to practice breathing exercises and cough suppressing techniques that have the potential to reverse the postulated CNS-mediated hypersensitivity in the long term, and abort acute attacks with techniques such as panting and sniffing.[11,21,25] Relationship-building with the patient is important as patients with VCD are known to use the health care system frequently prior to the proper diagnosis and management of symptoms.[26]

As psychiatric conditions have been postulated in the aetiology and provocation of VCD attacks, it is not surprising that psychotherapy, biofeedback, and hypnosis have been attempted as therapies. A review by Morris and colleagues found that 55.7% of treated patients received some form of psychotherapy.[10] Some patients seemed to benefit, particularly in the presence of psychological conditions such as anxiety, which may act as a trigger. However, the efficacy of these therapies have not been systematically evaluated. Essentially, speech-language pathology and psychotherapy are considered pillars of chronic management of vocal cord dysfunction, but systematic investigation of efficacy and long term data remain unavailable.

In terms of pharmacologic management, patients with VCD may benefit from maintenance therapy for co-existing conditions that may act as triggers, including GERD and allergies.[21] It is worth emphasizing that patients with VCD often have a history of unresponsiveness to asthma medications.[6,15] However, asthma may be concomitant, thus the decision to taper or start inhaled bronchodilators should be done cautiously.[14,15]

Acute management

VCD patients can also present with more severe attacks that require immediate management. In such settings, Heliox, an inhaled mixture of oxygen and helium has been commonly used.[27] Because of its low density, Heliox allows air to flow through and

Table 3. Treatment of acute and chronic VCD

Treatment options
Acute Attack
• Panting/ sniffing/ calming
• Heliox gas
• Benzodiazepine
• Botulinum toxin
Chronic
• Speech language pathology training
• Counselling/ psychotherapy

thus decrease the effort of breathing and consequently reduce the anxiety of the patient. Benzodiazepines have also been found to alleviate acute symptoms by acting as sedatives and reducing the associated anxiety.[4] Botulinum toxin injections have also been used for acute management. They work by paralyzing the muscles controlling the cords leaving them unable to adduct episodically.[11,21] This modality was first used in patients with laryngeal dysphonia[28,29] and later used in VCD.[31] The delay before onset of action and the need for continuous injections are two disadvantages to using this modality as maintenance therapy. Severe attacks requiring intubation, intermittent and continuous positive airway pressure, and tracheostomy have also been reported[6,21]. The main treatment goal is to avoid these invasive methods by recognizing the symptoms early and attempting the other options first (Table 3).

SUMMARY

Despite the availability of many reports and observational studies on this topic, there remains limited objective methods of diagnosis and treatment. Efforts have been directed towards understanding the pathophysiology, which suggest an irritant-mediated mechanism leading to altered central responses. This could aid in recognizing the symptoms and in better targeting the treatment at the dysfunctional pathways.[4,18,19] At this time, it remains the clinician's judgement to select a treatment modality that addresses the potential underlying defects suspected from the history, physical and other investigations, such as spirometry and laryngoscopy (Table 2). Ultimately, training by speech-language pathologists is recommended because it can be tailored to the patient to target the underlying defect.[5,17,24] Chronic episodic airway obstruction and accompanying wheeze can have an extensive burden on the functional and psychosocial aspects of the patient's life. A strong doctor-patient relationship and a multi-disciplinary approach are recommended to help educate patients, train them to control and abort these attacks, and to provide symptomatic relief. Future efforts should focus on well-designed randomized control trials and prospective observational studies to test treatment modalities objectively and to establish the epidemiology and risk factors of VCD, respectively.

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REVIEW

Evidence-Based Medicine: An Introduction for Medical Students

Diana Diao, BSc[a], Brandon Galm, BSc[a], Sandy Shamon, BHSc[b]

ABSTRACT

Despite its recent development, *evidence-based medicine* (EBM) is increasingly being implemented in clinical practice, taught in medical schools, and relied upon in government policy-making. Although the principles guiding EBM may seem simple, the translation of scientific and clinical evidence into medical practice has inherent challenges. This review of EBM provides an overview of the history and development of EBM. In addition, we discuss some of the current academic groups that provide EBM resources, specifically the Cochrane Collaboration and the Therapeutics Initiative. We also present several challenges that face the practice of EBM and the barriers that persist in the medical curricula as educators strive to teach these concepts.

KEYWORDS: *Evidence-based, systematic, Cochrane, Therapeutics Initiative*

HISTORY AND BACKGROUND

Evidence-based medicine (EBM) is a relatively new idea in clinical practice and has been defined as "the conscientious, explicit, and judicious use of the best current evidence in making decisions about the care of individual patients".[1] EBM acts as an important link between current scientific research and clinical practice and aims to provide patients with the best possible care.[2] Although the concept of testing various interventions for efficacy has existed for many centuries, EBM has only started to gain prominence in the late twentieth century. First developed through the work of the Scottish epidemiologist and physician Archie Cochrane in the 1970s, EBM was later introduced into medical practice and education by David Sackett and Gordon Guyatt of McMaster University in the 1990s.[3] A recent online poll conducted by the British Medical Journal named EBM the eighth most important medical breakthrough since 1840, illustrating its increasing significance.[4]

> "Will the use of EBM in medical teaching help medical students become better clinicians?

The use of EBM in clinical practice is a process that requires the application of five steps.[5] These steps, outlined in Table 1[1], should be followed in a rigorous manner in order to maximize benefits to patient care.

When evaluating studies for EBM, it is essential to use the best available evidence. In most cases, randomized controlled trials (RCTs) are considered to be the best evidence, while non-controlled trials, observational studies, and medical opinions that are not based on scientific research are considered weaker sources (Table 2).[2] The strength of RCTs lies in the process of randomization. This process balances both known and unknown confounding and biasing factors across the comparison groups, and thus makes the conclusions more reliable. However, while RCTs are considered the gold standard for evidence, they may not always be practical or ethical. For example, if one wanted to evaluate the effect of smoking on lung cancer, it would be unethical to assign one group of patients to smoke every day, while at the same time, assigning another group to refrain from smoking. In situations like these, observational or case-control studies are necessary. Similarly, lower levels of evidence are acceptable for the study of rare conditions where it is more difficult to perform large RCTs.

Several fundamental concepts underlie the proper application of the EBM process and the appropriate appraisal of evidence. The first is the use of suitable study outcomes. A clinical endpoint may or may not be perceived by the patient, but is clinically relevant. Morbidity and mortality are two clinical endpoints commonly used in clinical trials. Conversely, surrogate markers are those that act as surrogates for a disease process and are typically thought to be important in the pathophysiology of the disease. For example, medications for diabetes mellitus are often selected based on their ability to lower levels of hemoglobin A1C levels.[6] However, even if the drug is able to lower this surrogate marker of diabetes, it may not improve the quality of life or decrease the mortality and morbidity associated with the disease. In fact, in some instances, drugs that have been shown to act beneficially on surrogate markers have actually increased mortality and morbidity.[7] Evidently, to the patient, the quantity and quality of life are more important than blood levels of hemoglobin A1C. Thus, when evaluating trials, it is preferable to look at clinical outcomes as opposed to surrogate outcomes.

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Table 1. Steps Involved in the Use of Evidence-Based Medicine

1. Defined and focused clinical question
2. Thorough search of the appropriate literature for all relevant clinical trials
3. Critical appraisal of the collected evidence
4. Patient-centred decision making
5. Monitoring of clinical outcomes

EBM IN PRACTICE

One of the central, but arguably most challenging, aspects of modern medicine is keeping informed of the latest research. In order to assist physicians with this task, systematic reviews have become an important component of the practice of EBM. A systematic review is the process whereby all available clinical trials that seek to answer a clinical question and meet predefined inclusion criteria are aggregated into an analysis in order to create an overall conclusion. Once a systematic review has been performed, updates with new relevant research are expected. Some groups, such as the Cochrane Collaboration, require such updates be performed at least every two years. These reviews are especially useful to practicing clinicians as they are designed to provide a summary of the relevant clinical points that can be applied in medical practice.

> “Many medical schools are moving away from teaching methods of critical appraisal...and instead simply emphasizing the implementation of evidence.

There are several independent organizations around the world that are involved in producing systematic reviews. The largest and most comprehensive is the Cochrane Collaboration, which was founded in 1992 and named in honour of Archie Cochrane, a pioneer in the use of randomized controlled trials.[8] It is a non-profit organization with centers distributed internationally. At each centre, experts in EBM produce systematic reviews that appraise and summarize evidence from many trials on a particular topic. This type of evidence arguably ranks the highest because it critically appraises and interprets the evidence and then provides both the clinical implications and future research directions.

Another major organization involved in producing evidence-based reports is the Therapeutics Initiative (TI), which was established in 1994 in the Department of Pharmacology and Therapeutics at the University of British Columbia.[9] The TI addresses controversial topics in medicine through short “Therapeutic Letters”, which are published every two months. The goal of these letters is to provide evidence-based prescription drug therapy after an extensive review of the most current literature by the Drug Assessment Working Group of the TI. Before the letters are published, drafts are reviewed by all the members of the TI, including experts in a particular therapeutic area. As a member of the International Society of Drug Bulletins and of the Cochrane Collaboration, the TI has both international and local impact through the dissemination of its Therapeutic Letters and other evidence-based reports on its website.

As an example, in letter 62, the TI provides a case scenario to investigate the benefit gained from treating a patient with mild hypertension, defined as a blood pressure (BP) in the range of 140-160/90-100 mmHg.[10] They conducted a best-evidence search and concluded that treating patients within this BP range for five years achieves, on average, a 0.8% absolute risk reduction for total cardiovascular events. These results indicate that 125 patients must be treated with anti-hypertensive medications for five years in order to prevent one heart attack or stroke; in other words, the number needed to treat (NNT) would be 125 patients for five years. In addition, no significant reduction in total mortality was demonstrated. Should the patient therefore be treated? It is important that the patient understands the probability of benefit and participates in the decisions regarding treatment. This scenario demonstrates the complexity and difficulty of using EBM in practice. The fundamental message is that even the best evidence should not be blindly applied based on well-memorized cut-offs without placing the patient in context.

EBM IN THE MEDICAL CURRICULUM

Careful practice of EBM by physicians and residents can help improve patient outcomes in the clinical setting, but will the use of EBM in teaching help medical students become better clinicians? Over the past decade, EBM has become increasingly integrated into the curricula of many medical schools. This change has been shown to improve students’ ability to develop clinical questions and perform effective literature searches.[11] Evaluation of a longitudinal EBM curriculum has also shown an association with an increased breadth of knowledge of EBM that was sustained throughout the entire curriculum.[12] However, much work remains to be done in developing an effective curriculum for teaching EBM. One study evaluated perceived competence and actual performance in EBM techniques among medical graduates and found that, although many felt competent, the average score of the students was only 55% correct.[13]

In shaping their EBM curricula, many medical schools are moving away from teaching methods of critical appraisal, which form the basis of EBM, and instead simply emphasizing the implementation of evidence.[14] It is crucial that critical appraisal

Table 2. Levels of Evidence by Study Design

Level	Investigation Design
Ia	Meta-analysis of many RCTs
Ib	At least one large RCT
IIa	One controlled trial, without randomization
IIb	Controlled cohort or case-control studies
III	Non-experimental observational studies
IV	Case reports and clinical opinions

of evidence be applied at all levels of EBM. The term "evidence-based" may be used incorrectly or out of context, and it is important to consider factors such as for-profit funding, inappropriate controls, use of surrogate outcomes, publication and reporting biases and misleading reporting, when assessing the validity of individual studies or reviews.[14] This is the rationale behind the need to teach principles of EBM in addition to applying it in practice. Although systematic reviews are deemed to be the strongest form of medical evidence, not all systemic reviews follow the same set of standardized methodology or are of equal quality and reliability. A poorly conducted systematic review may not be immediately obvious to the reader. Additionally, many systematic reviews are not current; only Cochrane reviews are reliably updated every two years. Thus, simply reading the conclusion of a systematic review is seldom sufficient.

CHALLENGES FACING EBM

While EBM may seem to be the calling of medicine in the twenty-first century, there are many barriers that EBM faces before it can become completely accepted as the standard in patient care. While some arguments against EBM are based on misunderstandings, other concerns are legitimate and must be addressed. A common criticism is that EBM is a clinical cookbook for physicians to apply to every patient with a certain illness. However, it is important to understand that EBM is only one component of clinical practice: the goal of EBM is to allow the physician to integrate patient preferences with clinical judgment and appropriate evidence.[14] Another misconception is that only the results of RCTs should be used as a basis for clinical recommendations. While RCTs may be desirable, they are not, as discussed earlier, suitable for all situations and outcomes.[14] EBM strives to use the best available evidence, which may not always be the best form of evidence (i.e., when RCTs are not available). Finally, a lack of evidence in the literature is not equivalent proof that a certain intervention lacks effectiveness.[14] EBM serves to identify knowledge gaps in the literature, acting as an important stimulus for additional RCTs.

There exist other genuine concerns that need to be addressed before EBM becomes more widely accepted. The greatest challenge now is identifying ways to modify clinical behaviour so that EBM is used routinely by practicing physicians.[15] As in any professional field, there is often resistance to change. Barriers to the adoption of EBM often cited by physicians include feasibility, time constraints, and inadequate resources.[15] In a study of surgical residents, challenges faced in the application of EBM were categorized as 1) at the institutional level, where the availability of resources and time needed to obtain them is limited; 2) at the resident level, where the motivation and desire to apply literature to practice is lacking and resistance from attending staff is sensed; and 3) at the attending level, where there is inadequate EBM knowledge and practice. All three factors impeded the use of EBM.[15]

Finally, the private sector constitutes another substantial barrier to the proper implementation of EBM. Several of these issues have been raised previously, including for-profit funding of research trials and the marketing of medications based on surrogate outcomes. Pharmaceutical companies may oppose EBM when it conflicts with their marketing strategies and when certain medications, which may be more costly than older-generation drugs, are not shown to be any better in terms of clinical outcomes. It is also imperative to consider the influence that the pharmaceutical industry has on the development of clinical guidelines. Unfortunately, many current guidelines do not follow EBM principles as they are funded by groups with a vested interest. It is therefore vital that clinicians view recommended guidelines critically and be aware of biases when applying them in practice.

SUMMARY

Although EBM continues to evolve and play a key role in providing systematic reviews to answer crucial questions in medical practice, there remain numerous challenges in the dissemination, acceptance, and application of that evidence. The principles of EBM are rooted in the use of the best-possible study designs, large sample sizes, and the careful and unbiased interpretation of the best available evidence to support or oppose given medical treatments or interventions. However, although EBM may help provide a fundamental framework for practitioners in the delivery of health care, it must be applied appropriately and be sensitive to the needs of individual patients.

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All manuscripts should be submitted by the primary author, and should contain a covering letter indicating the name and full contact information for primary correspondence, the section to which the article is being submitted, and 1-3 suggestions for professionals or academics as expert reviewers. Please refer to www.ubcmj.com for covering letter and manuscript templates.

The manuscript should be clearly organized with an appropriate introduction, development, and conclusion. Longer submissions should consider incorporating subheadings for more appropriate formatting.

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The title page should constitute the first page of the manuscript and include a) the complete names of all authors, highest degree obtained, medical school class (if applicable), and appointments; b) the complete address to which correspondence should be addressed including email, telephone, and fax; and c) up to five MeSH key words describing the text.

3.2 Abstract

Abstracts, which should not exceed 250 words, should highlight the text's most significant points. The abstract may be structured or unstructured with the exception of articles submitted under Academic Research, which must have structured abstracts. If structured, the preferred format is OBJECTIVE, METHODS, RESULTS, AND CONCLUSION.

3.3 Tables, Figures, and Graphics

Tables and figures should only be used if they enhance understanding of the text. These should be named according to an appropriate reference in the text (e.g., figure1.jpeg, figure2.gif, etc.). Figures should be digitally-rendered; freehand-drawn figures and scanned figures will not be accepted. Tables, figures, and graphics must not be embedded within the manuscript but must be included at the end of the document or in a separate attachment, with appropriate referencing within the manuscript and accompanying captions. All abbreviations must be explained.

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Authors are responsible for the accuracy of references cited within the manuscript. References should follow the order in which they appear in the text. References must adhere to the Vancouver style, with in-text references indicated in parentheses. *UBCMJ* adheres closely to the Vancouver style of references (http://www.icmje.org).

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Both generic and trade names should be provided for all drugs, with the generic name in lower-case and the commercial name in parentheses and with a first letter in upper case. Drugs not yet available in Canada should be so noted.

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Research articles report student-driven research projects and succinctly describe

findings in a manner appropriate for a general medical audience. The articles should place findings within the context of current literature in their respective disciplines.

Full Length Articles

Manuscript should not exceed 3000 words excluding abstract, figures, tables, and references. Accepted manuscripts may be shortened for the print edition of the *UBCMJ* with complete versions of the article appearing online. Research should be divided into the subheadings INTRODUCTION, MATERIALS AND METHODS, RESULTS, DISCUSSION, ACKNOWLEDGEMENTS (if any), REFERENCES, DISCLAIMERS (if any). Subheadings within sections are encouraged if they facilitate presentation of the material. Please note the differences in abstract formatting outlined above.

Research Letters

Research Letters summarize research of a shorter length and depth. These do not require extensive elaborations regarding methods or results. Research letters should not exceed 800 words with a maximum of 2 figures or tables, and should not exceed 15 references. No abstract is required for research letters.

Disclosure Agreements

If in your manuscript you acknowledge anyone for a contribution that goes beyond administrative assistance, you must obtain written permission from that person to publish his or her name. It is required that all co-authors and other contributors sign a disclosure agreement that accompanies the submission (available at www.ubcmj.com). It is expected that all authors have read and understood the *UBCMJ* Copyright Policy (on website) prior to submission.

4.2 Case & Elective Reports

Case Reports

Case Reports describe notable clinical encounters with patients. The case should provide a relevant teaching point for medical students. The article should introduce the case and provide a history of the presenting problem and relevant signs and symptoms, diagnostic tests, and provide a discussion of potential treatment possibilities before arriving at a definitive diagnosis. Following the diagnosis should be a brief review of the pathophysiology of the condition and aspects of its presentation and history. Max 1500 words.

In addition to the standard submission criteria, case reports are encouraged to include a brief (200-word max.) inset summarizing the findings in the form of a standard medical history SOAP note (Subjective, Objective, Assessment, Plan).

Patient consent

Submissions must include acknowledgement from the patient in order to be considered for publication. A copy of the written consent obtained from the patient must accompany the submission. It is expected that the author has read and understood the *UBCMJ*'s consent policy prior to submission.

Elective Reports

Elective Reports aim to increase student exposure to a variety of medical specialties and training opportunities both locally and internationally. Reports give a description of the scope of practice of a specific medical specialty and/or training program, and recall the student's impressions and reflections during and upon completion of the elective. Articles should not exceed 1000 words.

4.3 News & Reviews

The purpose of this section is to discuss academic literature and current biomedical research.

There are two main types of submissions:

News and Views

News and Views articles highlight the significance of an interesting research study from a clinical perspective. The author should summarize the research methodology and findings, critically evaluate the experimental design, suggest future experiments, and discuss current research trends in that field. Articles should not exceed 1500 words.

Reviews

Reviews provide an overview of a body of scientific work or medical trend from leaders in the field. Articles should not exceed 2000 words.

4.4 Commentaries

The aim of this section is to provide a platform for intellectual dialogue on topics relevant to the study and practice of medicine.

Editorials

Editorials are well-researched submissions that outline a current or historical medical issue, explore ethics surrounding a particular subject, or give insight into the principles, practice, and/or history a specific medically-related field of study. Max 1000 words.

Commentaries

Commentaries are subjective, anecdotal pieces of personal reflection upon an issue relevant to medical studies, life as a future physician, or the current social context of medicine. Max 800 words.

Current Developments

Current Developments are objective pieces reporting the development of a new medical innovation, technique, or social or political movement. Max 800 words.

Book Reports

Book Reports are briefs featuring a nonfiction or fiction work and explain its significance and context in the practice and study of medicine. Max 800 words.

Community Partnerships Make Youth a Priority at the Vancouver Native Health Clinic

Mary Rendell, BHSc, MA[a], Mike Rivers-Bowerman,BSc, MSc[a], Grahame Quan, BA[a], Akin Famuyide, BSc[a], Georgia Geller, BSc[a], Arianna Watts, BSc[a], Andrea Thamboo, BSc[a]

The health outcomes experienced by residents of the Downtown Eastside (DTES) neighborhood in Vancouver, BC are amongst the worst in Canada. Issues of poverty, mental illness, infectious disease, substance use, sex trade, and homelessness dominate local and national discourse on the uncertain future of the community.[1] As the city readies itself to host the 2010 Olympic Winter Games, these issues have been thrusted into the spotlight. Hundreds of millions of dollars are being spent on Olympic facilities and related public works projects, and some feel that Vancouver's most vulnerable citizens are being left behind. Despite the concerted efforts of both government and community non-profit organizations, existing social housing projects are inadequate,[2] current detox facilities do not meet the demands,[3] and the city's single supervised injection facility operates at maximum capacity, servicing only a small fraction of the total daily neighborhood injections.[4] Life is difficult for many of the residents of Local Health Authority 162, and this is particularly true for youth.

The BC Centre for Excellence in HIV/AIDS, over the past decade, has clearly identified many of the health risks associated with substance use, sex-trade work, and street-involvement in the DTES. In 2005, theirUrban Health Research Initiative arm began the At-Risk Youth Study (ARYS) to analyze the ongoing health practices and outcomes in youth aged 14 to 26.[5] "At risk" youth were identified by a number of criteria, including, but not limited to, factors such as socio-economic situation, mental or physical health, and drug use. Blood samples and interviewer-administrated questionnaires are performed at baseline and then semi-annually to collect behavioural, demographic, and economic data. A recent ARYS report on 529 street-involved youth in Vancouver found that greater than 50% had participated in the illicit drug trade in the previous 6 months and that selling drugs was positively associated with injection cocaine use, crack cocaine use, and homelessness, among other findings. [6] Another ARYS report found that over 70% of study participants had recently used crystal methamphetamine (CM) and that CM use was linked to the initiation of injection drug use.[7] Given the unrelenting epidemic rise of HIV and hepatitis C virus amongst injection drug users, youth with substance dependencies are at a heightened risk of contracting these life-altering diseases.[8, 9] Female sex-trade workers are also a highly vulnerable demographic. Dangerous working conditions in Vancouver's DTES have led to one of the highest HIV infection rates in North America.[10] This is of direct relevance to addressing health outcomes in youth given that the average age of entry into sex-trade work is under 17 years.[11]

As one of the three major health clinics in the DTES, the Vancouver Native Health Clinic (VNHC) is dedicated to providing medical care to all residents, both of Aboriginal and non-Aboriginal descent. A chart review of patient visits between September 2007 and March 2008 found that only 7.3% of appointments were filled by those between the ages of 13 and 29. However, a demographic profile of the DTES for 2007 reported that 21.6% of the population is within this age bracket.[12] While confounding factors related to health care seeking behaviors may contribute to this discrepancy, the fact that demographics were not more closely reflected in clinic attendance statistics was alarming due to prevalent high-risk behavior and poor health outcomes in local youth.

> "The health outcomes experienced by residents of the Downtown Eastside (DTES) neighborhood in Vancouver, BC are amongst the worst in Canada.

In an effort to address the gap between community demographics and health care utilization at VNHC, our group came together in April 2008 to create the Vancouver Native Health Youth Initiative (VNHYI). The goal of this initiative is to increase youth access to primary health care in the DTES through collaboration with VNHC staff, the Community Health Initiative by University Students (CHIUS) and local youth-targeted organizations.

To achieve this goal, we focused on increasing the number of youth accessing VNHC and its related services by opening a youth drop-in clinic. It is open on Wednesday nights from 5:30 to 8:00 PM and is available to all individuals between the ages of 13 and 29. The drop-in is located in a space next door to the main clinic and is occupied by a bustling HIV day program that is left vacant at night. The space includes a large kitchen and eating area

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with an adjoining "living room" complete with couches, tables, and six computers with Internet access.

Measures that have been taken to address the health care needs of this high-risk population include hiring a physician to ensure youth attending the drop-in are given priority access to medical care. Hot, healthy meals are provided and youth have access to free basic health amenities such as toothbrushes, toothpaste, condoms, soap, shampoo, clean socks, and outdoor jackets that were donated to VNHYI last fall.

> "The goal of [the Vancouver Native Health Youth Initiative] is to increase youth access to primary health care in the Downtown Eastside.

Since the youth drop-in opened in October 2008, our approach to addressing the health needs of youth in the DTES has undergone a marked evolution in response to challenges and successes we have encountered along the way. The first three months of operations were very slow due to low attendance. We found it difficult to connect with street-involved youth as we had not yet formed working relationships with community stakeholders, service providers, and youth groups. We then contacted a DTES-based organization, named WATARI Youth Community and Family Services, which employs outreach workers to distribute harm reduction supplies and facilitate youth access to services. After learning about our work at VNHC, it became clear to both parties that by working together we could more effectively address the health care needs of local youth. While our group had the space and funding required to provide youth with access to medical services, WATARI had the direct connection to, and credibility with, the hard-to-reach population we were hoping to target.

Through our partnership with WATARI, two youth workers now do outreach every Wednesday night during drop-in hours, informing youth of the medical care, hot food, and basic amenities they can access at VNHC. This approach led to a marked increase in youth attendance on Wednesday nights. Awareness is spreading that the drop-in is a safe place for youth to relax, eat healthy food, and feel supported in accessing medical care. We now average 12 - 14 attendees during drop-in hours, with numbers steadily increasing each week. Youth who have accessed the clinic on Wednesday nights have received treatment addressing a variety of health concerns including pre-natal check-ups, contraception, methadone-maintenance therapy, STI testing, and wound care.

The significant growth that VNHYI has experienced since partnering with WATARI and their youth-focused network of advocates highlights the importance of seeking out and fostering meaningful partnerships with established community-based organizations. This is particularly important when working with marginalized populations, as interpersonal trust and acceptance are slow to develop. Extra efforts are thus required to ensure sustainability and we have addressed this issue for the coming 2009-2010 academic year by engaging a group of dedicated first-year medical students in the administration and delivery of the VNHYI youth drop-in. As our working relationship with WATARI continues to develop, our short-term goals include collaboration with local artists and musicians to organize regular programming events during drop-in hours. In the long term, VNHYI hopes to expand drop-in hours past 8 PM and to offer this service every night of the week. In the years to come, we hope that medical students beyond the Class of 2012 will continue fostering these partnerships with the VNHC and WATARI to prioritize the health of our community's youth.

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How to Save the Lives of Millions: Rx for Sustainability

Caroline A Walker, BSc[a]

ABSTRACT

Climate change is the greatest threat to global health in the 21st century. Scientists anticipate that climate change will bring famines, mass displacement, infectious disease, and freshwater shortages—problems that can be reduced, if not avoided, by limiting future greenhouse gas (GHG) emissions. Given a professional duty to do no harm, physicians must do what they can to reduce the impacts of climate change. As health advocates and counselors to their patients, physicians can accelerate the move toward sustainability. By promoting behavioural change, such as active transport and eating unprocessed, plant-based diets, physicians can both improve public health and help reduce GHG emissions.

KEYWORDS: *Climate change, Health, Emissions, Mitigation*

> Climate change is the biggest global health threat of the 21st century.[1]

In March 2009, a congress of scientists from over 80 countries raised their concern that current climate data are in line with the worst-case scenarios projected by the Intergovernmental Panel on Climate Change (IPCC).[2] However, the congress maintained that dangerous climate change could still be minimized if dramatic action to reduce global greenhouse gas (GHG) emissions is taken.[2]

The impacts of climate change will be overwhelmingly negative. As sea levels rise and millions of people have their food and water supplies threatened, there will be migrations in unprecedented numbers, exacerbating poverty and violent conflicts.[1-4] The International Organization for Migration estimates that climate change will uproot 200 million people by 2050.[5] A recent study also suggests that people in the tropics and subtropics, which contains half of the world's population, will face severe food shortages by 2100 without extensive adaptive measures.[6]

LOCAL PHYSICIAN LEADERSHIP

In 2007, the Canadian Medical Association General Council voted 95% in favour of a motion requesting that physicians discuss environmental issues with patients, work with healthcare facilities to reduce waste, green their own homes, and introduce environmental programs to medical education.[7] Promoting environmental sustainability has direct co-benefits for health, fits well within the physician's role, and is simply good preventative medicine.

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ACTIVE TRANSPORTATION

Transportation causes 23% of global GHGs and makes up 26% of world energy use.[8] In British Columbia, 58% of personal emissions are due to transport: cars and trucks (44%), air travel (12%), and bus and rail (2%).[9] A U.S. study found that the likelihood of obesity increased by 6% with each hour spent in a car each day.[10] Healthcare professionals can help decrease reliance on personal vehicles, not only by promoting active transportation such as walking or cycling, but also by advocating for infrastructure changes that make these activities safer and more appealing.[11] Active transport represents only 12% of all urban trips in Canada, compared with Germany (34%) and the Netherlands (46%) where cities and towns have extensive pedestrian zones, traffic calming, and dedicated bike lanes.[11] These measures reduce traffic speeds and make commuting safer for cyclists and pedestrians. A review of the impacts of cyclist- and pedestrian-friendly infrastructure in Denmark, Britain, Germany, and the Netherlands found traffic injuries reduced by, on average, 53% in traffic-calmed neighborhoods.[12] A recent meta-analysis of prospective cohort and case-control studies also found that active commuting, whether by foot or by bicycle, reduces cardiovascular risk by 11%.[13]

Reductions in motorized transport have measurable and immediate health benefits. A recent study in the New England Journal of Medicine found that life expectancy increases by about 0.61±0.20 years for every 10μg/m3 reduction in fine-particulate concentration (≤2.5μm).[14] A natural experiment occurred during the Atlanta Olympic Games where Olympics organizers took dramatic efforts to reduce traffic congestion.[15] For the duration

of the Games, the number of children seeking emergency care and hospitalization for asthma dropped by 41.6%, with minimal change in the number of children seeking medical attention for other reasons.[15]

LIMITING CONSUMPTION OF DIGASTRIC GRAZERS

While auto emissions are often at the centre of public attention when discussing climate change, agricultural emissions have an even larger impact. Farming and associated land-use comprise 35% of global GHG emissions.[16] Livestock production makes up 18% of global GHG emissions and uses almost one third of the world's entire land surface.[17] Furthermore, one third of all arable land is devoted to growing animal feed.[17] Dr. R.K. Pachauri, a Nobel Peace Prize recipient and chair of the IPCC, has said that reducing meat, especially beef, is a feasible and immediate way for individuals to significantly reduce their GHG emissions.[21] By encouraging patients to eat less meat and more unprocessed and plant-based foods, doctors can help lessen environmental impacts, simultaneously reducing heart disease, cancer, diabetes and obesity.[19,20] The risk of developing colorectal cancer is found to decrease by 33% for every 100g daily reduction in red and processed meat intake.[21] A prospective study of over half a million men and women demonstrated that high intake of red and processed meat increased the risk of death from cancer, and cardiovascular disease.[22] The researchers calculated that 11% of male deaths and 16% of female deaths within the quintile with highest red meat consumption (62.6g/1000 kcal/d) could have been prevented if their intake was reduced to that of the lowest quintile (9.8g/1000 kcal/d).[22] There is no risk associated with reducing meat intake as long as there is an adequate intake of necessary nutrients and micronutrients.[1,23] Physicians should support patients who choose to eliminate meat from their diets (and 33% of their food-related GHG emissions), since many studies and major dietetic associations recognize vegetarian diets to be healthy.[23,24]

PRIMUM NON NOCERE

As future healthcare providers, we accept our ethical duty to first do no harm. In light of the harms posed by climate change, physicians should be compelled to contribute to the effort to limit its severity. With dual benefits for individual and global health, active transport and a plant-based diet are preventative measures that physicians should advocate.

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Psychiatric Deinstitutionalization in BC: Negative Consequences and Possible Solutions

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ABSTRACT

Over the past half century, psychiatric deinstitutionalization has resulted in the movement of patients from hospitals to community care, supplemented by hospital beds for acute cases. Deinstitutionalization aims to empower mentally ill people and increase their autonomy. In British Columbia, thousands of psychiatric patients at Riverview Hospital have been transferred to the community since the 1990s. Although many patients benefit from community integration, some may experience negative effects. Funds saved by this trend have not been allocated to provide necessary supports to mentally ill people in the community. Due to a deficiency in mental health resources, this population is at risk for homelessness, drug abuse, incarceration in jail, and suicide. An understanding of these issues is required to propose effective solutions. In particular, there needs to be an increase in supportive housing and long-term care facilities for individuals with chronic mental health issues.

Historically, psychiatric patients have been placed in institutions and isolated from society. In 1913, Riverview Hospital was opened in British Columbia and by 1951, housed 4,630 patients.[1] Riverview provided custodial care, where patients had limited control and their lives were dictated by institutional routine.[2] However, with the rise of the human rights movement, deinstitutionalization of psychiatric patients has become widespread across Canada. According to the World Health Organization, mental health care has progressed over the past half century from institutionalization to community care supplemented by hospital beds for acute cases.[3] The goal of community care is to empower mentally ill people and integrate them into their communities. At Riverview, patient transfer to the community reduced the patient population to 1,000 by the early 1990's.[1] In 2002, the Riverview Redevelopment Project announced plans to transfer the remaining Riverview patients to community facilities on a "bed-by-bed" basis.[4] However, 200 beds at Riverview were never replaced.[1]

> "Due to a deficiency in mental health resources, [the mentally ill] population is at risk for homelessness, drug abuse, incarceration in jail, and suicide.

For some mentally ill people, community care is a positive experience and increases independence. Benefits include employment, social integration, and avoidance of re-hospitalization. Unfortunately, community care may not be suitable for all patients, especially with a lack of support. In a report on the deinstitutionalization of Riverview, researchers noted an "abysmal failure on the part of governments to provide community-based supports to people leaving institutions, including adequate housing and sources of income.[2]" The government has not re-allocated resources saved by closing institutions towards community care. Between 1994-95, the operating cost of BC psychiatric hospitals and psychiatric units in hospitals was 424 million dollars.[5] By 1998-99, this cost dropped to 234 million dollars. However, a comparison of expenditures for community psychiatric services between 1994-95 and 1998-99 shows a decrease from 208 million dollars to 200 million dollars.[5] Despite a 200 million reduction in spending on psychiatric institutions, the funding for community care decreased as well. These funding shortfalls lead to a lack of support for transferred psychiatric patients. Reduction in hospital beds results in psychiatric admissions only for acute cases and these patients are discharged quickly.[6]

NEGATIVE CONSEQUENCES OF DEINSTITUTIONALIZATION

Dwindling community resources have increased the use of ill-suited hospitals for mental health needs. Often, psychiatric patients require longer hospital stays to stabilize their condition. However, a national study in 2008 found that mental health patients in BC were discharged from hospitals in an average of 15 days, before many were stabilized.[7] Consequently, 10-20 percent of discharged patients were likely to be re-admitted within 30 days.[7]

Without sufficient mental health resources, there may be an increased risk for homelessness and drug abuse among mentally ill people. It is estimated that 30-35 percent of Canada's homeless population are mentally ill.[6] The lack of community-based supports means that psychiatric patients have difficulties obtaining employment and housing, and may not adhere to treatment. As a result, these patients may become poor and homeless.[6] In particular, the Vancouver Downtown Eastside (DTES) neighborhood is a low-income area, invested with many community resources targeted to the homeless, making it

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appealing to mentally ill people.[1] Over 50 percent of psychiatric patients have a co-existing drug or alcohol addiction, referred to as a "dual diagnosis".[6] For these people, services are lacking and there are long wait times for treatment.

Since mentally ill people may be homeless and many have co-existing drug addictions, police involvement is substantial. In a study conducted in 2008, the Vancouver Police Department found that response to mentally ill people accounted for approximately 31 percent of all calls they attended.[1] Calls were analyzed over a 16-day period in September 2007, and police officers indicated whether poor mental health was a factor. Specifically, 49 percent of calls within the DTES were attributed to mental illness. The report suggests police are informal "first responders" in our mental health system, and estimates an annual cost of 9 million dollars.[1] These results suggest psychiatric patients are not receiving the support they need.

A report by the Canadian Mental Health Association states that jails contain between 15 to 40 percent mentally ill people - significantly higher than the incidence of mental illness in the general population.[6] Incarcerated psychiatric patients are more likely to be victimized by others and exhibit disruptive behaviors than other prisoners. Instead of medical treatment, these patients may be disciplined through solitary confinement, which can worsen their mental condition.[6]

A lack of timely access to mental health treatment can put some psychiatric patients at increased risk of suicide: a 2003 review indicates that deinstitutionalization has been associated with elevated suicide rates in psychiatric patients.[8] This paper suggests that institutions provided early recognition, control and long-term treatment for suicidal psychiatric patients. With the dissolution of psychiatric hospitals, a reduction in supervision may lead to a higher likelihood of suicide. The author suggests that for some chronically suicidal patients, asylums may be extremely beneficial.

Although studies link deinstitutionalization with negative effects, it is difficult to establish the proportion of mentally ill patients that experience sub-optimal outcomes. Nonetheless, there is overall cause for concern given the severity of reported negative effects, which must be addressed through improvements in services.

POSSIBLE SOLUTIONS

Some mentally ill people cannot function optimally in the community and require more structure and support than others. In particular, suicidal patients may benefit from the control and long-term treatment offered by institutions. In the shift from paternalism to individualism, many psychiatric patients have been granted autonomy, but lack resources to maintain well-being. There needs to be a balance between independence and support; it is apparent from the current mental health situation that this balance has not been achieved.

To address mental health deficits, the Burnaby Center for Mental Health and Addiction was opened in July 2008.[10] This unique facility offers 100 beds for mentally ill patients with complex needs, including homelessness and drug addiction. Its goal is to stabilize patients over an average of nine months, then reintegrate them into the community. Patients have multiple points of access to the facility, including primary care, hospital, community, and the criminal justice system. This is a positive development, but there is a need for even more beds. The Vancouver Police report estimates that out of the 2,100 people not served adequately on the Downtown Eastside, 500 people are chronically mentally ill, with co-existing drug addictions, experience regular police contact, and lack of housing.[1]

To reduce police time spent responding to mental health, the Vancouver Police Department report suggests developing an "Urgent Response Center" for police to bring patients with mental health, addictions, and housing needs.[1] This immediate care system has been developed in other cities such as Calgary, Alberta, where mentally ill adults involved in minor criminal offences are kept out of jails and offered treatment.[9] This program has decreased hospital admissions, repeat charges, and court appearances.[9]

These proposed solutions require funding, but the government has saved millions of dollars through deinstitutionalization.[5] These resources should be re-allocated towards community care. Such solutions could reduce spending through decreased police response, hospital admissions and incarceration for mentally ill patients.

CONCLUSION

Research suggests the mentally ill population is at risk of homelessness, drug abuse, jail time, and suicide. In the wake of deinstitutionalization, it is vital that these patients possess community support to maintain wellbeing. Possible solutions include increased supportive housing, long-term care, and an urgent response center. As a society, we have an obligation to address these problems and provide needed medical care to people living with a mental illness.

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Can You Put a Price on a Cure for HIV/AIDS?

Iris Liu, MSc[a]

KEYWORDS: *HIV treatment, ethics, cost, CCR5, bone marrow transplant*

By the end of 2002, 22 million people were estimated to have died from secondary infections as a result from being infected by Human Immunodeficiency Virus (HIV).[1] In 2007, 33 million people were living with HIV/AIDS and 2 million people succumbed to the disease.[2] There are currently no vaccines available, and those that are under development are fraught with complications. For example, in 2007, a large scale clinical trial had to be discontinued because of safety concerns.[3]

This article will review and comment on a recent case study published in *The New England Journal of Medicine* (NEJM), by Hutter and colleagues, describing a patient who received a bone marrow transplant (BMT) that successfully conferred resistance to HIV.[4] While this type of a therapeutic intervention holds much promise, a number of bio-ethical and economic concerns are raised. How much are we willing to spend to treat HIV victims in the midst of a global epidemic?

The infection mechanism of HIV is well understood and majority of the current treatments and research invest in blocking this pathway at multiple steps in the infection process. Normally, the virus requires two receptors in order to enter cells: chemokine receptor 5 (CCR5) and CXC chemokine receptor 4 (CXCR4). Importantly, it has been reported that individuals with mutations in the CCR5 gene are resistant to HIV. Hutter and colleagues describe a patient who was seropositive for HIV. When he subsequently developed acute myeloid leukemia, he was treated for it with a bone marrow transplant from a donor who carried a homozygous mutation for the CCR5 gene. By replacing the patient's bone marrow with one that did not express CCR5, this group hoped to confer "resistance" towards the virus in this patient. Remarkably, over the next 20 months, both blood and rectal biopsy specimens had non-detectable levels of HIV.[4] This finding provided strong evidence for a new modality in HIV treatment: bone marrow transplant (BMT). Typical treatments have been pharmacologic blockade of the HIV virulence pattern, but now BMT might be an effective alternative.

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The concept of conferring HIV infection resistance to individuals through bone marrow raises a number of ethically contentious issues. First,where would this supply of CCR5-mutation cells be harvested from? This mutation is found in only 1 – 3% of the European population. Extensive screening programs would have to be established; what incentives would there be for volunteers to step forward?[5] Even if individuals were to consent to the donation, the ethics around selecting worthy and appropriate recipients, amongst the masses of victims infected with this disease, would likely be even more complicated. HIV is a disease that afflicts both the wealthy and the impoverished. What controls would there be to ensure equal access a costly, but potentially life-saving, intervention?

> "Is bone marrow transplant an ethically responsible treatment for HIV?

Even if the ethical considerations in selecting donors and recipients were to be resolved, the financial burden for this type of therapy would far exceed the current status quo. In British Columbia, antiretroviral drugs (ARVs) are provided to patients at no cost.[6] The costs are absorbed by the publicly-funded health care system at approximately $2,700 per year, per patient, depending on the drug regimen.[7] Assuming that a patient is diagnosed with AIDS at 25 years of age, and will require ARVs for the next 50 years (an assumption for normal lifespan), this brings the total cost of treatment to $135,000. This does not factor in other medical expenses such as physician visits, laboratory tests, and additional medications for treatment of secondary infections. Meanwhile, the average cost for a BMT in the United States can range from $150,000 to $200,000.[8] Considering, however, that the price for treatments can vary with time (e.g. in the 1980's, the cost of ARVs was $10,000 per year[8]), the price difference is not large enough to determine whether this is a good treatment plan for HIV.

One also needs to consider the safety of such a treatment option. BMT, conducted on a large-scale, is associated with significant health risks and complications. Current statistics

reveal the mortality rate for BMT to be 17% mortality overall, but worse in compromised patients. For example, there is a 30% mortality rate for BMT with cancer. Further, BMT is associated with numerous, and severe complications, including interstitial pneumonitis, acute graft versus host disease, and graft rejection.[10] In fact, Hutter and colleagues themselves question the feasibility of BMT as a treatment option because of the inherent risks.

Yet, is BMT an ethically responsible treatment for HIV? Suppose a patient is informed about these dangers, but still requests it as a treatment. Who should be responsible for paying? More importantly, would it be ethical to provide such treatment given the risks and costs involved? Those who favour patient autonomy may argue that this would be an ethical decision. Those who favour the principle of nonmaleficence may argue that this is not a viable option because of the harms associated with the BMT procedure. While we are in the early stages of research in BMT as a possible treatment option for HIV infection, the questions raised in this article will become increasingly important as more sophisticated and risky treatment options become available.

In conclusion, the multitude of ethical issues raised by this NEJM case report warrant further discussion on a scientific and ethical front.

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Fresh Perspectives: An Experience from an HIV/AIDS Prevention and Care Course

Jeanine Marshall, BSc[a]

Last summer, I took part in an HIV/AIDS prevention and care course offered by the Interprofessional Health and Human Service (IHHS) department at the University of British Columbia. I felt it would be the perfect primer on some of the issues I would encounter in the field of international healthcare, in which I have an interest. The course brought together students from medicine, pharmacy, social work, nursing, and nutrition. We had lectures from some of the leading experts in the field of HIV/AIDS and engaged with HIV positive individuals and activists. Two days each week were spent in a variety of different clinical settings – the Dr. Peter Centre, the HIV/AIDS ward at St. Paul's Hospital and the Portland Hotel, to name a few – in order for us to gain a sense of the impact that this illness has on the lives of those affected, and the resources available to them.

I met "Jackie" during one of my first clinical placements at St. Paul's Hospital, located in the Downtown Eastside (DTES) inner-city community of Vancouver. Jackie was a 29-year-old sex-trade worker who had a low CD4 count and suspected Tuberculosis. Her youthful features seemed out of context on her sickly frame; her arms and legs were wasted and limp and she had hardly enough energy to open her eyes, as she faded in and out of consciousness. This scene was a vivid reminder that perhaps I did not have to travel as far as I had thought to find people in the midst of a health care crisis. Though Vancouver's burden of HIV/AIDS is not comparable to that in many other parts of the world, if you take into account the sex trade, homelessness, remove mental health and addiction issues, the city has plenty of problems that have forced people into dire straits.

Another part of my experience during the course involved a visit to INSITE, Vancouver's internationally-recognized safe injection site. I was impressed by the slick stainless steel counters, the boxes of neatly organized medical supplies, and the mirrored cubicles with ample overhead lighting positioned close to the centralized nursing station to ensure adequate supervision. The sterility of this clinical environment was in stark contrast to the warmth and compassion demonstrated by the staff who worked there. They shared information about the organization of the clinic, interwoven with stories of their disappointments, struggles and successes, making the issue of harm reduction come to life. But the experience that perhaps made the biggest impact on me that day happened as I walked down Vancouver's infamous East Hastings Street on my way to INSITE. I distinctly remember being struck by the abrupt transition that occurred as I made my way there; the run-down hotels that were funded by welfare cheques were mere blocks from the ultra-modern high rises of Coal Harbour. How strange it is that the people of the DTES live parallel to such wealth, separated by the physical boundaries of Main and Hastings and by the intangible boundaries of social and financial inequality.

This course gave me the opportunity to get better acquainted with the struggles of the DTES and also with some of the people that have dedicated their lives to working there. During my final placement, I met with two street nurses who delivered antiretroviral medications to patients living in the DTES. The transience of the population to which they minister complicates their seemingly straightforward task. Personally delivering medications to people with a constantly changing address, or perhaps no address at all, requires dedication, patience, and a keen sense of geography. Some were easy to find, as they were not even able to get out of bed, never mind leave their apartment. For others, we combed the streets, looking down alleys, asking acquaintances when they had last seen their friend. The conditions that the nurses work in are often unpleasant: low-income housing complexes that smell of urine and stale smoke, often infested with bed bugs or rats. The street nurses work with the downtrodden and the forgotten - people who have lost faith in others, and often in themselves as well. They meet patients where they are at and provide full service, self-sacrificing care.

> "How strange it is that the people of the DTES live parallel to such wealth, separated by the physical boundaries of Main and Hastings and by the intangible boundaries of social and financial inequality.

When initially confronted by the problems of the DTES, it is easy to be overcome by a sense of hopelessness, but the people I worked with during this elective taught me a different approach than the traditional medical view of caring for patients. Rather than focusing on the 'cure,' they focus on the unique needs of the individual, offering respect and dignity to people who rarely, if ever, receive it. Looking at the problem as a whole becomes overwhelming, but by focusing on the individual and taking a moment to hear their story and see where they are coming from, things begin to seem more manageable. Success is found in the way one engages their patients – letting them know someone truly cares about their welfare. As I move through my clinical years and beyond, I have been reminded by this experience to focus on things from this perspective.

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CASE REPORT

Effective Reduction of Adhesive Capsulitis Pain With a Suprascapular Nerve Block Given in a Primary Care Clinic

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ABSTRACT

Adhesive capsulitis or "frozen shoulder" is a shoulder joint condition defined by pain with decreased active and passive range of motion. The etiology is poorly understood, but the pathological process involves a local inflammatory state, followed by fibrosis or contracture. The condition is often a self-limiting process that resolves within 18-24 months with benign neglect or conservative treatment. Patients failing to improve may require more invasive surgical procedures. The goal of conservative treatment is to reduce pain and improve function; usually this consists of analgesics, non-steroidal anti-inflammatory drugs and physical therapy. Invasive procedures used in non-responsive cases carry significant risks, including humoral fracture, infection, and general anesthesia complications. Suprascapular nerve block is a new treatment where the nerve innervating the shoulder joint is blocked with local anesthetic. Currently, this procedure is not the standard secondary treatment for adhesive capsulitis, but in the future may prove to be an effective way to avoid the risks of more invasive procedures in non-responsive patients. In this case study we describe the clinical presentation, diagnosis, and treatment of adhesive capsulitis in a 52 year-old female who received suprascapular nerve block treatment after failure of conservative primary treatment.

KEYWORDS: *Suprascapular nerve block, Adhesive capsulitis*

ADHESIVE CAPSULITIS

Adhesive capsulitis (AC) is a shoulder condition defined by an insidious onset of pain and a gradual loss of both passive and active range of motion (ROM) in the affected shoulder.[1, 2] Some cases of AC may occur subsequent to injury or immobilization, but most are idiopathic in origin.[2] AC is characterized by inflammation of the synovial lining and capsule with subsequent generalized contracture of the glenohumoral joint.[1] The natural history of AC is usually self-limiting and often improves with benign neglect in 18-24 months.[3] The condition often appears in the fifth and sixth decades of life, but is rare in patients under 40 years of age.[4] The prevalence of AC is thought to be 2% in the general population, although this is increased with other comorbid conditions such as diabetes, hyperthyroidism, hypertriglyceridemia, and Dupuytren's contracture.[4,5]

HISTORY AND CLINICAL FINDINGS

Patients will most commonly present with gradual onset of aching pain over the insertion of the deltoid or acromion with sleep disruption.[5,6] Pain occurs with shoulder movement and results in loss of ROM, especially abduction and external rotation.[4,6] Physical examination reveals limited active and passive ROM of the affected shoulder. Laboratory investigations are unremarkable with the exception of elevated C-reactive protein in early stages.[5] Plain radiographs are normal with AC, but are often ordered to exclude other pathologies.[5]

DIAGNOSTIC CRITERIA

As AC shares many clinical findings with other shoulder conditions, the diagnosis is one of exclusion.[5] Differential diagnoses include impingement, partial and full-thickness rotator cuff tears (RCT), arthritis, and locked posterior dislocation.[5] A list of clinical features of AC defined by Codman criteria include: insidious onset, pain at the insertion of the deltoid, poor sleep due to pain, incomplete elevation and external rotation, reduced active and passive ROM, atrophy of the spinati, and negative radiograph.[5,6]

Two of these features are crucial for distinguishing AC from other shoulder pathologies. First, reduced external rotation is found with AC, arthritis, locked posterior dislocation, fullthickness RCT, but AC does not show any radiographic changes.[5] Second, limited passive shoulder ROM is only caused by joint surface abnormality as found in arthritis or contracture of the glenohumoral ligaments as found in AC.[5] In practice, AC diagnosis is made if physical exam and history include a positive Codman's criteria with confirmation by normal radiograph. Ultrasound may also be used to rule out RCT if it is suspected.

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PATHOPHYSIOLOGY

The pathological process of AC remains unclear, but it is hypothesized that it begins with synovial inflammation followed by capsular fibrosis and contracture.[5,7] The current pathophysiological understanding is described in the context of AC stages. Four stages of AC are described as 1) Inflammatory, 2) Freezing, 3) Frozen, and 4) Thawing.[5,7]

In stage 1, passive ROM is increased with anesthesia indicating that passive ROM is pain limited. Histological specimens demonstrate inflammatory infiltrates and hypervascular synovitis with a normal underlying capsule.[7] Stage 2 differs in that passive ROM is similar with or without anesthesia. Histological specimens indicate hypertrophic, hypervascular synovitis with subsynovial and capsular scarring.[7] In stage 3, pathological specimens show reduced synovitis and dense scar formation in the underlying capsule.[7] Stage 4 represents resolution and no pathological specimens have been described.[7]

CASE PRESENTATION

A 52 year-old female patient first presented with achy left shoulder joint with pain that radiated down her arm with a severity of 7/10. Range of motion (ROM) in the affected shoulder was reduced such that she could not dress herself. She also had disrupted sleep due to pain. This patient had a history of hypertension and type II diabetes mellitus. Physical examination showed no signs of erythema or edema in the shoulder or elbow and no scapular winging. She was referred for physical therapy and shoulder ultrasound to rule out RCT.

Within the next five months she noted some reduction in pain and increased ROM. She found mild relief with cryotherapy and ibuprofen. No rotator cuff tears were identified on ultrasound. Pain severity at rest was 3/10, and 9/10 with shoulder movement. Active shoulder ROM in the left (AL) and right (AR) shoulder and passive ROM in the left (PL) and right (PR) were as follows: Forward Flexion AL 110°, PL 120°, AR 170°, PR 170°; Abduction AL 90°, PL 100°, AR 160°, PR170°; and External Rotation AL 5-10°, PL 10°, AR 70°, PR 70°. With internal rotation the patient could reach to S1 on the left and T7 on the right. A clinical diagnosis of adhesive capsulitis (AC) was made and the patient was to remain in physical therapy, and return if pain worsened.

> "...in the future [suprascapular nerve block] may prove to be an effective way to avoid the risks of more invasive procedures in non-responsive patients."

SOAP Note

Subjective

- 52 year-old female patient presents with a 5 month history of achy left shoulder that radiates down arm
- pain and decreased range of motion limit ability to dress herself
- pain rated as 3/10 at rest, 9/10 with shoulder movement
- patient found minimal pain relief with cryotherapy and ibuprofen
- physical therapy mildly successful at reducing pain
- patient has hypertension and diabetes mellitus

Objective

- no signs of erythema or edema in affected shoulder
- no scapular winging
- patient has reduced active and passive range of motion in the affected shoulder, especially external rotation
- no rotator cuff tears identified on ultrasound

Assessment

- history, clinical findings, and ultrasound are consistent with adhesive capsulitis

Plan

- continue physical therapy and NSAIDs
- if pain worsens, patient is to return to discuss further treatment options including:
  - manipulation under anesthesia
  - open surgery
  - arthroscopic capsular release
  - suprascapular nerve block

TREATMENT

Initial treatment for AC is non-operative, consisting of benign neglect, non-steroidal anti-inflammatory drugs (NSAIDs), oral corticosteroids, and intra-articular corticosteroid injections.[9] The main benefit from these treatments appears to be pain reduction with little improvement in ROM.[10] Physical therapy provides a non-invasive approach to stretching the contracture.[5] Within non-operative treatments, success varies with many patients opting for multiple treatment modes. Regardless of mode, 89.5% of AC cases will respond to non-operative treatment.[9]

Invasive treatment may be required for AC cases that are non-responsive to conservative treatment after 6 months.[7] The most common invasive treatment is manipulation under anesthesia in which the shoulder is manipulated to break the contracture.[5] Success rates are variable with some risk of humeral fracture or dislocation.[5,10] Open surgical capsular release is a last resort due to complications, but is effective in severe cases.[4] The more common surgical technique is arthroscopic capsular release which improves ROM with reduced operative morbidity relative to open release.[11,12]

SUPRASCAPULAR NERVE BLOCK (SSNB)

SSNB is not recognized as standard treatment for AC, but has shown greater relief from symptoms compared to placebo and a faster and more complete reduction in symptoms when compared to intra-articular corticosteroid injections.[13,14] The suprascapular nerve originates from the superior trunk of the brachial plexus and passes posterolaterally through the suprascapular notch and suprascapular fossa to innervate the glenohumoral joint (Figure 1). Blockade of this nerve has been described by Wertheim and more recently by Dangoisse.[15,16]

Using the Dangoisse technique a 21G x 1.5" needle is inserted 2cm superior to the bisection of the scapular spine in the plane of the blade of the scapula and directed inferiorly toward the supraspinous fossa floor (Figure 2). The needle is advanced in this plane until bony contact is made with the fossa floor. The needle must be aspirated to eliminate the risk of intravascular needle placement. Once in place, 10cc of local anesthetic plus corticosteroid is injected into the floor of the fossa, bathing the suprascapular nerve. The benefit of corticosteroid in addition to local anesthetic alone has been debated as the injection point is not a site of inflammation.[17] However, there is evidence that a combined local anesthetic and corticosteroid may increase the duration of nerve blockade.[18] Aside from vasovagal episodes, the risk of SSNB appears to be low, with no significant complications reported in over 2000 procedures.[13]

RETURN TO CASE

The patient returned two months later, seven months after initial onset of symptoms, with increased pain. Her pain severity was 7-8/10 at rest. Active ROM in the shoulders was: Flexion L 130°, R 170°; Abduction L 70°, R 170°; External Rotation L 10°, R 50°; and internal rotation reach was L S1 and R T7. After consultation, the patient was interested in SSNB treatment.

A SSNB of 9 cc of 0.5% bupivicain and 1 cc of 0.4% dexamethasone using the Dangoisse technique was provided with the patient's consent. She noted some immediate pain relief within 5 minutes of the injection and her pain scores were followed for six weeks after the injection.

Pain was evaluated with a 100mm visual analogue scale (VAS) and disability with a validated shoulder dysfunction questionnaire [Shoulder Pain and Disability Index (SPADI)][19] before treatment and 1,3 and 6 weeks post-injection. VAS and SPADI scores through the 6-week duration are presented in Table 1.

Symptoms were reduced throughout this period with the patient also requiring reduced use of analgesic medication. Physical examination was completed at six weeks post injection with active ROM showing improvement: Flexion L 140°, R 170°; Abduction L 150°, R 180°; External Rotation L 30°, R 70°; and internal rotation reach was L L3 and R T5. Passive ROM was not recorded at this time. Pain severity was significantly improved six weeks post injection with a reported value of 1-2/10.

CONCLUSION

SSNB was an effective treatment for this patient, providing a simple, safe and non-invasive alternative to manipulation under anesthesia, arthroscopy, or open surgery. The patient's AC symptoms were greatly reduced with SSNB after seven months of unsuccessful physical therapy and ibuprofen. Her symptoms continued to diminish up to three weeks post-injection and remained reduced at six weeks follow-up. She did not return for further treatment of recurrent symptoms after such time.

SSNB carries less risk of complications than the aforementioned invasive treatments and can be administered in a clinic setting by a primary care physician rather than in an operating room by a surgeon so there is a reduction in patient discomfort and possibly some reduction in treatment cost. However, further research is required to evaluate the effectiveness of this procedure and the necessity for corticosteroid co-injection with SSNB as some debate exists over the treatment efficacy, ability for symptom reduction and mechanism of action.

Table 1. Visual Analogue Scale (VAS) and Shoulder Pain and Disability Index (SPADI) Summary

Measure	T1	T2	T3	T4
VAS (mm)	74	58	17	15
SPADI (%)	84	55	33	32

This table represents the patient's reported visual analogue scale (VAS) pain measures and shoulder pain and disability index (SPADI) measures throughout 6 weeks of treatment monitoring: pre-injection (T1), 1 week post-injection (T2), 3 weeks post-injection (T3), and 6 weeks post-injection (T4). *Note:* VAS score 0 represents no shoulder pain and 100 represents most severe shoulder pain. SPADI score represents combined pain and disability: score 0 represents no shoulder pain or disability and 100 represents maximum shoulder pain and disability.

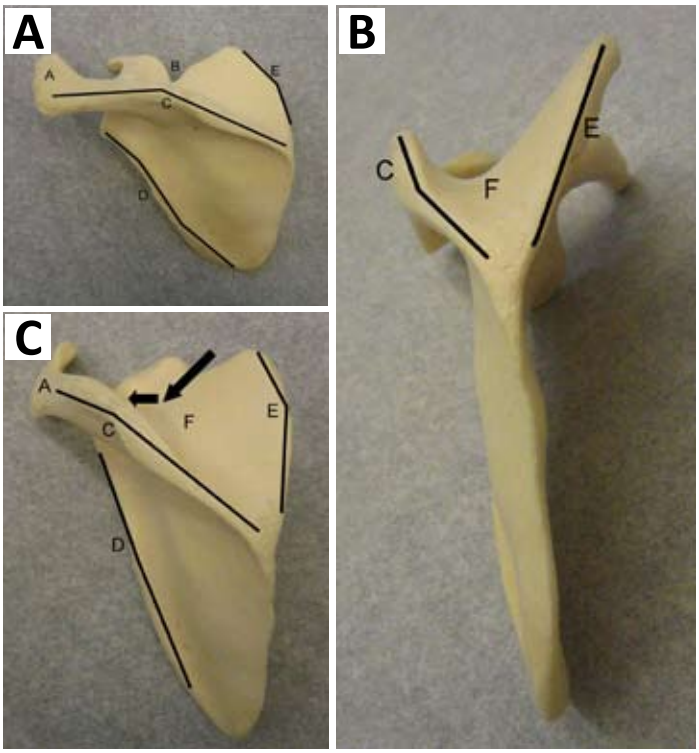

Figure 1. Left scapula viewed posteriorly (Panel A), medially (Panel B), and posteromedially (Panel C). Landmarks are labeled as follows: Acromion (A), Suprascapular notch (B), Spine of scapula (C), lateral border of scapula (D), medial angle of scapula (E), and supraspinous fossa (F). The posterolateral passage of the suprascapular nerve from the brachial plexus, through the suprascapular notch, toward the glenohumeral joint is indicated by two dark arrows (Panel C).

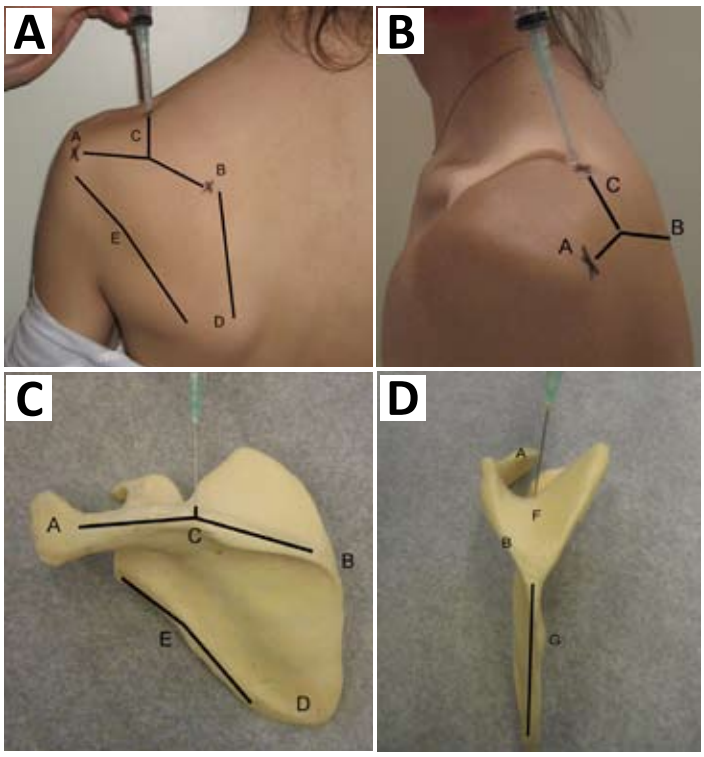

Figure 2. Posterior (Panels A and B) and lateral (Panels C and D) images of SSNB using Dangoisse technique. Landmarks are indicated as follows: Acromion and lateral end of scapular spine (A), medial end of scapular spine (B), midpoint of scapular spine (C), inferior angle of scapula (D), lateral border of the scapula (E), supraspinous fossa (F), and blade of the scapula (G). Note the needle is aligned 2cm superior to the midpoint of the scapular spine parallel to the blade of the scapula.

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"Atrial Flutter" by Alexandra Otto, Island Medical Program 2012

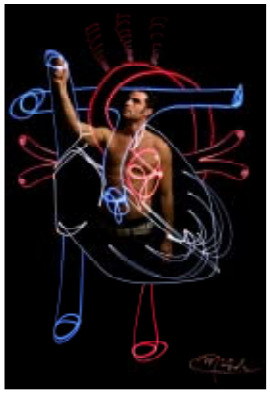
How did you develop your interest in drawing / art?

I have never had any formal art training, and perhaps that is what keeps my mind open to the possibilities. I find it easiest to express my art with pencil crayons, because of the amount of control and amount of colour saturation. I have always enjoyed balancing science with art and this opportunity was a perfect fusion of the two. Medical school takes so much of our time that so little is left for other avenues of interest. The contest presented a perfect excuse to put down the books and pick up the pencil crayons, almost forcing myself to remember the other aspects of life that bring enjoyment.

How was the Atrial flutter inspired?

I remember seeing all of the past years submissions and being blown away with the creativitiy. When I thought of all the different cardio terms, I was intrigued by the play on words of "atrial flutter." My natural tendendacy toward optimism made me think of a whimsical solution for a serious medical condition. In a more literal (although a rather abstract) way...a heart fluttering away on butterfly and bird wings. I don't remember a particular lecture, rather, the whole of the cardio block was inspiring.

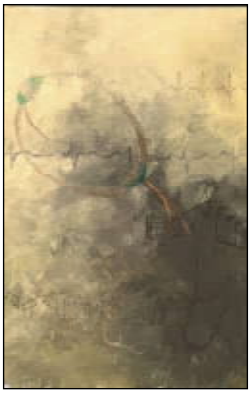
More Heartfelt Images 2009 Winners



"Light-Hearted"
Cyrus McEachern

"Heart Healthy Habits"
Evan Wiens

"Healthy Heart"
Cyrus McEachern



"In the Key of ECG"
Dawn Smith

"Guard your Heart"
Myra Butler

"Peace of Heart"
Cyrus McEachern

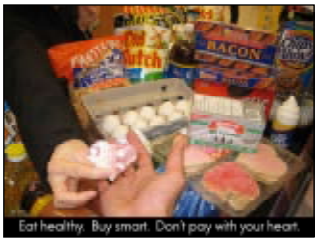
"What good is a heart if you don't use it?"
Nima Kashani

"Pulmonary Emboli"
Morgan Evans

"Open Cake Surgery"
Mariko Vaughan

"Preload"
Irvin Janjua & Laura Chng

"Heartburn"
Irvin Janjua & Laura Chng



"Money Hearty"
Alex Weinberg & Jennifer Tam

"Re-entry at UBC"
Alex Suen & Jennifer Tam

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