



UBCMJ

Volume 9 Issue 2 Spring 2018

UNIVERSITY OF
BRITISH COLUMBIA
MEDICAL JOURNAL

MEDICINE OF YOUTH

ACADEMIC RESEARCH

Web of culture:
Critically assessing
online mental health
resources for
Indigenous youth in
northern British
Columbia using digital
storytelling

COMMENTARY

Youth and the opioid crisis:
Strategies for intervention and
the British Columbian experience

NEWS AND LETTER

MIND speaks up: An online
platform for youth mental health

FEATURE

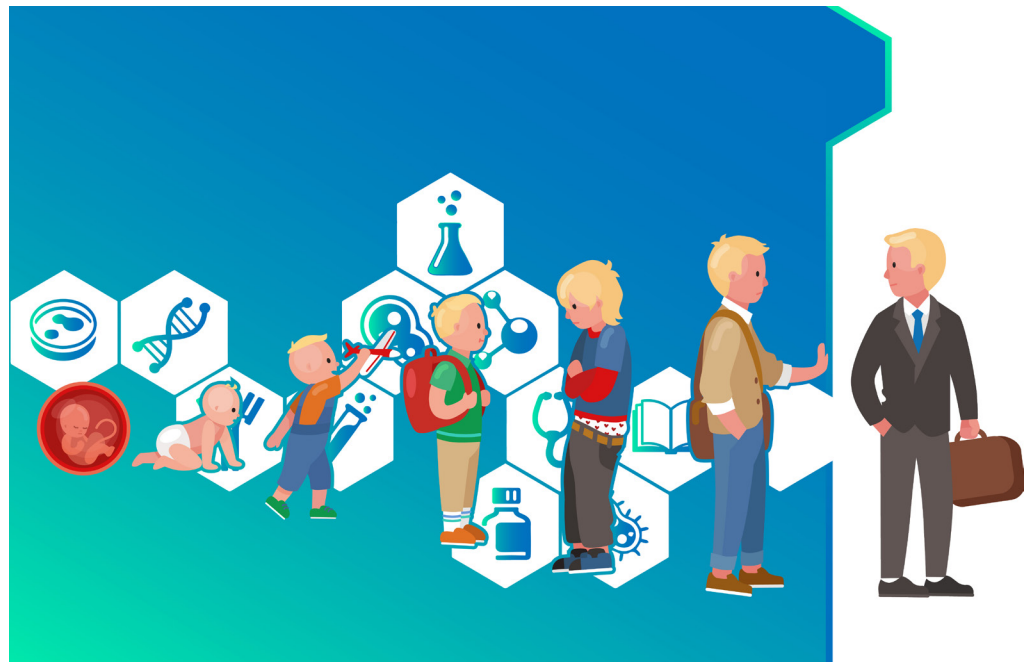
Advocacy in pediatrics:
it's part of patient care



THE UNIVERSITY OF BRITISH COLUMBIA

The University of British Columbia Medical Journal (UBCMJ) is a peer-reviewed, student-driven academic journal with the goal of engaging students in medical dialogue and contributing meaningful discourse to the scientific community.

On the cover



Though there are battles to face at every stage of life, in this issue we explore health issues relevant to youth. The process of growing up, from infancy to young adulthood, is often fraught with peril. Congenital disorders, disabilities, mental health, and substance abuse are just some of the important medical topics to consider. Especially in this present era of extended adolescence, when adulthood seems more elusive than ever, the wellness of our youth population needs to be addressed.

Nancy Duan, MD Program, Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada

To subscribe, advertise or submit, see our website.
ubcmj.med.ubc.ca

Mailing Address:
UBC Medical Journal
c/o Student Affairs, UBC Faculty of Medicine
2775 Laurel Street, 11th Floor
Vancouver, BC V5Z 1M9

DISCLAIMER: Please note that views expressed in the UBCMJ do not necessarily reflect the views of the editors, the Faculty of Medicine or any organizations affiliated with this publication. They are solely the authors' opinion and are intended to stimulate academic dialogue.

Contents

VOLUME 9 ISSUE 2 | March 2018

EDITORIAL

- 3 Looking to the future: Addressing the health concerns of youth today**
Qiu A., Britton H.

FEATURE

- 4 Advocacy in pediatrics: It's part of patient care**
Fitzgerald B.
- 5 What is a biobank and why is everyone talking about them?**
Vercauteren S.
- 7 Immune therapies in children's cancer**
Schultz K.R.

REVIEWS

- 8 Pediatric medulloblastomas: Classification, therapeutics, and management**
Cairns J.

ACADEMIC RESEARCH

- 12 Community perceptions and knowledge of mental illness in the rural Kisumu region of Kenya**
Kotadia N., Walton S.E., Webster D.M., Matheson L.E., Kapoor V.
- 16 A survey of teacher and student perspectives on how running is taught and evaluated in British Columbia schools**
Protheroe C.L., De Souza A.M., Harris K.C., Claydon V.E., Sanatani S.
- 20 Web of culture: Critically assessing online mental health resources for Indigenous youth in northern British Columbia using digital storytelling**
Ward V., Leeuw S.
- 23 Medical student second language abilities and confidence in clinical use: Mandarin pilot**
Zhuang M., Tran W., Ho K.

CASE REPORTS

- 27 Rapid resolution of a gastric lymphoma with *Helicobacter* eradication therapy**
Kosyakovsky L.B., Laghari M., Alwelaie Y., Savage K., Yoshida E.

COMMENTARIES

- 30 Diagnosing pediatric mild traumatic brain injury: Current techniques in a vulnerable demographic**
Stubbs J.L.
- 32 Perspectives in pediatric oncology: Understanding the experiences of two Syrian refugee families at B.C. Children's Hospital**
Rice A., Strahlendorf C.
- 34 Youth and the opioid crisis: Strategies for intervention and the British Columbian experience**
Schweitzer C.S., Gill S.J., Kennedy A., Eppler K.
- 36 Confronting the disparity in nonmedical prescription opioid use among rural and urban youth: A call for broader recognition in the era of clandestine fentanyl**
Tompkins P.

NEWS AND LETTERS

- 38 Houston, we have a doctor**
Galts C.
- 40 Cannabis in Canada: What the upcoming legalization of one of Canada's most popular drugs means for young people**
Paul B.R.
- 42 MIND Speaks Up: An online platform for youth mental health**
Smith M.J., Zhao E., Hawkins C., Lucey M., Yeo J., Zerr K.
- 44 SCOPE and the Live 5-2-1-0 initiative – implementation and impact of a community based participatory project on childhood obesity prevention**
Fruhstorfer C.J.
- 46 Can mobile applications improve non-adherence in diabetes management?**
Bann S.
- 48 A future beyond insulin injections? Regenerative medicine for type 1 diabetes**
Kamal S.

Looking to the future: Addressing the health concerns of youth today

Alvin Qiu¹; Heidi Britton²

Citation: UBCMj. 2018: 9.2 (3)

Pediatric medicine is a broad field of medicine that encompasses the care of neonates, infants, children, adolescents, and even young adults. At these various milestones and life stages, numerous unique health challenges present themselves; it is therefore no surprise that there exists an increasing number of recognized pediatric subspecialties in Canada and across the globe. These emerging subspecialties include pediatric rheumatology¹, anesthesiology², critical care medicine³, and child maltreatment⁴.

This UBC Medical Journal (UBCMJ) issue brings together a wide array of exciting featured articles that aim to address several emerging trends and ideas that drive the way we are practicing pediatric medicine and care for the health needs and concerns of youth. We begin with a compelling commentary from Dr. Barbara Fitzgerald, a developmental pediatrician and Medical Director at the Alderwood Family Development Centre. In her piece, Dr. Fitzgerald shines a light on the socioeconomic disparity for children, the subsequent health consequences, and the role that she—and all other physicians—must fulfill as health advocates for their young patients. Next, we have an article written by Dr. Suzanne Vercauteren, a clinician–investigator and Director at the B.C. Children's Hospital BioBank. Dr. Vercauteren illustrates the workflow of a “biobank”, its role in translational and clinical research, and the inception of Canada's first pediatric site-wide biobank here at B.C. Children's Hospital. Our final featured article comes from Dr. Kirk Schultz, Director of the Michael Cuccione Childhood Cancer Research Program at the B.C. Children's Hospital. Dr. Schultz begins with a historical overview and the mechanisms underlying cancer immunotherapies, and highlights the role of B.C. Children's Hospital as a world leader in hematopoietic stem cell transplantation. Finally, he describes the use of chimeric antigen receptor T cells as an emerging therapy as well as new leukemia and neuroblastoma immunotherapy clinical trials that are underway in British Columbia.

During the preparation of this issue, the UBCMj was contacted by the B.C. Cancer Agency's Journal of Family Practice Oncology. We were approached about sharing two articles that pertain to our theme on medicine of youth, and describe recent changes in the way that Human Papilloma Virus (HPV) is managed in British Columbia. In the first article, “HPV Related Cancers: Tip of a Very Large Iceberg,” Dr. Margaret Smith provides a brief overview of the disease presentation, variety of strains, pathophysiology, and Canadian epidemiological data about HPV⁵. In the second article, “HPV Vaccine Program for Grade 6 Boys Now Available in B.C.,” Dr. Monika Naus highlights changes to the HPV vaccine program in British Columbia beginning this 2017/2018 school year. As many practitioners may be aware, the HPV vaccine program has been available for girls in grade 6 since

2008. However, this year, it has expanded to include boys in grade 6. Dr. Naus continues to provide the evidence and rationale behind this new provincial expansion⁶. Both articles are available in full-text at our online News & Letters section (<http://ubcmj.med.ubc.ca/news-letters/>) along with a link to the original articles in the Journal of Family Practice Oncology.

With such a broad field of medicine, one can expect an approach to the care of youth to be multidisciplinary and complex. A World Health Organization survey estimated the leading causes of death in children under the age of five to be pneumonia, diarrhea, malaria, neonatal pneumonia or sepsis, preterm delivery, and asphyxia at birth⁷. Moreover, a majority of these global early childhood deaths, which are caused by communicable disease, occur in African countries⁷. It is thus clear that the care of youth necessitates global considerations. Closer to home and in stark contrast, an issue that plagues Canada and much of North America is childhood obesity. As national rates of childhood obesity continue to climb, youth face a number of health consequences, either now or in the future, including increased risk of type 2 diabetes, hypertension, coronary artery disease, stroke, dyslipidemia, and several cancers⁸. Approaches to target obesity and these related chronic conditions involve nutrition and dietary management. Stemming from the topic of diet, other health concerns of youth can be explored. For instance, poorer diet in children and adolescents has been linked poorer mental health outcomes⁹, another complex area of pediatric care in itself. Undeniably, the topics in medicine of youth are far-reaching.

Throughout your exploration of this issue of the UBCMj, you will come across a variety of manuscripts that explore challenges and opportunities in the health care of youth such as those mentioned above. Our authors united in the belief that securing our future means investing in the lives, particularly the health and well-being, of young people today. We hope this issue will spark meaningful discussion for medical trainees, physicians, and the public alike.

References

1. Spencer CH. Why should pediatric rheumatology be recognized as a separate subspecialty: an open letter to medical councils and government agencies. *Pediatr Rheumatol*. 2007;5(1):21.
2. Rockoff MA, Hall SC. Subspecialty Training in Pediatric Anesthesiology: What Does It Mean? *Anesth Analg*. 1997;85(6):1185-90.
3. Epstein D, Brill JE. A History of Pediatric Critical Care Medicine. *Pediatr Res*. 2005 Nov;58(5):987-96.
4. Block RW, Palusci VJ. Child Abuse Pediatrics: A new pediatric subspecialty. *J Pediatr*. 2006;148(6):711-2.
5. Smith M. HPV related cancers: tip of a very large iceberg! *J Fam Prac Oncol*. 2017 Fall;29:1.
6. Naus M. HPV vaccine program for grade 6 boys now available in B.C.. *J Fam Prac Oncol*. 2017 Fall;29:2.
7. Bryce J, Boschi-Pinto C, Shibuya K, Black RE. WHO estimates of the causes of death in children. *Lancet*. 2005 Mar26-Apr1;365(9465):1147-52.
8. Lau DC, Douketis JD, Morrison KM, Hramiak IM, Sharma AM, Ur E. 2006 Canadian clinical practice guidelines on the management and prevention of obesity in adults and children [summary]. *CMAJ*. 2007 Apr;176(8):S1-S13.
9. O'Neil A, Quirk SE, Housden S, Brennan SL, Williams LJ, Pasco JA, et al. Relationship Between Diet and Mental Health in Children and Adolescents: A Systematic Review. *Am J Public Health*. 2014 Oct;104(10):e31-e42.

¹MD/PhD Training Program, Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada

²MD Program, Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada

Correspondence to
Alvin Qiu (alvin.qiu@alumni.ubc.ca)
Heidi Britton (heidibritton@outlook.com)

Advocacy in pediatrics: It's part of patient care

Barbara Fitzgerald^{1,2}

Citation: UBCMJ. 2018; 9.2 (4)

Jake was a five-year-old who had just been taken into foster care. I saw him at his school for developmental concerns. His mom told me that she had moved to Vancouver to escape an abusive relationship and an unhealthy lifestyle. She was looking for housing and in the meantime was “couch surfing” with various friends and acquaintances. Social services intervened and placed her son in foster care. I confirmed with the social worker that her lack of housing was considered a Child Protection issue and she was obligated to remove him. Jake was in foster care because his mom could not afford to pay rent in Vancouver. I watched him hold tightly to his mother as the social worker took him away. He cried out to his mother to let him stay with her. She silently watched him leave with tears streaming down her face.

What is the correct response for a physician in a situation where the child's problem is caused by poverty? We collaborate with social workers that generally work to keep children with their parents, but their decisions may be shaped by factors that ultimately do not serve the child. The social worker felt helpless; the waiting list for social housing was many years and her supervisor insisted that children must have stable housing to be safe. We went to the local Member of the Legislative Assembly's office, called various agencies, and made no progress. With the mother's permission, I called the newspaper and they ran a story. The next day they were placed in housing and strangers sent them money to help them get back on their feet.

Rachel Remen, a great pediatrician, said: The meaning of medicine is not science; it is service. It is not a competency; it is a way of life, the deep wish to make things better or larger than how you found them. Service is larger and older than science.¹

I started my career as a Pediatric Emergency Physician. One night, at three in the morning, I saw an eight-month-old baby in septic shock. Despite intensive efforts to save him, he died. A normal baby had just died of a completely treatable condition in a major teaching hospital in a country with universal health care. I slowly walked into the waiting room to tell his young First Nations parents that their child was dead. The mother told me how they had come to emergency earlier that day and were told that he likely had a virus, but to bring him back if he worsened. When he became lethargic, she called, but interpreted the advice as being that bringing him back was an abuse of emergency services. She didn't have the courage to bring him in before it was too late.

I am not a political person; I am just a pediatrician. I see children and families and try to help by listening, diagnosing, recommending treatment, and mostly by creating a safe place where parents and children can confide their deepest concerns and fears. Over the years, I realized that many of the issues I was seeing needed to be dealt with at a higher/broader level than a pediatrician's office.²⁻⁴

We are in an era of pediatrics where prevention and treatment for many conditions that caused morbidity and mortality for children in previous generations has been achieved. Physicians caring for children are increasingly faced with health issues that are caused by poverty and other social vulnerabilities. If you are a physician seeing children today, you are seeing the results of toxic stress.⁵ In BC, one out of five children are living in poverty.⁶ Eradicating the root cause of many of their health conditions involves identifying poverty as the cause and advocating for social change to prevent its effects. Once it was determined that polio caused significant childhood morbidity, physicians advocated for a universal vaccine to eradicate it.

For children in poverty, standard medical care is often just a patch

job for the underlying problem. As pediatricians, we are the experts; we must speak out about factors that prevent children from reaching their potential. Advocacy comes in many forms; it can be as simple as asking parents about food security⁷ and early adverse experiences;⁸ it can involve writing letters to newspapers, calling school principals, speaking at community meetings and medical conferences. Being a physician gives us a voice that people listen to; with that power comes an obligation to use it.⁹

I started a charity, Mom to Mom, where I could put my knowledge into action. Volunteers are trained as mentors to work with moms who have experienced generational poverty to provide friendship and support for basic needs like housing and nutrition. The volunteers provide the kind of support that middle class mothers get from their network of friends and family. Women living in poverty may have supportive families, but they are often facing the same challenges that their mothers did. The more I spoke out about what I was seeing, the more support Mom to Mom received. Support came in the form of money for families, action at schools, and recognition of the challenges that families in poverty face by citizens who were unaware of what was happening to children in their province.

There were also barriers; I was shocked when hospital administrators told me to stop advocating, that it was unethical to be a physician serving vulnerable children and to also speak out for policies that affect them. They said that the provincial government might feel criticized, which could adversely affect hospital funding. University and hospital ethics boards advised me to continue. Advocacy for children is not a partisan activity; we advocate for children and their basic rights to health, education, safety, and recreation. I persist in the same way that I would persist in advocating for a child to get antibiotics for meningitis. To not do so would be unethical.

There has been debate as to whether it is our job to advocate for patients.^{10,11} From my perspective, advocacy is a form of patient care. We see patients and determine the best treatment. It may be a medication, a call to a social worker to ask for food, or a letter to a school to ask for supports. We see what children need and advocate for it. Children do not have a public voice; we can and must be that for them.

Advocacy is also good for physicians. We entered medicine to help people; when we are unable, we feel frustrated. Speaking up allows us to provide patient care. I have recently written that poverty may be the diagnosis in many conditions that we treat and call other things.¹² If poverty is the diagnosis, we know what the ‘cure’ is, and are obligated to speak up for it. When we see a way to change the life of a child, how can we keep silent?

References

1. Remen NR. My Grandfather's Blessings: Stories of Strength, Refuge, and Belonging. New York: Penguin Random House Books; 2001.
2. Isaacs D. Advocacy. *J Paediatr Child Health*. 2015;51(8):747-8.
3. Schwarz K, Sisk B, Schreiber J, Malik F. A common thread: pediatric advocacy training. *Pediatrics*. 2015;135(1):7-9.
4. Chamberlain IJ, Kelly N. Child Advocacy in the Twenty-first Century. *Adv Pediatr*. 2015;62(1):91-103.
5. Shonkoff JP. Capitalizing on Advances in Science to Reduce the Health Consequences of Early Childhood Adversity. *JAMA Pediatr*. 2016;170(10):1003-7.
6. First Call. Poverty Report Card 2016 [Internet]. 2017 [cited 2017 Sep 15]. Available from: <http://stillin5.ca/report-card/>
7. Kootenay Boundary Division of Family Practice. Kootenay Poverty Tool, 2015 [Internet]. 2015 [cited 2015 Sep 21]. Available from: <https://divisionsbc.ca/CMSMedia/WebPageRevisions/PageRev-10164/BC-Poverty-2015-Final.pdf>
8. Felitti VJ, Anda RF, Nordenberg D, Williamson DF, Spitz AM, Edwards V, et al. Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The Adverse Childhood Experiences (ACE) Study. *Am J Prev Med*. 1998;14(4):245-58.
9. Royal College of Physicians and Surgeons of Canada. CanMEDS 2015 Framework, Health Advocate [Internet]. 2017 [cited 2017 Oct 1]. Available from: <http://www.royalcollege.ca/resite/canmeds/framework/canmeds-role-health-advocate-e>
10. Huddle TS. Perspective: Medical professionalism and medical education should not involve commitments to political advocacy. *Acad Med*. 2011 Mar;86(3):378-83.
11. Kanter SL. On physician advocacy. *Acad Med*. 2011 Sep;86(9):1059-60.
12. Jakovljevic I, Miller A, Fitzgerald B. Child Mental Health: Is Poverty the Diagnosis? *BCMJ*. 2016 Oct; 58(8):454-60.

¹Division of Developmental Pediatrics, Department of Pediatrics, BC Children's Hospital, University of British Columbia, Vancouver, BC, Canada

²Alderwood Family Development Centre, The Children's Foundation, Vancouver, BC, Canada

Correspondence to:
Barbara Fitzgerald (barbara.fitzgerald@ubc.ca)

What is a biobank and why is everyone talking about them?

Suzanne Vercauteren¹

Citation: UBCMJ. 2018; 9.2 (5-6)

Over the last decade, biobanks have become an important infrastructure in research institutes and academic health centers around the world.^{1,2} A biobank is defined as “a facility for the collection, preservation, storage and supply of biological specimens and associated data, which follows standardized operating procedures and provides material for scientific and clinical use.”³

Over the last 15 years, the use of the word “biobank” has increased steadily every year, rising from three papers in 2002 up to 184 papers in 2012¹ and 679 in 2014. According to *TIME* magazine in 2009, biobanks were one of the ten things that were predicted to change the world that year.³

Biobanks are internationally acknowledged and a society exists for them (the International Society for Biological and Environmental Repositories, ISBER).⁴ Members of the ISBER community have been exemplary leaders and have developed documents such as “Best Practices for Biobanking”.⁵ In Canada, other organizations exist to support and guide biobanks such as the Canadian Tissue Repository Network (CTRNet)⁶ and, here at the University of British Columbia, the Office of Biobank Education and Research (OBER).⁷ As part of recognizing the importance of biobanks, CTRNet has launched a biobank registration and certification program. This program has been taken up in many parts of the world including countries in North America, Europe, and Australia.

Biobanks recruit patients to health research by identifying and consenting potential participants and subsequently collecting, processing, and preserving biospecimens (also referred to as biological specimens, specimens, or samples). Clinical data that may be collected include demographics, diagnoses, and outcome parameters. Researchers may then apply to the biobank requesting biospecimens that fulfill their research criteria. A typical biobank workflow is presented in Figure 1. The biobank process allows for the preservation of highly valuable specimens, which are then available for multidisciplinary, high-quality health research.

Many biobanks are project-driven and are often operated by a single investigator or researcher, resulting in numerous biobanks across a single institute. A situation such as this was present on the Oak Street Campus in Vancouver with researchers recruiting research participants on an as-needed basis and, in some cases, establishing their own informal biobanks. We identified several problems with this approach including: 1) high operating costs for single biobanks hampering access to specimens for researchers with minimal funding or without clinical connections; 2) lack of standardization of methods, making sharing of specimens between researchers problematic; 3) lack of guardianship for specimens resulting in abandoned collections when principal investigators (PIs) retire or leave the campus; and 4) high consent burden for participants resulting in a paternalistic approach whereby clinicians make decisions about which studies “their patients” were allowed to be approached for, leading to less connected researchers, or researchers with limited funding being excluded. To alleviate these issues, we proposed, as others have,^{8,9} that consolidation of these individual biobanks into a single biobank has significant benefits. This approach was supported by institutional management as it was deemed that with good governance, a campus-wide biobank would reduce (if not remove) risks such as breaches of privacy or misuse of specimens.¹⁰ As a result, B.C. Children’s Hospital now houses B.C.

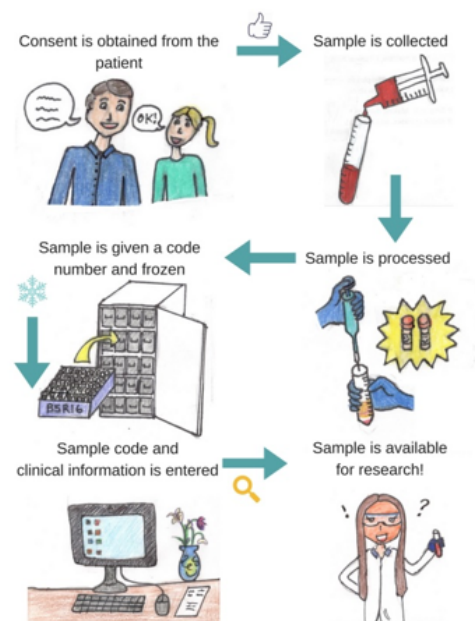


Figure 1 | A typical biobank workflow, depicted by grade five students at Queen Mary Elementary School, Vancouver, B.C. A project led by Suzanne Vercauteren, Tamsin Tarling, and Heather Van Tassel.

Children’s Hospital BioBank (BCCHB, the first pediatric site-wide biobank in Canada),¹¹ which is registered and certified under the CTRNet program.

B.C. Children’s Hospital BioBank has recruited 1,204 participants from the clinics displayed in Figure 2 for future research and has supported 15 research projects in the areas of immunology, oncology, and rheumatology. In addition, BCCHB is able to provide services for PIs to aid with their projects such as consenting for studies, processing biospecimens, secure storage of biospecimens, or a combination of these. BCCHB currently provides services to more than 50 PIs.

So why are biobanks so important and how are they able to support research?

1. Biospecimens are necessary for translational research (bench-to-bedside). 45% of research uses biospecimens.¹² It is therefore

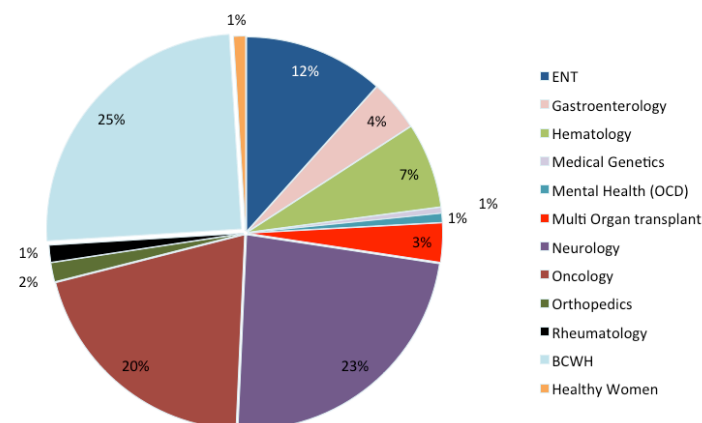


Figure 2 | B.C. Children’s Hospital BioBank: current clinic representation. ENT: ear, nose, and throat; OCD: obsessive-compulsive disorder; BCWH: B.C. Women’s Hospital.

¹BC Children’s Hospital BioBank, BC Children’s Hospital, Vancouver, BC, Canada

Correspondence to:
Suzanne Vercauteren (svercauteren2@cw.bc.ca)

critical for researchers to have access to biospecimens. However, having sufficient biospecimens to be of statistical significance for a published research project can be an arduous task to manage out of a research laboratory. Biobanks are able to identify eligible patients and recruit them to the biobank with the understanding that their biospecimens will be used for as-yet-undetermined research.

2. Quality of specimens. There are many factors that contribute to the reproducibility of research, the quality of the biospecimens used is just one of them. By following approved standard operating procedures, biobanks have the ability to ensure that specimen quality is high and standardized. At the BCCHB, we record the type of tube the specimen was collected in, the volume, time of collection, time of processing, time of freezing, and the person responsible for each step. This means that if researchers requesting samples have very specific criteria (for example, they are working with a biomarker which is known to degrade within 30 minutes of being at room temperature) we can work with them to identify which specimen which will be eligible for their study and which will not.

3. Facilitation of personalized medicine. Biobanks are able to facilitate personalized medicine, as specimens are collected throughout treatment, including germ line specimens. Annotated clinical data is collected and it is possible to recruit family members in addition to the patient. Due to the methods used, which generate numerous aliquots of the specimen, there is also the ability to request further aliquots of the same specimen for verification or use in other experimental models.

4. One patient specimen may fuel numerous research projects. As mentioned directly above, biobanks generate multiple aliquots of the same specimen and its associated derivatives. This means that a specimen can be used in many different research projects, as dictated by the consent form, as opposed to being designated for one specific project.

5. Secure storage of clinical data and personal information. All specimens and clinical data are securely stored in biobanks. Numerous databases exist that have been designed to store biobank information such as inventory, demographics, diagnosis, clinical annotation, and, where applicable, contact information. Biobank best practices recommend storing samples in freezers that are monitored 24/7 and are in a secure facility with air conditioning and oxygen monitoring.

6. Appropriate governance over the utilization of biospecimens used for research. Transparent governance with robust oversight is key to the success of biobanks^{13,14} as it helps to ensure public trust as well as the trust of researchers, as fair access to specimens and data are ensured.

7. Ethical oversight and public engagement. Research Ethics boards ensure that biobanks are established with a governance structure, policies around the return of research findings, policies around re-contacting participants in the future, a fully informed consent process, and assignment of custodianship. Biobanks tend to be established with an ongoing nature so that samples can be collected throughout treatment and patients can be contacted for administrative

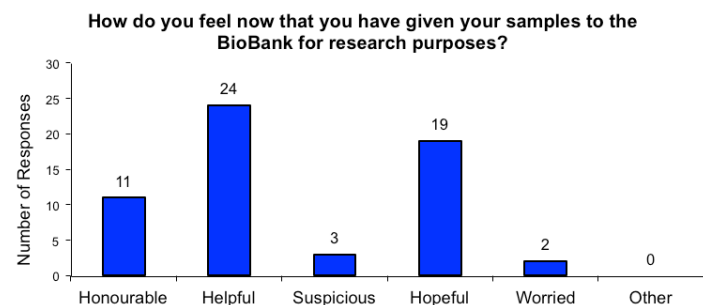


Figure 3 | Responses of 30 biobank participants regarding how they felt after donating samples to a biobank.

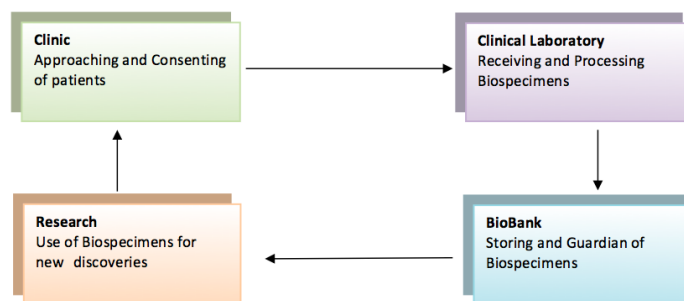


Figure 4 | Workflow to demonstrate the integration of biobanks into healthcare and research.

purposes or future research; this communicative piece gives rise to opportunities for patient engagement and education about healthcare research.

8. Therapeutic effect of biobanking. The BCCHB has carried out surveys with biobank participants. The results of these surveys suggest a therapeutic effect of biobanking that is reinforced by the conversations that BCCHB staff have had with numerous families during the consent interview for BCCHB participation. Patients embrace the concept of being able to give back in some way. In a study of 30 biobank participants, we (BCCHB staff) asked how participants felt now that they had donated to the biobank. Respondents could select as many of the following options as they wished: honorable, helpful, suspicious, hopeful, worried, or other. The vast majority said that they felt either honorable, helpful, or hopeful (Figure 3).¹⁵

In summary, biobanks have been established to facilitate research and to provide investigators with a high-quality building block (biospecimens) for their research as well as the associated clinical information. Biobankers envisage that specimens collected from patients will be processed, stored, and released for research with the hope that the research conducted will give rise to new treatment and therapies such that it may give back to the clinic in the future (Figure 4).

References

- Hewitt R, Watson P. Defining biobank. *Biopreserv Biobank*. 2013 Oct;11(5):309-15.
- Henderson M, Simeon-Dubach D, Albert M. Finding the path to biobank sustainability through sound business planning. *Bio Biopreserv Biobank*. 2015 Dec;13(6):385-6.
- Park A. 10 Ideas Changing the World Right Now – Biobanks. *Time Magazine* 2009 Mar 12;173(11).
- International Society of Biological and Environmental Repositories (ISBER). ISBER; 2018 [cited 2017 Jan 11]. Available from: <http://www.isber.org/>
- Campbell L, Betsou F, Garcia DL, Giri JG, Pitt KE, Pugh RS, et al. Development of the ISBER best practices for Repositories: collection, storage, retrieval, and distribution of biological materials for research. *Biopreserv Biobank*. 2012 Apr;10(2):232-3.
- Canadian Tissue Repository Network (CTRNet). CTRNet; 2018 [cited 2017 Jan 11]. Available from: <http://www.CTRNet.ca>
- Office of Biobank Education and Research (OBER). OBER; 2018 [cited 2017 Jan 11]. Available from: <http://pathology.ubc.ca/education-resource/ober/>
- Rogers J, Carolin T, Vaught J, Compton C. Biobankonomics: a taxonomy for evaluating the economic benefits of standardized centralized human biobanking for translational research. *J Natl Cancer Inst Monogr*. 2011;(42):32-8.
- Vaught J, Rogers J, Myers K, Lim MD, Lockhart N, Moore H, et al. An NCI perspective on creating sustainable biospecimen resources. *J Natl Cancer Inst Monogr*. 2011(42):1-7.
- Tarling TE, Lasser F, Carter C, Matzke LA, Dhugga G, Arora N, et al. Business planning for a campus-wide biobank. *Biopreserv Biobank*. 2017 Feb;15(1):37-45.
- BC Children's Hospital BioBank (BCCHB). BCCHB; 2018 [cited 2017 Jan 11]. Available from: <https://bcchr.ca/biobank>
- Carrick DM, Mette E, Hoyle B, Rogers SD, Gillanders EM, Schully SD, et al. The use of biospecimens in population-based research: a review of the National Cancer Institute's Division of Cancer Control and Population Sciences grant portfolio. *Biopreserv Biobank*. 2014 Aug;12(4):240-5.
- O'Doherty KC, Burgess MM, Edwards K, Gallagher RP, Hawkins AK, Kaye J, et al. From consent to institutions: designing adaptive governance for genomic biobanks. *Soc Sci Med*. 2011 Aug;73(3):367-74.
- Caulfield T, McGuire AL, Cho M, Buchanan JA, Burgess MM, Danilczyk U, et al. Research ethics recommendations for whole-genome research: consensus statement. *PLoS Biol*. 2008 Mar;25(6):e73
- Tarling TE, Strahlendorf C, Schultz KR, Milner R, Vercauteren SM. Verbal permission to obtain clinically urgent bio-specimens for a paediatric biobank. *J Clin Res Bioeth*. 2014 Nov 04;5(6):202.

Immune therapies in children's cancer

Kirk R. Schultz^{1,2}

Citation: UBCMj. 2018; 9.2 (7)

Great advances have been made in applying chemotherapy and targeted drugs to improve the survival rate of children and adolescents with cancer, from a survival rate of less than 20% in the 1960s to an expected overall survival rate of 85% in 2017.¹ The improvements in survival rate occurred primarily due to the fact that pediatric cancer research has been highly collaborative since the 1960s, using scientifically-based studies with a high number of children treated on treatment protocols set within National Cancer Institute (NCI)-funded US cooperative groups. The current NCI pediatric cancer cooperative group is the Children's Oncology Group (COG), which includes over 230 centers in Canada, the US, Australia, and New Zealand. With a long life expectancy, children cured of cancer have a big positive impact in our society. While immune therapies are currently at the forefront of research, only recently has the COG been able to offer therapies directing the immune system against children's cancer.

The concept of using the immune system to treat cancer has been considered for many decades. Immune therapy is based on the concept that cancer is not 'self' and cancer cells should be recognized by the host's immune system as foreign cells to be removed, destroyed, or suppressed. Immune therapies attempt to utilize all aspects of the immune response, including the innate (initial response) and adaptive (memory) immune responses. Treatments exploiting the innate immune response have included developing natural killer cells and adjuvants that induce inflammatory responses; these potentially are the first step in a specific response to the malignant cells. Other approaches have included using cancer-specific responses by cytotoxic T cells, which are very specific and restricted to small peptides on the cell surface in the context of the major histocompatibility complex or human leukocyte antigens (HLA) in humans. Such a response is very specific, but the development of treatments using these approaches has been limited over the last 30 years by the low concentration of cancer-specific antigens processed by the malignant cells and antigen presenting cells.

Moreover, there are very few of the specific cancer-reactive T cells, resulting in difficulty finding those rare cells to be increased for therapy. Another approach using the adaptive immune system has been to utilize monoclonal antibodies against cancer antigens. Unlike the antigens for T cells, responses are not specific to just the malignant cells. The big advantage is that antibodies are not restricted to antigens displayed by the HLA molecules, allowing for a much broader response. To date, immune therapies using monoclonal antibodies have been incorporated with conventional chemotherapy, resulting in significantly increased survival in both high-grade neuroblastoma and lymphomas.^{2,3}

The only truly immune cell-based therapy is hematopoietic stem cell transplantation (HSCT) or blood and marrow transplantation (BMT). HSCT has been used to significantly improve the cure rate for children and teenagers with high-risk leukemia that does not respond to standard chemotherapy approaches. Since the 1980s, allogeneic BMT has become the established immunotherapy for a number of cancers, including leukemia and lymphoma, but has not done well outside of the blood cancers. Allogeneic BMT relies on donor immune system recognition of cancer cells and constitutes all of the aspects required for induction of a long-lasting immune response against malignancy, including an initial innate response with inflammation and an adaptive immune response including T cell-mediated cancer killing

and induction of B cell derived antibodies against foreign malignant cells.⁴ Most important is the induction of immune memory that helps to maintain a long-term immune response, for a permanent curative outcome. One of the big drawbacks is an off-target response called "graft-versus-host disease," the induction of an autoimmune disease that may attack any organ in the body.⁵

BC Children's Hospital (BCCH) has been a world leader in HSCT, providing leadership of the largest HSCT network for children, the Pediatric Blood and Marrow Transplant (BMT) Consortium. BCCH also currently provides scientific leadership for both the Canadian BMT Group and Canadian National Transplant Program. BCCH has developed adjuvant immune therapies that have resulted in early phase clinical trials in leukemia; as well, it has the largest biomarker research group worldwide, targeting rejection after HSCT in children and adolescents. HSCT, with significant contributions by BCCH researchers, has informed the fundamental design of all the new and novel cellular immune therapies currently being designed. Through donations by Mining for Miracles, BCCH is now developing the beginning of cell manipulation of hematopoietic cells. Because almost every child has a living parent, over 95% of children have an available donor. Using this novel transplantation approach we can expand it to serve as a template for the addition of other cellular therapies in the future.

An exciting recent advance has been to re-target cytotoxic T cells by genetically engineering the cells to express a new chimeric antigen receptor (CAR). This allows all T cells—irrespective of what antigen is recognized by their T cell receptor—to be engineered to express the CAR receptor, resulting in all T cells attacking malignant cells.⁶ This has been so successful that the FDA approved the first CAR T cell for leukemia in August 2017.⁷

The current status of immune therapies for children in BC is very exciting. There have been phase III trials using monoclonal antibodies in neuroblastoma in the multicenter COG trials, and the first phase III trials using a bi-specific antibody to activate T cells against leukemia show a significant decrease in the therapeutic toxicity compared to conventional chemotherapy. In addition, the COG is planning the first phase III clinical trials to evaluate CAR T cells against leukemia next year. Children and adolescents in BC will also have increased access to early-phase immune therapy studies as one of the two selected Canadian sites for the NCI-funded Pediatric Cancer Immune Therapy Network, which is focused on applying novel non-cellular immune therapies to pediatric cancer. The BCCH, in collaboration with the BC Cancer Agency, is also one of the primary target identification sites for the Saint Baldrick's-funded immune therapy network for childhood cancer. Lastly, with support by the Michael Cuccione Foundation, BCCH is now the only Canadian CureWorks center and will be offering early-phase trials for cutting-edge interventions using CAR T cells for leukemia, neuroblastoma, and brain tumors starting in 2018.

Overall, a time with new hope has begun in British Columbia for children with cancer. We are one major step closer to achieving a cure for every child or teenager with cancer.

References

1. Canadian Cancer Society's Advisory Committee on Cancer Statistics. Canadian Cancer Statistics 2017. Toronto, ON: Canadian Cancer Society; 2017.
2. [Yang RK, Sondel PM. Anti-GD2 strategy in the treatment of neuroblastoma. *Drugs Future*. 2010 Aug;35(8):665-74.
3. [Le T-P, Thai T-H. The state of cellular adoptive immunotherapy for neuroblastoma and other pediatric solid tumors. *Front Immunol*. 2017;8:1640ff.
4. Gragert L, Eapen M, Williams F, Freeman J, Spellman S, Baitty R, et al. HLA match likelihoods for hematopoietic stem-cell grafts in the U.S. registry. *N Engl J Med*. 2014;371:339-48.
5. Khouri IF, Wei W, Korbling M, Turturro F, Ahmed S, Alousi A, et al. BFR (bendamustine, fludarabine and rituximab) allogeneic conditioning for chronic lymphocytic leukemia/lymphoma: reduced risk of myelosuppression and severe graft-versus-host disease. *Blood*. 2014;124:2306-12.
6. Sadelain M, Brentjens R, Riviere I. The basic principles of chimeric antigen receptor (CAR) design. *Cancer Discov*. 2013;3:388-98.
7. Bach PB, Giral SA, Saltz LB. FDA approval of Tisagenlecleucel – promise and complexities of a \$475 000 cancer drug. *JAMA*. 2017;318(19):1861-1862.

¹Division of Pediatric Hematology/Oncology/Blood & Marrow Transplant, Department of Pediatrics, BC Children's Hospital, University of British Columbia, Vancouver, BC, Canada

²Michael Cuccione Childhood Cancer Research Program, BC Children's Hospital Research Institute, Vancouver, BC, Canada

Correspondence to:
Kirk R. Schultz (kschultz@mail.ubc.ca)

Pediatric medulloblastomas: Classification, therapeutics, and management

James Cairns¹

Citation: UBCMj. 2018; 9.2 (8-11)

Abstract

Medulloblastomas are a type of primary malignant brain tumour arising within the cerebellum and posterior cranial fossa adjacent to the fourth ventricle. Medulloblastomas are the most common primary malignant brain tumours in the pediatric population, and an increasing body of basic and clinical research is providing important insights into the etiology, pathogenesis, and development of novel therapeutics to treat these highly invasive tumours. Recent advances in genomics and transcriptomics have allowed researchers to classify and diagnose medulloblastomas based on differences in genetic and transcriptomic factors. Based on these findings, medulloblastomas have been classified into four main subgroups: 1) the Wntless/int subgroup, 2) the Sonic hedgehog subgroup, 3) Group 3 tumours, and 4) Group 4 tumours. These advancements in classifying and diagnosing medulloblastomas are significant, as different tumour subgroups have different pathophysiology, differing prognoses, and variable responses to treatment. This article will briefly highlight the latest classification criteria of pediatric medulloblastoma, review molecular and genetic features believed to be involved in the pathogenesis of each of the four subgroups of medulloblastoma, and provide an overview of treatments and therapies that are currently available and in development for medulloblastoma.

Introduction

Medulloblastomas are the most common primary malignant pediatric brain tumours that typically arise within the cerebellum, and it is estimated that 25% of medulloblastomas are derived from cerebellar granule cell precursors following inappropriate activation of the Sonic hedgehog (Shh) pathway (Figure 1).¹⁻⁴ Medulloblastomas are a heterogeneous group of clinically and molecularly diverse tumours, and are classified into four tumour subgroups based on demographic, clinical, transcriptional, and genetic characteristics.^{5,6}

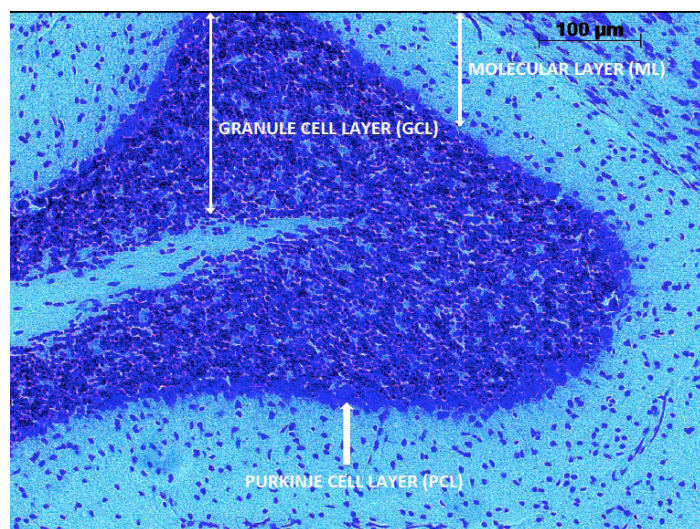


Figure 1 | Histological appearance of the cerebellar cortex in the mammalian brain. The outermost layer of the cerebellar cortex is the molecular layer (ML), which has a sparse population of neurons. The middle layer of the cerebellar cortex is the Purkinje cell layer (PCL), a monolayer of cells made up of Purkinje neurons, which constitute the sole efferent outputs of the cerebellar cortex to the rest of the central nervous system (CNS). The innermost layer of the cerebellar cortex is the densely packed granule cell layer (GCL). Approximately one-quarter of medulloblastomas arise from granule cell precursors in the cerebellum, and tumour initiation is related to the aberrant activation of the Sonic hedgehog (Shh) signaling pathway. This light photomicrograph was taken at 20x magnification using cresyl violet (CV) staining to reveal the cytoarchitecture of the cerebellar cortex.

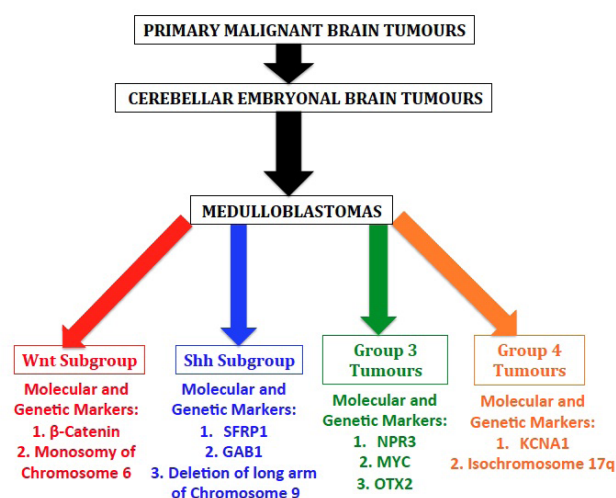


Figure 2 | Classification of cerebellar embryonal brain tumours. Medulloblastomas are classified into four main subgroups based on the molecular and transcriptomic characteristics of the tumour.

The four subgroups are: 1) the Wntless/int (Wnt) subgroup, 2) the Shh subgroup, 3) Group 3, and 4) Group 4 medulloblastomas (Figure 2).⁷ Previously, medulloblastomas were classified based on their histopathological features, and included variants such as desmoplastic/nodular, medulloblastoma with extensive nodularity, classic medulloblastoma, large cell medulloblastoma, and anaplastic medulloblastoma.⁷ Recently, several research groups have begun to classify medulloblastomas based on transcriptomic differences.⁸ These developments led to a conference being organized in 2010 where a consensus statement was created declaring that there are four main subgroups of medulloblastomas, with each subgroup subdivided into different subtypes of tumours based on the transcriptional and molecular profile of the tumour. Group 3 and Group 4 tumours are generically named because less is known about these neoplasms, though it is believed that non-Wnt and non-Shh signaling pathways are involved in the development and progression of these tumour subtypes.⁷ Here we will review the classification of the four subgroups

¹MD Program, Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada

Correspondence to:
James Cairns (j.cairns@alumni.ubc.ca)

of medulloblastoma and provide an overview of therapeutic options available for the treatment and management of medulloblastomas.

Wnt subgroup of medulloblastomas

The Wnt subgroup of medulloblastomas has a relatively good prognosis, with long-term survival rates estimated to be >90%; mortality in this subgroup is believed to be related to complications of therapy or due to secondary neoplasms.⁹ Genetic mutations implicated in Wnt tumours include germline mutations of the adenomatous polyposis coli gene, a Wnt signaling pathway inhibitor.¹⁰ Somatic mutations in the catenin beta-1 (*CTNNB1*) gene, which encodes β -catenin, have also been discovered in cases of sporadic medulloblastomas.¹⁰ Along with the unique genetic and transcriptomic features of Wnt tumours, this subgroup of medulloblastoma has characteristic histological features that aid in its diagnosis. A common histological feature of Wnt tumours is nuclear β -catenin staining, and this is commonly associated with *CTNNB1* mutations and monosomy of chromosome 6.¹¹ Under normal conditions, β -catenin is located in the cytoplasm and is phosphorylated by glycogen synthase kinase-3 β (GSK-3 β), leading to degradation by the ubiquitin-proteasome system.¹² With aberrant Wnt signaling, β -catenin is not phosphorylated by GSK-3 β and β -catenin is translocated to the nucleus where it acts as a transcription cofactor in the expression of genes involved in cell growth and proliferation.¹² Wnt signaling pathway mutations have been discovered in Shh and Group 3 tumours, suggesting that the Wnt pathway may be involved in the pathogenesis of multiple subgroups of medulloblastoma.¹¹ Overall, medulloblastomas are more common in males, but the Wnt subgroup of medulloblastoma affects an equal number of males and females.⁷ Wnt tumours are uncommon in infants, but can affect older children of all ages.⁷ It is hypothesized that Wnt tumours are derived from the inferior rhombic lip of the cerebellum, but further research is needed to better understand the pathogenesis of this subgroup of medulloblastoma.⁷

Shh subgroup of medulloblastomas

Shh has been implicated in tumour initiation and progression, and Shh tumours can be characterized by unique patterns of genetic mutations and transcriptome profiles. The prognosis of Shh medulloblastoma is approximately the same as Group 4 medulloblastoma; both have worse prognoses than Wnt medulloblastoma and better prognoses than Group 3 medulloblastoma.⁷ Germline mutations in the Patched 1 (*PTCH1*) gene encoding protein patched homolog 1, the Shh receptor, have been linked to Gorlin syndrome, and these mutations are associated with an increased risk of developing medulloblastoma.¹³ Mutations in the suppressor of fused homolog (*SUFU*) gene, which is an inhibitor of Shh signaling, predispose individuals to developing infantile medulloblastoma.^{14,15} Somatic mutations in the *PTCH1*, *SUFU*, and smoothened (*SMO*) genes, and gene amplifications in the glioma-associated oncogenes *GLI1* and *GLI2*, have been found in cases of sporadic medulloblastomas.^{16,17} Diagnostic features of Shh tumours can include secreted frizzled-related protein 1 or GRB2-associated-binding protein 1 immunoreactivity in histological sections. Fluorescent in situ hybridization identification of deletions of the long arm of chromosome 9 can also aid in the diagnosis of Shh tumours, which is significant because the gene encoding the Shh receptor and tumour suppressor *PTCH1* is located at chromosome 9q22.^{11,18} Shh medulloblastomas affect males and females equally; they have the highest incidence in children aged zero to three years and in young adults older than 16 years.⁷

Group 3 medulloblastomas

Diagnostic features of Group 3 medulloblastomas include immunoreactivity for natriuretic peptide receptor C in histological sections, increased expression and gene amplification of the oncogene *MYC*, and increased expression of the medulloblastoma oncogene orthodenticle homeobox 2.^{19,20} Group 3 tumours are characterized by chromosomal abnormalities such as duplication of the long arm of chromosome 1 and/or deletion of the long arms of chromosomes 5 and 10.⁷ Group 3 medulloblastoma is more common in males, can develop in both infants and older children but rarely in adults, and is frequently metastatic.⁷ Two subtypes of Group 3 tumours are Group 3 α and Group 3 β medulloblastoma. Group 3 α medulloblastoma patients have *MYC* gene amplifications, higher recurrence rates, and increased mortality as compared to other types of medulloblastoma, whereas Group 3 β medulloblastoma patients do not have *MYC* gene amplifications and have better prognoses.^{7,21}

Group 4 medulloblastomas

Group 4 medulloblastomas are diagnosed through their transcriptome profiles and tend to have a cluster of shared characteristics. Group 4 tumours have a prognosis similar to Shh medulloblastomas. The pathogenesis of Group 4 medulloblastoma is poorly understood, although potassium voltage-gated channel subfamily A member 1 is a putative immunohistochemical marker of Group 4 tumours.²¹ Chromosomal abnormalities are relatively common in Group 4 medulloblastoma, with a defect known as isochromosome 17q observed in two-thirds of Group 4 tumours.⁷ Isochromosome 17q is produced by the transverse splitting of a centromere so that both arms of the chromosome on the same side of the centromere are identical in length and possess identical genes. Isochromosome 17q is not unique to Group 4 tumours, and is also observed in 26% of Group 3 medulloblastomas.²² Group 4 medulloblastoma is more common in males, with a gender ratio of two males to one female, and 80% of females diagnosed with Group 4 medulloblastoma have X chromosome loss in tumour cells.⁷

Treatment and management of pediatric medulloblastomas

Medulloblastoma can have poor outcomes in some pediatric patients, and prognosis can vary depending on molecular, genetic, clinical, and demographic factors. Approximately one-third of medulloblastomas are diagnosed in children aged zero to three years and, compared to older children with medulloblastoma, the prognosis in younger children is worse following treatment with surgery, chemotherapy, and/or radiotherapy.^{23,24} Poorer outcomes in pediatric patients are related to metastases of the primary tumour at or after the time of diagnosis.^{25,26} The molecular and genetic subgroup of the tumour is significant, as certain types of medulloblastoma are associated with higher recurrence rates and lower long-term survival rates.^{25,26}

There are numerous side effects of treatments observed in patients. The brain is still undergoing rapid maturation, growth, and development throughout childhood. Radiotherapy and chemotherapy can have profound effects on brain structure and function. The developing brain is particularly vulnerable to post-operative radiotherapy, which can lead to significant cognitive deficits; however, in a clinical trial exploring the outcomes of post-operative chemotherapy, it was found that children with medulloblastoma treated with chemotherapy alone still had lower cognitive scores as compared to age-matched healthy controls.²⁷⁻²⁹

To reduce the neurocognitive effects of post-surgical craniospinal

irradiation (CSI), it was shown that adjuvant chemotherapy can be combined with lower radiation dose CSI to achieve the same long-term outcomes as higher radiation dose CSI treatment in standard-risk patients.³⁰⁻³² Children aged three to seven years with medulloblastoma are at the highest risk of neurocognitive deficits following CSI, and clinical trials have found that children receiving increased doses of CSI had increased intellectual decline as compared to patients receiving lower doses of CSI with or without chemotherapy.³⁰⁻³²

Previous estimates in the 1990s for patient survival following post-surgical chemotherapy with or without concurrent radiotherapy were poor, with survival rates estimated at 25-45%; however, modern multi-modal therapy in the last five years has improved survival rates to 80-85% in standard-risk medulloblastoma patients and 70% in high-risk patients.³⁰⁻³³ Improved survival rates are attributed to patients being treated and managed by following clinical risk stratification guidelines, which are based on the extent of tumour resection during neurosurgery and the presence or absence of metastatic disease.³¹

Pediatric patients greater than three years old with surgical resection resulting in <1.5 cm² of residual tumour and without metastasis are classified as standard-risk patients, with all other patients being classified as high-risk.³¹ Following surgical resection of the neoplasm, empirically based CSI with concurrent weekly vincristine and adjuvant chemotherapy following radiotherapy with agents like lomustine, cisplatin, and vincristine have become the standard of care for medulloblastoma.³⁰ Clinical trials looking at the effectiveness of treatments have noted that improvements in survival outcomes are due to improved application of empirically-based CSI and adjuvant chemotherapy following tumour resection.³⁰ In high-risk patients, empirically-based treatments have also significantly improved survival outcomes, and current surgical, CSI, and chemotherapy interventions are not strictly based on medulloblastoma subgroup.³⁰ However, the poor prognosis associated with some types of medulloblastoma following standard treatments highlights the need to identify novel therapeutic targets in different subgroups of medulloblastomas. There is also a need to develop therapies with fewer side effects and better safety profiles for treatment of brain tumours in pediatric populations.

Future directions in medulloblastoma treatment

A study published in *Cell* developed a high-throughput screening assay to identify putative compounds and drugs that may be useful in treating Group 3 medulloblastomas, which are associated with higher recurrence rates and increased mortality.³⁴ The study found that combination therapy of pemetrexed and gemcitabine inhibited Group 3 tumour cell growth *in vitro*, and preferentially inhibited neoplasm proliferation *in vivo* in mouse models of Group 3 medulloblastomas.³⁴ The authors noted that combination therapy of gemcitabine and pemetrexed, but not treatment with either drug alone, increased survival rates in mouse models of Group 3 tumours overexpressing the oncogene *MYC*.³⁴ This study highlights that combination therapy for medulloblastoma may be more effective than monotherapy. Treatments should be tailored to an individual patient's tumour subgroup, because there is considerable variability in prognosis and response to treatment in different types of medulloblastoma.

A recent systematic review looked at the effectiveness, safety profiles, and survival outcomes associated with classical chemotherapeutic agents and novel treatments developed for medulloblastoma. The study found that temozolomide, either taken on its own or in combination with irinotecan, showed promising

results in a large pediatric population with a more tolerable toxicity profile.^{35,36} Temozolomide also had positive synergistic effects when combined with classical chemotherapy agents or newer targeted drugs in the treatment of medulloblastomas, although the authors noted that the follow-up time for disease-free survival was short.^{35,36} Because aberrant Shh pathway activation is associated with initiation of tumour development in a number of medulloblastomas, researchers have developed targeted therapies against SMO, which is a member of the Shh signaling cascade.³⁷ The SMO inhibitor vismodegib has shown potent albeit short-lived effectiveness in the treatment of Shh tumours, and is being evaluated in a clinical trial for maintenance therapy following chemotherapy and radiotherapy in skeletally mature children with standard-risk Shh subgroup medulloblastoma.³⁸

The promising findings surrounding novel treatments targeting specific medulloblastoma subgroups will help to guide and inform future clinical treatment and management decisions. Studies examining molecular and genetic features unique to different medulloblastoma subgroups have also identified common molecular features found in all subgroups of medulloblastoma.³¹ Mutations in chromatin-modifying genes are found in all four subgroups of medulloblastoma and are also guiding the development of future medulloblastoma treatments.³¹ Demethylating agents (decitabine and azacitidine) and histone deacetylase inhibitors (vorinostat and panobinostat) are currently under investigation for the treatment of medulloblastoma.³¹

Conclusion

As with other healthcare decisions, patient and family values and preferences should be considered when developing a treatment and management plan for medulloblastoma. Patient quality of life should be taken into account as well, as treatments for medulloblastoma can be invasive. Chemotherapy and radiotherapy can produce long-lasting cognitive deficits in pediatric patients, with a subset of medulloblastoma patients at increased risk of developing leukoencephalopathy due to the toxicity of drugs like methotrexate.^{39,40}

Improved prognoses in standard-risk and high-risk medulloblastomas have come from refinements of current therapies. For example, maximal surgical resection of the tumour followed by targeted CSI and four courses of cyclophosphamide-based chemotherapy with hematopoietic stem cell therapy has improved five-year event-free survival to 70% in high-risk medulloblastoma patients.³⁰ Targeted subgroup-specific therapies should allow physicians to improve the prognosis of certain tumour subtypes, as previous pre-clinical and clinical trials have demonstrated the utility of combined multi-modal approaches in improving survival outcomes in medulloblastoma.

References

1. Ellison DW, Onelude OE, Lindsey JC, Lusher ME, Weston CL, Taylor RE, et al. b-Catenin status predicts a favorable outcome in childhood medulloblastoma: the United Kingdom children's cancer study group brain tumour committee. *J Clin Oncol*. 2005;23:7951-7957.
2. Gajjar A, Chintagumpala M, Ashley D, Kellie S, Kun LE, Merchant TE, et al. Risk-adapted craniospinal radiotherapy followed by high-dose chemotherapy and stem-cell rescue in children with newly diagnosed medulloblastoma (St Jude Medulloblastoma-96): long-term results from a prospective, multicentre trial. *Lancet Oncol*. 2006;7:813-820.
3. Thompson, MC, Fuller C, Hogg TL, Dalton J, Finkelstein D, Lau CC, et al. Genomics identifies medulloblastoma subgroups that are enriched for specific genetic alterations. *J Clin Oncol*. 2006;24:1924-1931.
4. Kool M, Koster J, Bunt J, Hasselt NE, Lakeman A, van Sluis P, et al. Integrated genomics identifies five medulloblastoma subtypes with distinct genetic profiles, pathway signatures and clinicopathological features. *PLoS ONE*. 2008;3:e3088.
5. Gibson P, Tong Y, Robinson G, Thompson MC, Currie DS, Eden C, et al. Subtypes of medulloblastoma have distinct developmental origins. *Nature*. 2010;468:1095-1099.

6. Pomeroy SL, Tamayo P, Gaasenbeek M, Sturla LM, Angelo M, McLoughlin ME, et al. Prediction of central nervous system embryonal tumour outcome based on gene expression. *Nature*. 2002;415:436-442.
7. Taylor MD, Northcott PA, Korshunov A, Remke M, Cho YJ, Clifford SC, et al. Molecular subgroups of medulloblastoma: the current consensus. *Acta Neuropathol*. 2012;123:465-472.
8. Thompson MC, Fuller C, Hogg TL, Dalton J, Finkelstein D, Lau CC, et al. Genomics identifies medulloblastoma subgroups that are enriched for specific genetic alterations. *J Clin Oncol*. 2006;24:1924-1931.
9. Ellison DW, Kocak M, Dalton J, Megahed H, Lusher ME, Ryan SL, et al. Definition of disease-risk stratification groups in childhood medulloblastoma using combined clinical, pathologic, and molecular variables. *J Clin Oncol*. 2011;29:1400-1407.
10. Zurawel RH, Chiappa SA, Allen C, Raffel C. Sporadic medulloblastomas contain oncogenic beta-catenin mutations. *Cancer Res*. 1998;58:896-899.
11. Northcott P, Korshunov A, Witt H, Hielscher T, Eberhart C, Mack S, et al. Medulloblastoma comprises four distinct molecular variants. *J Clin Oncol*. 2011;29:1408-1414.
12. Kikuchi A. Tumor formation by genetic mutations in the components of the Wnt signaling pathway. *Cancer Sci*. 2003;94:225-229.
13. Taylor MD, Mainprize TG, Rutka JT. Molecular insight into medulloblastoma and central nervous system primitive neuroectodermal tumor biology from hereditary syndromes: a review. *Neurosurgery*. 2000;47:888-901.
14. Slade I, Murray A, Hanks S, Kumar A, Walker L, Hargrave D, et al. Heterogeneity of familial medulloblastoma and contribution of germline PTCH1 and SUFU mutations to sporadic medulloblastoma. *Fam Cancer*. 2010;10(2):337-342.
15. Taylor MD, Liu L, Raffel C, Hui CC, Mainprize TG, Zhang X, et al. Mutations in SUFU predispose to medulloblastoma. *Nat Genet*. 2002;31:306-310.
16. Northcott P, Hielscher T, Dubuc A, Mack S, Shih D, Remke M, et al. Pediatric and adult sonic hedgehog medulloblastomas are clinically and molecularly distinct. *Acta Neuropathol*. 2011;122:231-240.
17. Northcott PA, Nakahara Y, Wu X, Feuk L, Ellison DW, Croul S, et al. Multiple recurrent genetic events converge on control of histone lysine methylation in medulloblastoma. *Nat Genet*. 2009;41:465-472.
18. Hatten ME, Roussel MF. Development and cancer of the cerebellum. *Trends Neurosci*. 2011;34(3):134-142.
19. Adamson DC, Shi Q, Wortham M, Northcott PA, Di C, Duncan CG, et al. OTX2 is critical for the maintenance and progression of Shh-independent medulloblastomas. *Cancer Res*. 2010;70:181-191.
20. de Haas T, Oussoren E, Grajkowska W, Perek-Polnik M, Popovic M, Zdravcevic-Zalatel L, et al. OTX1 and OTX2 expression correlates with the clinicopathologic classification of medulloblastomas. *J Neuropathol Exp Neurol*. 2006;65:1-11.
21. Cho YJ, Tsherniak A, Tamayo P, Santagata S, Ligon A, Greulich H, et al. Integrative genomic analysis of medulloblastoma identifies a molecular subgroup that drives poor clinical outcome. *J Clin Oncol*. 2011;29:1424-1430.
22. Kool M, Korshunov A, Remke M, Jones D, Schlanstein M, Northcott P, et al. Molecular subgroups of medulloblastoma: An international meta-analysis of transcriptome, genetic aberrations, and clinical data of wnt, shh, group 3, and group 4 medulloblastomas. *Acta Neuropathol*. 2012;123(4):473-484.
23. Rutkowski S, Bode U, Deinlein F, Ottensmeier H, Warmuth-Metz M, Soerensen N, et al. Treatment of early childhood medulloblastoma by postoperative chemotherapy alone. *New England Journal of Medicine*. 2005;352:978-986.
24. Kaatsch P, Rickert CH, Kuehl J, Schuez J, Michaelis J. Population-based epidemiologic data on brain tumors in German children. *Cancer*. 2001;92:3155-3164.
25. Evans AE, Jenkin RD, Sposto R, Ortega JA, Wilson CB, Wara W, et al. The treatment of medulloblastoma: results of a prospective randomized trial of radiation therapy with and without CCNU, vincristine, and prednisone. *J Neurosurg*. 1990;72:572-582.
26. Packer RJ, Rood BR, MacDonald TJ. Medulloblastoma: present concepts of stratification into risk groups. *Pediatr Neurosurg*. 2003;39:60-67.
27. Mulhern RK, Horowitz ME, Kovnar EH, Langston J, Sanford RA, Kun LE. Neurodevelopmental status of infants and young children treated for brain tumors with pre-irradiation chemotherapy. *J Clin Oncol*. 1989;7:1660-1667.
28. Jenkin D, Danjoux C, Greenberg M. Subsequent quality of life for children irradiated for a brain tumor before age four years. *Med Pediatr Oncol*. 1998;31:506-511.
29. Kiltie AE, Lashford LS, Gattamaneni HR. Survival and late effects in medulloblastoma patients treated with craniospinal irradiation under three years old. *Med Pediatr Oncol*. 1997;28:348-354.
30. Gottardo NG and Gajjar A. Chemotherapy for malignant brain tumours of childhood. *J Child Neurol*. 2008;23(10):1149-1159.
31. Gajjar A, Bowers DC, Karajannis MA, Leary S, Witt H, and Gottardo NG. Pediatric Brain Tumors: Innovative Genomic Information Is Transforming the Diagnostic and Clinical Landscape. *Journal of Clinical Oncology*. 2015;33(27):2986-2998.
32. Moxon-Emre I, Bouffet E, Taylor MD, Laperriere N, Scantlebury N, Law N, et al. Impact of Craniospinal Dose, Boost Volume, and Neurologic Complications on Intellectual Outcome in Patients With Medulloblastoma. *Journal of Clinical Oncology*. 2014;32(17):1760-1768.
33. Eaton BR, Esiashvili N, Kim S, Weyman EA, Thornton LT, Mazewski C, et al. Clinical Outcomes Among Children With Standard-Risk Medulloblastoma Treated With Proton and Photon Radiation Therapy: A Comparison of Disease Control and Overall Survival. *Int J Radiation Oncol Biol Phys*. 2016;94(1):133-138.
34. Morfouace M, Shelat A, Jacus M, Freeman III BB, Turner D, Robinson S, et al. Pemetrexed and Gemcitabine as Combination Therapy for the Treatment of Group 3 Medulloblastoma. *Cancer Cell*. 2014;25:516-529.
35. Bautista F, Fioravanti V, de Rojas T, Carceller F, Madero L, Lassaletta A, et al. Medulloblastoma in children and adolescents: a systematic review of contemporary phase I and II clinical trials and biology update. *Cancer Medicine*. 2017;doi: 10.1002/cam4.1171 [Epub ahead of print].
36. Grill J, Geoerger B, Gesner L, Perek D, Leblond P, Cañete A, et al. Phase II study of irinotecan in combination with temozolomide (TEMIRI) in children with recurrent or refractory medulloblastoma: a joint ITCC and SIOPE brain tumor study. *Neuro. Oncol*. 2013;15:1236-1243.
37. DeSouza RM, Jones BRT, Lowis SP, Kurian KM. Pediatric medulloblastoma – update on molecular classification driving targeted therapies. *Front. Oncol*. 2014;4:176.
38. Gajjar A, Stewart CF, Ellison DW, Kaste S, Kun LE, Packer RJ, et al. Phase I study of vismodegib in children with recurrent or refractory medulloblastoma: a Pediatric Brain Tumor Consortium study. *Clin. Cancer Res*. 2013;19:6305-6312.
39. Gudrunardottir T, Lannering B, Remke M, Taylor MD, Wells EM, Keating RF, et al. Treatment developments and the unfolding of the quality of life discussion in childhood medulloblastoma: a review. *Childs Nerv Syst*. 2014;30:979-990.
40. Riva D, Giorgi C, Nichelli F, Bulgheroni S, Massimino M, Cefalo G, et al. Intrathecal methotrexate affects cognitive function in children with medulloblastoma. *Neurology*. 2002;59:48-53.

Community perceptions and knowledge of mental illness in the rural Kisumu region of Kenya

Naima Kotadia¹, Sophie E. Walton¹, Devon M. Webster¹, Laura E. Matheson¹, Videsh Kapoor²

Citation: UBCMj. 2018; 9.2 (12-15)

Abstract

Objective: The University of British Columbia's Global Health Initiative (GHI) collaborated with the NGO, Kenya Partners in Community Transformation (PCT), to explore community knowledge, beliefs and practices surrounding mental health and illness in the rural Kisumu region.

Methods: Five focus group discussions (FGDs) were held in three rural communities within the Kisumu region. Demographic groups surveyed included: women (n=54), men (n=14), and Community Health Workers (CHWs; n=36). Focus groups probed community mental health knowledge and included case-based vignettes describing presentations of mental illnesses as outlined in the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition.

Results: Participant responses on mental health and mental illness definitions were generally well understood; however, stigmatizing perceptions were present among community members and CHWs. Medical-based etiologies and treatment were rarely suggested for psychiatric illness, and CHWs did not identify themselves as a resource for mental illness cases. Significant barriers to accessing mental healthcare exist in the area, including stigma, financial strain, and long distances to care centers.

Conclusion: Overall, FGDs with community members and CHWs indicated education on mental health was limited. Qualitative data gathered will be used to tailor WHO mental health modules to meet the unique needs of CHWs living in the rural Kisumu region of Kenya.

Introduction

Mental illness accounts for approximately 7.4 % of global disease burden,¹ with depressive disorders projected to be the leading contributor to global disease by 2030.² This is concerning in Kenya, where limited resources and legislation have resulted in inadequate mental health services.³ The World Health Organization (WHO) reports 0.19 psychiatrists per 100,000 people in Kenya compared to 7.79 and 12.40 in the US and Canada, respectively.⁴ This scarcity of psychiatric resources results in many individuals consulting traditional healers for mental healthcare, especially in rural regions.⁵ Disharmony in mental healthcare provision suggests a need for collaboration between traditional healers and the biomedical healthcare system to create an integrated care model.⁶ Community health workers (CHWs) are volunteers who liaise between healthcare centers and community members to provide health education and refer individuals to healthcare services as needed. Thus, they are uniquely positioned to connect community members with necessary mental health services.⁷

Limited research exists on perceptions of mental health in sub-Saharan Africa, likely secondary to the limited mental health resources in African countries.⁸ Kenya Partners in Community Transformation (PCT) is an NGO that addresses the needs of three communities in the rural Kisumu region: Kit Mikayi, Kaila, and Kajulu Koker. The University of British Columbia's Global Health Initiative (UBC GHI) has partnered with PCT to develop and implement sustainable community projects. In 2015, PCT identified mental health education as a priority topic within the community. Accordingly, our study used focus group discussions (FGDs) to evaluate knowledge, perceptions, and practices surrounding mental health in the Kisumu region. A FGD is an open forum utilized to elicit themes and overarching attitudes on a topic to gather qualitative data. Although other studies have evaluated mental health in Africa, this study presents novel research specific to the Kisumu region of rural Kenya. Qualitative mental health research has been completed outside of Kenya or in urban populations with different demographics.^{9,10} It would be unfair to generalize data from other urban, African studies to these rural communities, which have a distinct language and culture. Accordingly, qualitative data collection was necessary to appropriately tailor mental health education materials for local individuals.

The research team hypothesized that community knowledge of mental health would be limited, and that treatment options would be based upon cultural and spiritual beliefs. Although mental health education is not typically incorporated into CHW training, it was hypothesized that, compared to community members, CHWs would have a greater experiential understanding of mental illness and appropriate treatment options because of their unique background.

It is our hope to address potential mental health disparities in the rural Kisumu region by using the qualitative data collected in this study to develop

education materials that respond to individual and cultural values and add to the baseline understanding of mental illness in the region. The qualitative results from this study will be used by future GHI teams to tailor WHO mental health modules and develop culturally appropriate workshops for CHWs to increase awareness, improve screening, and educate community members on mental illness. As a precursor to these future efforts, qualitative data collection was considered to be more effective as an initial study methodology rather than the immediate use of quantitative methodology, which may have imposed too narrow a focus

Methods

The study protocol was approved by the University of British Columbia's Behavioural Research Ethics Board.

Participants

To survey community knowledge and attitudes of mental health, five FGDs were conducted in Kit Mikayi, Kaila, and Kajulu Koker: one with CHWs (n=36; female = 33, male = 3), one with men (n=14), and three with women (n=54) for a total of 104 participants (Figure 1). Members of all groups, including CHWs, reported no prior training in mental health. PCT staff used network sampling to recruit participants to the study who were eligible according to the inclusion criteria. FGD participants were self-selected to participate, but were screened to ensure location of residence and age between 18 and 50 prior to participation.

Focus group discussions

Community FGDs were divided by gender given the cultural norms of the region, as there was a concern that women may not share ideas in a discussion with male participants. FGDs were held in community centers located in three target communities. Data collection took place from June 18 to July 8, 2015. Consent forms were provided in simple English and Luo, the local language. Consent forms were distributed to all FGD participants and orated in English and Luo. FGDs were audio recorded for future transcription. Participants were given the opportunity to ask questions before consenting. FGDs were conducted over 60-90 minutes, with two facilitators and two PCT translators for each session. Discussion topics were designed to assess understanding of mental health, mental illness, and barriers to mental healthcare.

Discussion commenced by asking participants to define mental health and illness. Following this, WHO and National Institute of Mental Health (NIMH) definitions of mental health and illness were shared with participants. Subsequently, case-based vignettes describing mental illnesses, as defined by the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), were presented, and questions about the patient's diagnosis, function, and quality of life were discussed.¹¹ These vignettes were adapted from DSM-5 Made Easy: The Clinician's Guide to Diagnosis¹² and modified with PCT staff to be representative of life in rural Kenya. The following is the vignette for major depressive disorder:

George is a 40-year-old farmer in your community that has stopped taking care of his land, something he enjoyed a few months earlier. He says he

¹ MD Program, Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada

² Department of Family Medicine, Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada

Correspondence to:
Naima Kotadia (naima.kotadia@gmail.com)

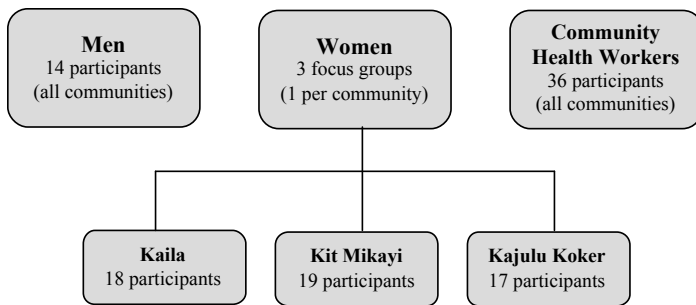


Figure 1 | Representation of focus group discussion demographic breakdown and the number of participants in attendance.

feels that the amount of work is overwhelming. He feels constantly tired and is not able to sleep through the night because he worries about his land and feels guilty for not working harder. He has lost his appetite and appears to be losing weight.

FGD questions explored treatment options and barriers to care. The full FGD script template can be seen in Table 1. After the FGD, attendees were provided with food and travel compensation of 200 KES (approximately \$2 CAD) to cover transportation.

Analysis

Following data collection, audio recorded FGDs were translated and transcribed from Luo into English by a private translator from Maseno University. The translator signed a confidentiality agreement to maintain the anonymity of participants. Respondent names were not on the audio recordings. English transcriptions were analyzed independently by four of the authors who had conducted the FGDs. The definitions of mental health and illness vocalized during FGDs were compared and categorized based on WHO and NIMH definitions. Analysis included identifying salient themes and categorizing quotes from discussions into these different themes. Thematic analyses were then combined and verified for agreement between the authors. Participants also responded to one survey question by a show of hands, recorded by researchers.

Results

The data presented are drawn from FGD transcriptions and researcher notes.

Mental health and illness definitions

Themes extracted from the WHO definition of mental health¹³ and NIMH definition of mental illness¹⁴ were used to categorize the FGD qualitative data. The WHO (2014) defines mental health “as a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully and is able to make a contribution to her or his community.”¹³ All FGD respondents had a good understanding of mental health and provided responses that fell in line with identified themes, as listed in Table 2. The NIMH (1999) defines mental illness as “health conditions that are characterized by alterations in thinking, mood, behavior (or some combination thereof) associated with distress and/or impaired functioning.”¹⁴ Overall, participant responses appropriately described mental illness; however, some responses did not fall in line with the definition’s themes and have been reported in Table 3. For example, some participants felt that mentally ill individuals are ‘unclean’, ‘dirty’, and of low socioeconomic status. In Kit Mikayi, four out of seven women’s responses fell outside of the realm of the definition and reflected stigmatizing concepts of psychiatric disorders. In Kaila, there were two out of seven responses in this category. This result was consistent among CHWs, with three out of seven responses similarly defining mental illness with negative connotations. All responses provided in the Kajulu Koker women’s and men’s FGD aligned with the NIMH definition of mental illness.

Major depressive Disorder

FGDs discussed ‘George,’ presented in the depression case-based vignette. When participants were asked what might have caused George to become like this, three of five responses in the men’s FGD suggested poor nutrition and reduced strength. Two of four responses in the CHW FGD and six out of thirteen responses in the women’s FGDs suggested illness generally as a cause, with only one person from Kit Mikayi stating, “I think George may be... depressed.” One response in the CHW FGD, three in the women’s FGDs, and one in the men’s FGD assessed George’s emotional state: “George has been working hard and had a goal to achieve but seemingly he is disappointed for not getting his desires, so he lost hope and is stressed.” None of the community members suggested a supernatural cause of George’s presentation; however, one CHW suggested George “is bewitched.” Participants were then

Table 1 | Questions asked to participants in mental health focus group discussions. The table provides the full script template for focus group discussions and questions asked to stimulate responses.

Mental Health Definitions
<i>In your own words, how do you define mental health and wellbeing?</i>
<i>In your own words, how do you define mental illness?</i>
Mental Health Perceptions
<i>Vignettes depicting the DSM-5 definition of the following mental disorders:</i>
<ul style="list-style-type: none"> • Major Depressive Disorder • Bipolar Disorder • Generalized Anxiety Disorder • Substance Use Disorder • Schizophrenia • Obsessive-Compulsive Disorder • Intellectual Disability • Epilepsy
<i>What do you think about this person?</i>
<i>What might have caused the person to become like this?</i>
<i>Could this person live a normal life? (e.g., live with the family, get married, continue working/ studying)</i>
<i>Can such a person be helped in any way? If so, who can best help such a person?</i>
Mental Health Resources
Community Members
<ul style="list-style-type: none"> • <i>What types of healers are you aware of that treat people who have a mental illness?</i> • <i>Who would you seek help from first?</i> • <i>If you or someone you knew had a mental illness, what barriers might stop you from seeking help? What could be done to remove those barriers?</i>
CHWs
<ul style="list-style-type: none"> • <i>Are there any agencies involved in the management of the mentally ill? Please give examples.</i> • <i>In what way do they help?</i> • <i>Have you had any training in mental health? Please specify.</i> • <i>Where do you think mentally ill patients should be treated?</i> • <i>What suggestions could you offer to the Ministry of Health to improve the care of the mentally ill?</i>

asked whether George could live a normal life and who could help him. Women from each community stated prayers would help George, whereas CHWs suggested “he can be taken to a faith healer.” Participants in all FGDs suggested hospital referral, including, “George could go to the hospital and get help from healthcare providers,” stated by a woman in Kit Mikayi, and that he “should be taken to the hospital for diagnosis and treated properly,” suggested by a CHW. Many stated counseling would be beneficial, with one man stating, “through counseling, he is able to open up and get proper help” and another Kajulu Koker woman suggesting, “Community Health Workers can also counsel.” A CHW also noted that George could live a normal life “if [he] is counseled,” but CHWs did not suggest themselves as a resource. Access to mental health care was quantified in subsequent discussion.

Access to Mental Healthcare

Community members identified an array of medical, cultural, and spiritual resources that they would access for mental illness, which are listed in Table 4. During the FGD, participants were asked to respond to the question “Where would you first seek help for mental illness?” The survey results are included in Figure 2. Interestingly, the majority of Kit Mikayi, Kajulu Koker, and the CHW participants said they would go to a hospital; however, community members were more likely than CHWs to access spiritual and cultural resources for primary mental healthcare, or to seek help from friends and family. In fact, when 17 women in the Kaila FGD were surveyed on their first point of care for mental illness, 53% of respondents said they would go to a faith healer, while 47 % said they would go to a hospital. All CHWs reported they had not received formal mental health training and, therefore, did not self-identify as a resource.

Identified Barriers

Barriers to accessing mental health care were discussed in community FGDs. Shared themes included stigma, personal hesitancy, financial barriers, lack of knowledge and support, and distance to access tertiary hospitals. All participants identified finance as a prominent barrier: “treatment is very expensive both at hospitals and even with traditional healers” (Male FGD). A woman in Kit Mikayi noted, “distance to health facilities” and “stigma can make one avoid help.” A woman in Kajulu Koker suggested community “lack of awareness” and another noted, “culture, [as] some people have a belief that hereditary problems must not be taken to the hospital.” A male participant stated: “this is a delicate and sensitive matter, in the society very few are able to talk about it.” Another noted, “most people with the problem or with family members with the

Table 2 | All participant responses to discussion question: “In your own words, how would you define mental health and well-being?”

The data from Focus Group Discussions have been analyzed in context of three themes used to describe an individual from the WHO definition of mental health. These include someone who has potential and is productive, can contribute to society, and can cope with normal stresses. Abbreviations have been used to identify location in which quotes were provided by women, where KA is Kaila, KK is Kajulu Koker and KM is Kit Mikayi.

Definition themes	Has potential and is productive	Contribute to society	Cope with normal stresses
Women (n=54)	<ul style="list-style-type: none"> - <i>Lucid</i>: “clear mind” (KA) - <i>Logical</i>: “organized” (KM) - <i>Problem Solver</i>: “someone who knows what is to be done at the right time” (KA) - <i>Good recall</i>: “one who is able to listen and remember events well and clearly” (KK) 	<ul style="list-style-type: none"> - <i>Rational</i>: “someone who... has a right upstairs, clear vision, reasons well, and has a clear mind based on interpersonal communication with him or her” (KA) - <i>Good communicator</i>: “one who is able to communicate well with another person,” “one who is able to participate and contribute to seminars like the one we are having” (KK) - <i>Socially appropriate</i>: “someone who dresses decently, very orderly, and always in an upright position while walking,” “someone who does not shy away from answering any question he or she is asked and answers the questions asked” (KA) 	<ul style="list-style-type: none"> - <i>Capable of activities of daily living</i>: “one who has a clear mind and is organized in his or her doings” (KM)
Men (n=14)	<ul style="list-style-type: none"> - <i>Good recall</i>: “one who has good mental health is one who is able to remember or recall situations as they are or as scheduled.” - <i>Problem Solver</i>: “mental health is to do with the thinking capacity” - <i>Logical</i>: “A person who is mentally healthy is a person who does his programs in an orderly manner” 	<ul style="list-style-type: none"> - <i>Good communicator</i>: “A person, who does things at the right time, can communicate properly” - <i>Socially appropriate</i>: “one is able to plan and achieve it well” 	<ul style="list-style-type: none"> - <i>Capable of activities of daily living</i>: “One can also be in school and be able to sit for an exam”
CHWs (n=36)	<ul style="list-style-type: none"> - <i>Lucid</i>: “one who is upright in his doings” - <i>Logical</i>: “one who is orderly” 	<ul style="list-style-type: none"> - <i>Good communicator</i>: “one who is understanding and able to communicate” - <i>Able to participate in social activities</i>: “able to advise the community correctly” - <i>Socially appropriate</i>: “one who is able to distinguish between good and evil” 	

problem are not courageous to speak out the truth,” reiterating societal stigma.

Community members were asked what could mitigate barriers, to which respondents suggested community interventions to increase awareness, promote openness, and reduce stigma. One woman in Kaila noted “we should stop being fearful and stigmatized, and always be outspoken to share our problems to others.” A Kaila FGD participant suggested, “trainings should be organized to create awareness on such kind of illnesses.” Given distance barriers, a woman from Kit Mikayi noted, “we can seek help from [CHWs] to reach those who we are not able to face.”

Discussion

The voiced definitions of mental illness from FGDs suggested many participants held negative perceptions of individuals with psychiatric disorders. From all the women’s FGDs, 35% of responses on mental illness fell outside of the NIMH definition themes and reflected stigmatizing concepts of psychiatric disorders. This result was consistent among CHWs with three out of seven responses similarly defining mental illness with negative connotations, and was in fact proportionately greater compared to all the responses in the women’s FGDs (Table 3). This was a surprising result given the role of CHWs as a health care resource, and may be reflective of negative experiences working with mentally ill patients while lacking the expertise to effectively manage these cases.

Based on the vignette results, only one individual used “depressed” to describe George. Beyond this, no other mental health–related terminology was applied, including among CHWs. This lack of knowledge on psychiatric conditions and terminology may hinder CHWs’ ability to screen for psychiatric morbidity in the community and provide appropriate treatment.¹⁵ Given the negative views toward mental illness expressed by some CHWs, it is necessary to address this gap in knowledge.

FGD participants consistently highlighted stigma and a lack of community support as barriers to care. Furthermore, as reflected in Table 4, cultural and mythical perceptions of mental illness often factored into treatment choice, with many seeking help from faith healers; this may have had the effect of delaying or replacing treatment at local clinics offering access to medications and counseling from trained nurses. Interestingly, no participants indicated they would first seek help from a psychiatrist for a mental illness. This reflects the general lack of access to psychiatric services in Kenya, consistent with WHO data that Kenya has a significantly reduced proportion of psychiatrists for their population.⁴ CHWs are trusted community members who, with appropriate training, are in a unique position to visit households to support community members, address negative perceptions, and, if appropriate, refer to local clinics or hospitals following basic mental health assessments. To date, CHWs had not received any formal training in mental health. Reassuringly, our data show that 94% of CHWs identify the hospital as the first resource to seek help for mental illness, indicating they are already poised to refer community members to appropriate resources should mental health concerns arise. Community members suggested that increasing community awareness and mental health education would reduce barriers to assessing care for mental

illness. This reinforces the importance of understanding the local community’s educational needs and current understanding of mental illness to create culturally appropriate interventions.

This is the first study evaluating mental health in rural Kisumu, with no existing local data. Data gathered from FGDs will be used to clarify misconceptions, increase awareness of mental health topics, and provide education on appropriate treatment choices, which may be used in conjunction with traditional spiritual consultants. Given that CHWs serve as community health care informants, supporting them would have a significant impact on furthering community education. Data will be used by future GHI teams to inform the development of culturally appropriate mental health modules to provide basic mental health training to CHWs.¹⁶

The small sample size used in this study provides a preliminary understanding of attitudes and perceptions in the area, and future studies may use larger sample sizes to improve the generalizability of these results.

The participants of this study self-selected to engage in the FGDs, and therefore, the results are susceptible to selection bias. However, there was a diverse range of study participants varying in age, and FGDs targeted all populations including men, women, and CHWs. CHWs from all three communities attended their FGD.

FGDs were conducted in English and translated by PCT workers into Luo, risking mistranslation or loss of meaning. To mitigate this, FGDs were audio recorded and sent to a translating service to transcribe Luo responses into English prior to analysis.

Given that a qualitative study design was implemented that required subjective interpretation of discussion points to extrapolate themes, observer bias may have influenced conclusions. To mitigate observer bias, team

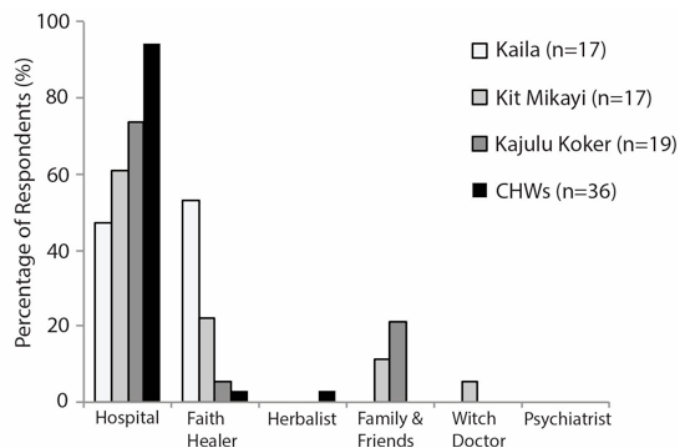
**Figure 2** | Where focus group discussion respondents would first seek help for mental health care.

Table 3 | All participant responses to discussion question: “In your own words, how would you define mental illness?”

The data from focus group discussions have been analyzed in context of four themes used to describe an individual from the NIMH definition of mental illness, including someone who has altered thinking, altered behaviour, impaired functioning, and is distressed. An additional section was added for responses that did not fit these definitions.

Definition themes	Altered Thinking	Altered Behaviour	Impaired Functioning	Distress	Not in line with definition
Women (n=54)	<ul style="list-style-type: none"> - <i>Illogical</i>: “one who is neither composed nor logical in his/her reasoning” (KK); “A person who is not organized, who is not able to coordinate properly” (KM) - <i>Confusion & poor concentration and memory</i>: “A mentally ill person is someone who most of the time loses concentration and looks confused” (KA); “one who is not able to think very fast,” “one who forgets quickly and not able to remember events well” (KK) 	<ul style="list-style-type: none"> - <i>Socially inappropriate</i>: “able to walk naked and sees nothing wrong with it” (KM); “someone who walks naked and most of them carry large languages[sic] containing waste dumped materials,” “someone who doesn’t dress well, talks alone, and indulges in activities a sound mind person cannot be involved in doing” (KA) - <i>Careless</i>: “lives a careless life” (KA) - <i>Personality changes</i>: “A person who leaves a decent home and lives on the streets” (KM) 	<ul style="list-style-type: none"> - <i>Impaired social functioning</i>: “mentally ill people at times are forced to go to mentally challenged schools since they cannot mingle with the mentally healthy [students]” (KA) 		<ul style="list-style-type: none"> - <i>Violent</i>: “they have loose vulgar words and mostly uses abusive languages,” “can be violent without proper reason” (KM); “Some of the mentally ill persons are violent in their doings” (KA) - <i>Unclean & Dirty</i>: “A mentally ill person mostly eats dirty foods especially the waste food materials dumped and most of them are untidy and go without showering at all” (KA); “they collect dirty things” (KM) - <i>Low socioeconomic status</i>: “They beg for food and money” (KM)
Men (n=14)	<ul style="list-style-type: none"> - <i>Illogical</i>: “Mental disorder is when one is not thinking properly and not able to coordinate his thinking properly” 	<ul style="list-style-type: none"> - <i>Socially inappropriate</i>: “For example in a funeral when people should be mourning a person with a mental disorder does the contrary, either happy or just laughing unnecessarily.” 	<ul style="list-style-type: none"> - <i>Substance abuse induced</i>: “Use of hard drugs like bhang can also lead to mental instability” - <i>Illness induced</i>: “There are instances where diseases like malaria can cause mental disorder”; “Lack of some important essentials like oxygen in the brain can cause mental problem” 	<ul style="list-style-type: none"> - <i>Stress induced</i>: “when someone is stressed because of the pressures of life. This leads to so much confusion hence mental instability”; “one can also have a mental problem as a result of too much [work]” 	
CHWs (n=36)	<ul style="list-style-type: none"> - <i>Illogical</i>: “A person who does things that are not understood can be said to be mentally ill” - <i>Confusion</i>: “one who is generally confused” 	<ul style="list-style-type: none"> - <i>Socially inappropriate</i>: “walks on the streets naked”; “Talks to himself” 			<ul style="list-style-type: none"> - <i>Violent</i>: “one who is destructive”; “one who is violent without cause” - <i>Dirty</i>: “eats dirty, unimagineable things”

Table 4 | Suggested resources for mental illness from focus group participants. The data presented includes suggestions provided by the men and women’s focus group discussions for appropriate resources for mental illness treatment.

Definition themes	Has potential and is productive	Contribute to society	Cope with normal stresses
Women	<ul style="list-style-type: none"> - Tertiary care hospital - Doctors at specialized hospitals - Psychiatrist 	<ul style="list-style-type: none"> - Witch doctor - Traditional healer - Herbalist 	<ul style="list-style-type: none"> - Spiritual leaders - Special prayers
Men	<ul style="list-style-type: none"> - Medical treatment - Rehabilitation centre - Counselling 	<ul style="list-style-type: none"> - Witch doctor (witchcraft) - Traditional healer 	<ul style="list-style-type: none"> - Prayers

members independently reviewed FGD transcripts and compared analyses to look for commonalities and discrepancies. In addition, since Canadian medical students facilitated the FGDs, participant bias may have impacted the responses of participants. To address this issue, FGDs were co-led by Kenyan translators and preemptive suggestions were made to stimulate discussions among participants rather than directly responding to facilitators.

Conclusion

As the global disease burden of mental illness continues to grow, appropriate mental health interventions become increasingly important. Study results aligned with the hypothesis that knowledge of mental health is limited in the Kisumu region among community members. Unsurprisingly, community members and CHWs suggested treatment resources that incorporated cultural and spiritual practices. Unexpectedly, CHWs held many negative perceptions of mental illness.

Although there were numerous barriers to accessing mental health services, community members identified potential solutions, including increased openness in the community and training programs for education that will reduce stigma and improve awareness. CHWs are in a unique position to provide education to community members, but currently have received no formal training in mental health. The results of this study will be used by future GHI teams to modify WHO CHW Mental Health Modules to meet the

specific cultural needs of the rural Kisumu communities. The research team hopes this will empower CHWs to become an important community resource for mental health information.

Acknowledgements

The research team acknowledges Patrick Mbullo & Kenya Partners in Community Transformation, Kisumu, Kenya, and the Florence E. Heighway Summer Research Award administered by the University of British Columbia Faculty of Medicine Dean’s Office for their support.

References

- Whiteford HA, Degenhardt L, Rehm J, Baxter AJ, Ferrari AJ, Erskine HE, et al. Global burden of disease attributable to mental and substance use disorders: findings from the Global Burden of Disease Study 2010. *Lancet*. 2013 Aug 29;382(9904):1575-86.
- World Health Organization. The global burden of disease: 2004 update [Internet]. Geneva: World Health Organization; 2008 [cited 2017 Sep 20]. Available from: http://www.who.int/healthinfo/global_burden_disease/GBD_report_2004update_full.pdf
- Ndeti DM, Gatonga P. Improving access to mental health care in Kenya. *Ethn Inequal Health Soc Care*. 2011;4(3):97-102.
- World Health Organization. Global Health Observatory (GHO) data [Internet]. Geneva: World Health Organization; 2016 [cited 2017 Sep 20]. Available from: <http://www.who.int/gho/en/>
- Ndeti DM, Ongercha FA, Mutiso V, Kuria M, Khasakhala LA, Kokonya DA. The challenges of human resources in mental health in Kenya. *S Afr Psychiatry Rev*. 2007;10(1):33-6.
- Kohn R, Saxena S, Levav I, Saraceno B. The treatment gap in mental health care. *Bull World Health Organ*. 2004 Dec 14;82(11):858-66.
- Jenkins R, Kiima D, Okonji M, Njenga F, Kingora J, Lock S. Integration of mental health into primary care and community health working in Kenya: context, rationale, coverage and sustainability. *Ment Health Fam Med*. 2010 Mar;7(1):37-47.
- Jacob KS, Sharan P, Mirza I, Garrido-Cumbrera M, Seedat S, Mari JJ, et al. Mental health systems in countries: where are we now? *Lancet*. 2007 Sept 4;370(9592):1061-77.
- Mamah D, Striley CW, Ndeti DM, Mwayo AW, Mutiso VN, Khasakhala LI, et al. Knowledge of psychiatric terms and concepts among Kenyan youth: Analysis of focus group discussions. *Transcult Psychiatry*. 2013 Aug;50(4):513-31.
- Needs and Preferences for Receiving Mental Health Information in an African American Focus Group Sample. *Community Mental Health Journal*. 2009;45(2):117-126.
- American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 5th ed. Arlington (VA): American Psychiatric Publishing; 2013. 947 p.
- Morrison J. DSM-5 made easy: the clinician’s guide to diagnosis. New York (NY): Guilford Press; 2014. 652 p.
- World Health Organization. Mental health: a state of well-being [Internet]. Geneva: World Health Organization; 2014 Aug [cited 2017 Sep 20]. Available from: http://www.who.int/features/factfiles/mental_health/en/
- US Department of Health and Human Services. Mental health: a report of the Surgeon General. Rockville (MD): National Institute of Mental Health; 1999. 494 p. Report No.1.
- Angermeyer MC, Matschinger H. Social representations of mental illness among the public. In: Guimón J, Fischer W, Sartorius N, editors. The image of madness: the public facing mental illness and psychiatric treatment. Basel: Karger; 1999. p. 20-28.
- World Health Organization. Mental health: education and training materials [Internet]. Geneva: World Health Organization; 2017 [cited 2017 Sep 20]. Available from: http://www.who.int/mental_health/policy/education/en/

A survey of teacher and student perspectives on how running is taught and evaluated in British Columbia schools

Clare L. Protheroe¹, Astrid M. De Souza², Kevin C. Harris², Victoria E. Claydon¹, Shubhayan Sanatani²

Citation: UBCMJ. 2018; 9.2 (16-19)

Abstract

Objective: Running is a simple and inexpensive exercise to maintain cardiovascular health. We aimed to evaluate student and teacher perspectives on the incorporation of running in physical education classes in British Columbian schools to determine how running is taught in schools.

Methods: All 60 superintendents representing the school districts in British Columbia were contacted. They gave written approval for our research team to send a survey to schools within their districts. Teacher and student perspectives on running in middle and high schools were collected.

Results: Teachers (n=63) and students (n=597) would like more information on proper running form and the cardiovascular benefits associated with this exercise. There is inconsistency in reporting medical conditions, and it is not clear whether students are graded fairly in comparison to one another ($p < 0.05$).

Conclusion: There is a lack of education in schools on running. Improvements to the incorporation of running within the physical and health education curriculum may enhance student enjoyment and in turn help reduce sedentary behaviours and associated comorbidities in the general population.

Introduction

The economically developed world has documented a high prevalence of obesity and health related complications, including diabetes in childhood and adolescence, which threaten longevity.¹⁻⁶ As a result, public health goals aim to increase physical activity levels to help reduce the prevalence of these conditions, as well as the economic burden of chronic disease on the medical system.^{4,6-8} Physical literacy has become a key focus of physical activity and is defined as “the motivation, confidence, physical competence, knowledge, and understanding to value and take responsibility for engagement in physical activities for life”.⁹ Fundamental movement skills such as running are a key component of physical literacy and provide the foundation for higher level sport skills that are then incorporated into various decision-making situations.⁹ Mastery of physical literacy skills in childhood allows individuals to be active as children and through all phases of adulthood,¹⁰ physically literate children have improved health indicators and are more likely to be physically active.¹¹⁻¹³

Physical education (PE) classes provide an opportunity for children to develop physical literacy and accordingly have become a focus for intervention.^{14,16} Running is a fundamental movement skill that is incorporated into PE classes, although it is unclear whether children are formally taught how to run in a structured way that focuses on the individual's progress. Running improves cardiorespiratory health, enhances self-esteem, and is an inexpensive activity that can be incorporated into a healthy active lifestyle over the lifespan.^{12,7,14} Unfortunately, there are often barriers to participation, and these benefits require perseverance and commitment.¹⁷ An appropriate warm-up and cool-down, along with a periodized program (one that includes a variety of speeds and time intervals) and education about appropriate technique, wear, and stretching, allows runners to train in a structured, progressive manner to make running a manageable and enjoyable activity with improvements that are attainable, achievable, and suitable for the majority.^{7,17}

While almost all children are able to safely participate in their PE classes, some children have chronic medical conditions that require a modified exercise program to meet their needs. In economically developed countries, an estimated 10-31% of children under the

age of 18 years have a chronic medical condition—most commonly asthma or congenital heart disease.¹⁸⁻²² These conditions may impact an individual's physical activity level, and considerations should be made to ensure safe participation in PE, but there is limited research investigating how these differences are incorporated into PE classes. Catering to the different needs of children and adolescents with various chronic medical conditions also presents an additional challenge for the PE teacher. Clinically, many children with congenital or inherited heart disease have abnormal cardiovascular responses to exercise; for these children, modified exercise programs are necessary, and performance-based assessments are particularly inappropriate. However, it is not clear what approach is being taken in schools to tailor the PE classes for these children.

We sought to better understand how running was incorporated into the physical and health education curriculum in schools in British Columbia (B.C.), Canada. The objectives of the study were: 1) to determine how PE instructors teach students how to run as a form of exercise; 2) to investigate how students are evaluated on their running performance in their PE class; and 3) to determine if chronic medical conditions are considered in the teaching and evaluation of PE.

Materials and Methods

Ethical approval was obtained from the University of British Columbia Children's & Women's Research Ethics Board and the Office of Research Ethics at Simon Fraser University. All participants gave informed consent prior to completing the survey.

Protocol

With permission from the B.C. Physical Education Association, the Ministry of Education, and the B.C. Teacher's Federation, we contacted each school district superintendent within the 60 public school boards in B.C. If the superintendent provided an approval letter allowing the research team to contact schools in their district, principals for each school with grades 4 to 12 were contacted and asked if teachers and their students could participate in the study. All teachers and students who taught PE or were taking PE classes who were interested in participating in the study were included. All school districts, schools, teachers, and students that did not respond were not included in the study.

Surveys

Teacher and student surveys underwent stakeholder review by a group of four teachers who were currently teaching elementary and middle school

¹Department of Biomedical Physiology and Kinesiology, Simon Fraser University, Burnaby, BC, Canada

²Children's Heart Centre, BC Children's Hospital, Vancouver, BC, Canada

Correspondence to:
Shubhayan Sanatani (ssanatani@cw.bc.ca)

grades, prior to beginning this project. Surveys were distributed from January 2011 to June 2012. The survey was available as either a paper copy mailed to schools or online using SurveyMonkey (SurveyMonkey.com, LLC, Palo Alto, California, USA). Each survey included both closed and open-ended questions and was divided into four sections: personal background information, student medical history, teaching of running, and grading and evaluation. Surveys were sent to teachers and students to gain their perspectives on how running is taught in the current physical education curriculum. Both students and teachers were able to skip questions if they wished.

Statistics

All statistical analyses were performed in Sigmaplot 11 (Systat Software Inc, San Jose, CA). Data were reported as number of responses, percentages of responses to that particular question, or means \pm standard error, as applicable. Significant differences were assumed when $p < 0.05$. Differences between teachers and students were evaluated using either the Fisher's exact or chi-squared analyses.

Results

There was a response rate of 32% from all school districts, with 19 school districts agreeing to participate; 25 districts did not reply after repeated email and telephone contact, and 16 declined participation (five did not want to participate, two were already involved in other research studies, and nine were unable to participate due to the 2011-2012 school year job action) (Figure 1). In total, 175 schools in these 19 districts were contacted, and 19 schools responded, an 11% response rate. Completed surveys were obtained from 63 teachers and 597 students. The students were all from classes taught by the teachers.

Personal characteristics

The majority of teachers had been instructing PE classes for more than five years (69%) in primary to senior grades. The teachers' undergraduate education was diverse (Figure 2), with only 38% of teachers specifically trained in PE or a related discipline (Kinesiology or Human Kinetics). The remainder completed their undergraduate training in Art (29%: Geography/History N=5, English N=4, Psychology/Sociology N=5, Unspecified discipline N=2), Science (6%: Chemistry N=1, Forest Science N=1, Unspecified discipline N=1), or Education (27%). There were more responses from teachers in suburban areas than from students in suburban areas (Table 1).

Thirty-one teachers (65%) ran as a form of exercise, but most teachers participated in a variety of activities to keep fit. Teachers reported exercising on average 4.2 ± 0.5 days per week with 49% exercising for five or more hours per week.

Student responses represented grades 4 to 12, with the majority of students in grades 7 (43%), 8 (27%), and 9 (23%), giving a mean age of 13.5 ± 0.1 years (47% male). The majority of students reported that they do run outside of school (74%), and 198 (33%) students reported participating in other forms of physical activity.

Running: teaching, grading, and evaluation

More teachers (68%) than students (42%, $p < 0.01$) reported that proper running form was taught in PE classes, with more teachers than students reporting PE incorporated education on appropriate body position, cool-down, and the risk and avoidance of injury (Table 1). More teachers (70%) reported that different types of running (e.g. sprints, intervals, or sustained running) were incorporated into the PE class, compared to 49% of students ($p < 0.05$). Only 60% of teachers discussed or required appropriate footwear for running; 15% of teachers cited financial concerns as reasons why some children did not have appropriate footwear, and 22% of teachers stated that current fashion trends created challenges around getting students to wear appropriate footwear.

The health benefits of running were discussed in PE class according to 70% of teachers but only 43% of students ($p < 0.01$). There was a lack of agreement between teachers and students concerning what types of stretching were included before or after running, with fewer students reporting that stretching was incorporated in running classes and students reporting greater emphasis on dynamic stretching and slow running than teachers (Table 1). Both students (78%) and teachers (66%) reported



Figure 1 | British Columbia (B.C.) district and school participation. There are 60 school districts in British Columbia. 19 schools responded to our request for participation and 7 schools completed the survey (63 teachers and 597 students).

that running was graded based on speed or distance covered, with no significant difference between their responses ($p = 0.123$); the beep test (a 20 metre timed shuttle run test)²³ and the one-mile run (where students run one mile as fast as they can) were the most frequently used evaluation tools. More teachers (98%) than students (42%, $p < 0.001$) reported that the grading of students with medical conditions would be tailored to their physical limitations. More students than teachers commented that they were encouraged to increase their running distance or speed in a structured way ($p < 0.01$). Both teachers (49%) and students (61%) noted that students were encouraged to record their running progress (Table 1).

Additionally, 21 of 32 teachers (66%) thought change to the current physical education and health curriculum was required. In general, they supported that running is an activity in which students can easily participate. Teachers reported that running is not always taught properly (47%), and that this could be improved with more professional development activities for PE teachers (41%) to help them address logistic concerns, incorporate individualized approaches, and address concerns regarding students with medical disorders that impact their ability to exercise.

In contrast to only 34% of teachers who thought current PE classes were satisfactory, 65% of students who responded said PE classes were satisfactory. The responses from the remaining 35% of students indicated that improvements were necessary in order to motivate all individuals to participate. The main areas identified for change by the students were: grading based on individual performance over time instead of relative to the most athletic of their peers, more variety in each class with the inclusion of running, removal of the beep test, and more education on both how to run and the benefits associated with exercise.

Medical history

Only 69% percent of teachers and 55% of students reported that a medical form is completed before participation in PE class (Table 1). Additionally, 80% of teachers but only 56% of students reported that there was a standard procedure for reporting medical conditions ($p < 0.05$).

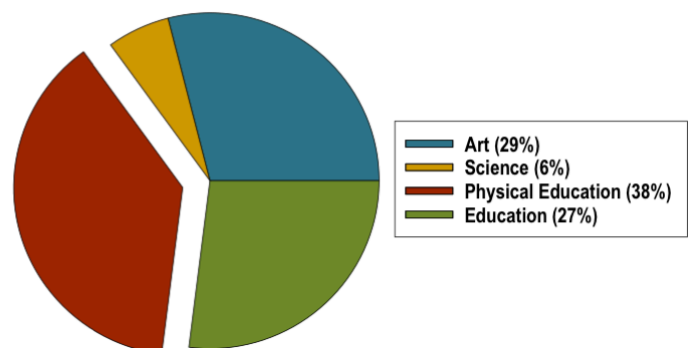


Figure 2 | Academic background of the teachers surveyed. Only 38% of teachers (red) had an undergraduate education in a related discipline (physical education, kinesiology, or human kinetics). The remainder completed their undergraduate training in disciplines related to arts, science, or education.

Table 1 | Student and teacher responses. Percentage responses for each question are shown. Statistical significance was compared using the Fisher Exact test.

	Students (%)	Teachers (%)	p
School area			
Urban	29	42	0.100
Suburban	21	44	0.001
Rural	50	19	0.180
Health condition	12	-	-
Medical form	55	69	0.095
Run outside school	74	65	0.417
Education on proper running form	42	68	0.002
Position	37	60	0.012
Warm-up	86	92	0.452
Cool-down	44	81	0.012
Running types	49	70	0.015
Possible injury	28	54	0.002
Warm-up/stretching activities	61	84	0.003
Static stretching	55	49	0.493
Dynamic stretching	43	62	0.025
Slow running	37	62	0.005
Other	18	19	1.000
Education on footwear	75	60	0.031
Health benefits of running	43	70	0.001
Encouraged to increase distance/speed	81	61	0.003
Record achievement	61	49	0.135
Graded on speed/distance	78	66	0.123
Individualized grading	42	98	0.001

Another discrepancy in the responses was that 30% of teachers, but 80% of students, reported that there was a procedure for updating changes to medical conditions during the school year ($p < 0.05$).

Surprisingly, 41% of teachers stated that not all PE teachers were aware of student medical conditions. Teachers reported that a general medical form used in schools was filled out by parents and submitted to the school office, but that there was no specific form used for PE classes to identify medical conditions that would affect participation. Almost one-third of teachers (31%) reported that substitute teachers are rarely advised of medical conditions.

A chronic medical condition was reported by 12% of students, with asthma being the most common condition reported. Of the 65 students who reported a chronic medical condition, 41 said that their doctor had recommended running as a form of exercise, but 36 said they had been advised to lower their activity levels because of their health condition.

Discussion

This study provides perspectives from both teachers and students on how running is taught in B.C.. Running is incorporated into the PE class, and teachers report that they teach different types of running as well as proper running form. A high percentage of both teachers and students surveyed reported that grading is based on speed or distance covered. While many teachers reported that grading would be tailored in those with medical conditions, a large percentage also noted that PE teachers were not always aware of medical conditions and substitute teachers were rarely advised on medical conditions of students. This has potentially important implications for expectations and safety in the PE class.

Incorporation of running into the physical education class

Running is one of many fundamental movement skills that is learned in early childhood, develops with age, and can be incorporated into a

healthy active lifestyle in adulthood.¹³ PE provides an opportunity to teach students about running. While teachers incorporated running into their PE classes, students did not identify that they were taught different types of running or proper running technique. The discrepancy between teacher and student responses may be related to the fact that students are not understanding the information that they are being taught, or not retaining the information discussed. Educational support to enhance student retention of information may be of benefit.

This difference in responses may also partly reflect the teachers' lack of specific expertise in this area, and not having the correct tools to educate students; the teachers' undergraduate education was diverse and not always tailored to PE classes. Both teachers and students expressed interest in learning more about running to increase their motivation in both teaching and participation. As such, professional development in the area of running, stretching, fitness, and the associated health benefits might improve the transmission and retention of information to students. Future development of the current curriculum, perhaps with the incorporation of a mastery motivational climate (which fosters intrinsic motivation of the student to engage in running) or a game sense approach, may lead to the fulfillment of these objectives.^{7,17,24}

Physical fitness is pertinent for cardiovascular health in all individuals regardless of the presence of chronic medical conditions, and the challenge remains to deliver appropriate information early in student development.²⁰ The physiological benefits associated with regular exercise should be explained to the population at large to give individuals motivation to improve their health. Physical literacy has been identified as a key component that benefits physical activity levels, health, and body composition.^{11,12} Additional information in terms of how to incorporate running as a periodized program inside and outside of the classroom will give students the tools to develop an active lifestyle.⁷ It has been shown that students are more likely to continue to participate in physical activity if they believe in its value and find it interesting.^{7,20} As such, there is a niche to be filled by experts to enable the translation of information concerning physical literacy and running in schools so as to promote active lifestyles and health benefits in the community.²⁵

Grading and evaluation

Student running performance was often graded in PE classes based on speed or distance covered, with the use of the beep test and the one-mile run most often reported; however, these tests actually evaluate cardiorespiratory fitness,²³ highlighting a problem in the evaluation of running performance. Particularly in the presence of chronic medical conditions, it may be more appropriate to set student goals and tailor exercise programs based on individual improvements over the course of a semester or school year, with the long-term goal of providing students with an understanding of commitment to exercise over their lifespan. This idea has been considered in the Achievement Goal Theory, where individuals target competency-based aims relating to physical mastery or performance, and which has been explored in an effort to understand how to motivate children to exercise.^{7,17} It is clear that teaching methods and the approach to physical activity must consider that there is a learning process based on individual ability.⁷ In addition, motivation is key to success with exercise programs,²⁴ and if this is incorporated into PE classes and assessment, students will be more likely to pursue an active lifestyle. Although some teachers did report using this approach, student responses differed, potentially suggesting a lack of formalization of assessment and expectations in this area. Physical activity should be promoted in schools to educate students not only on its importance, but also on suitable adaptations to cater to all ability levels, particularly given that certain medical conditions can interfere with an individual's ability to exercise.

Consideration of chronic medical conditions

This study has documented the prevalence of chronic medical conditions in a sample of B.C. schools (12%) and related this to the incorporation of running within the physical education and health curriculum. This proportion of affected students is towards the lower end of the range reported in the literature (10–31%),^{18–22} possibly due to the definition in the survey being interpreted incorrectly by students ("Do you have a long-lasting health condition that affects you when you exercise?").

However, one commonality with the literature was concordance in the most commonly reported condition, which was asthma, and supports previous studies.^{19,20} Overall, it is pertinent to have the resources that cater to these students' needs.²⁰ Furthermore, it is unclear how students with chronic medical conditions are graded against their peers; one teacher commented that these students typically did not receive high grades.

Approximately 40% of teachers reported that PE teachers were not always aware of medical conditions. Schools did not have a medical form specific to PE classes for reporting conditions that may limit a student's ability to exercise. This is important as some children may be graded unfairly based on a lack of understanding of their medical condition, and could even be put into unsafe conditions for their health. A general health form was often submitted to the school office, but teachers commented that this was not always completed. In PE classes, it seems appropriate that a medical form or health screening tool is available to students during their first PE class to address any conditions that may affect their performance and participation. The PAR-Q survey is a validated instrument that is recommended for people aged 15-69 years as a prescreening tool before carrying out an exercise program.^{26,27} A recent revision (the PAR-Q+) is reported to be targeted for all age groups and is currently undergoing validation.²⁸ Although the wording is not applicable to younger students, a variation may be useful to firstly describe the risks associated with exercise, but also to educate students on exercise physiology and exercising safely. This remains to be implemented, but is another area for consideration for development. In the interim, parent completion of the PAR-Q+ may provide useful information for PE teachers.

Limitations

The low response rates of the school districts and the individual schools limit the generalizability of our findings. The process of gaining permission to contact schools in B.C. to obtain information about current practices was time consuming and was made more difficult by the job action that occurred during the 2011-2012 school year. Nine districts cited the job action as a barrier to participation in this study. Response rates of schools were also low in school districts that approved the study, which further limits the generalizability of our findings. We were unable to ascertain the reason for the low response rate.

There are inherent risks of bias with survey studies. It is possible that responders to surveys are those that are most interested in the subject matter. Survey studies are especially challenging in younger age children who may be particularly prone to self-reporting inaccuracies compared to older children or adults. Similarly, while the wording of the student survey was aimed at a young audience and reviewed by a group of teachers for appropriateness, it is possible that some of the younger children may not have fully understood the questions (we did provide the opportunity for students to skip questions). Despite these potential inaccuracies, the students' perceptions about how running is taught and evaluated in their PE class was important for our understanding. The discrepancy in the teachers' and students' responses potentially highlights the need for enhanced discussion about running, its health benefits, and how it is evaluated. Communication between students and teachers regarding pertinent health concerns is an important area to address for PE teachers.

The majority of responses in this data set were from students in grades seven to nine which is another area of potential bias. Physical activity declines with age and progression through the school system.²⁰ Accordingly, future studies in both younger and older students may lead to further insight into how student attitudes and motivation change as they age.

Finally, while teacher and student surveys were reviewed by a group of four teachers who were currently teaching elementary and middle school grades, a representative student population would be helpful to validate the survey for students. A validation study was beyond the scope of this project.

Conclusion

Teachers and students have varying perceptions about how running is taught. The evaluation of running is often based on performance and may not account for the intrinsic limitations of the many children with chronic medical conditions. Notably, there is a demonstrated interest from both students and teachers for more education on running form, technique, and its benefits.

Acknowledgements

This work was sponsored by research funding from the Children's Heart Centre at B.C. Children's Hospital and Simon Fraser University. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

References

- Harris KC, Kuramoto LK, Schulzer M, Retallack JE. Effect of school-based physical activity interventions on body mass index in children: a meta-analysis. *Can Med Assoc J*. 2009 Mar 31;180(7):719-26.
- Carnethon MR, Gulati M, Greenland P. Prevalence and cardiovascular disease correlates of low cardiorespiratory fitness in adolescents and adults. *JAMA*. 2005 Dec 21;294(23):2981.
- Hobin EP, Leatherdale ST, Manske SR, Burkhalter R, Woodruff SJ. A multilevel examination of school and student characteristics associated with physical education class enrollment among high school students. *J Sch Health*. 2010 Aug 4;80(9):445-52.
- Beets MW, Pitsetti KH. Contribution of physical education and sport to health-related fitness in high school students. *J Sch Health*. 2005 Jan;75(1):25-30.
- Wilson R. Childhood obesity: what can we do? *BC Med J*. 2012;54:17-8.
- GBD 2015 Obesity Collaborators, Afshin A, Forouzanfar MH, Reitsma MB, Sur P, Estep K, et al. Health effects of overweight and obesity in 195 countries over 25 years. *N Engl J Med*. 2017 Jul 6;377(1):13-27.
- Xiang P, McBride RE, Bruene A. Fourth-grade students' motivational changes in an elementary physical education running program. *Res Q Exerc Sport*. 2006 Jun;77(2):195-207.
- Bryant CA, Courtney AH, McDermott RJ, Alfonso ML, Baldwin JA, Nickelson J, et al. Promoting physical activity among youth through community-based prevention marketing. *J Sch Health*. 2010 May;80(5):214-24.
- International Physical Literacy Association [Internet]. [cited 2017 Nov 28]. Available from: <https://www.physical-literacy.org.uk/>
- Physical Literacy: Canada's Physical Literacy Consensus Statement [Internet]. [cited 2017 Nov 28]. Available from: <http://physicalliteracy.ca/physical-literacy/consensus-statement/>
- Comeau ME, Bouchard DR, Levesque C, Johnson MJ, Rioux BV, Mayo A, et al. Association between functional movements skills and health indicators in children aged between 9 and 12 years old. *Int J Environ Res Public Health*. 2017 Sep 4;14(9).
- Paakkari L, Kokko S, Villberg J, Paakkari O, Tynjälä J. Health literacy and participation in sports club activities among adolescents. *Scand J Public Health*. 2017 Jul 1;1403494817714189.
- Canadian Sport for Life – Long-Term Athlete Development 2.1 [Internet]. Sport for Life. [cited 2018 Jan 10]. Available from: <http://sportforlife.ca/portfolio-view/long-term-athlete-development-2-1/>
- Trudeau F, Shephard RJ. Contribution of school programmes to physical activity levels and attitudes in children and adults. *Sports Med*. 2005;35(2):89-105.
- Kim HY, DeKruyff RH, Umetsu DT. The many paths to asthma: phenotype shaped by innate and adaptive immunity. *Nat Immunol*. 2010 Jul 18;11(7):577-84.
- Graham DJ, Sirard JR, Neumark-Sztainer D. Adolescents' attitudes toward sports, exercise, and fitness predict physical activity 5 and 10 years later. *Prev Med (Baltim)*. 2011 Feb;52(2):130-2.
- Xiang P, Bruene A, McBride RE. Using Achievement Goal Theory to assess an elementary physical education running program. *J Sch Health*. 2004 Aug;74(6):220-5.
- Tak YR, McCubbin M. Family stress, perceived social support and coping following the diagnosis of a child's congenital heart disease. *J Adv Nurs*. 2002 Jul;39(2):190-8.
- Green A. Outcomes of congenital heart disease: a review. *Pediatr Nurs*. 30(4):280-4.
- Chiang Y-T, Chen C-W, Chen Y-C. From limitation to mastery: exercise experience for adolescents with mild congenital heart disease. *J Clin Nurs*. 2011 Aug;20(15-16):2266-76.
- Suris J-C, Michaud P-A, Viner R. The adolescent with a chronic condition. Part I: developmental issues. *Arch Dis Child*. 2004 Oct 1;89(10):938-42.
- Pinzon, J; Harvey J. Care of adolescents with chronic conditions. *Paediatr Child Heal*. 2006;11:43-8.
- Léger LA, Mercier D, Gadoury C, Lambert J. The multistage 20 metre shuttle run test for aerobic fitness. *J Sports Sci*. 1988 Jun;6(2):93-101.
- Rosa JPP, de Souza AAL, de Lima GHO, Rodrigues DF, de Aquino Lemos V, da Silva Alves E, et al. Motivational and evolutionary aspects of a physical exercise training program: a longitudinal study. *Front Psychol*. 2015 May 18;6:648.
- Faulkner MS, Michaliszyn SF, Hepworth JT. A personalized approach to exercise promotion in adolescents with type 1 diabetes. *Pediatr Diabetes*. 11(3).
- Jamnik VK, Gledhill N, Shephard RJ. Revised clearance for participation in physical activity: greater screening responsibility for qualified university-educated fitness professionals. *Appl Physiol Nutr Metab*. 2007 Dec;32(6):1191-7.
- Jamnik VK, Warburton DER, Makarski J, McKenzie DC, Shephard RJ, Stone JA, et al. Enhancing the effectiveness of clearance for physical activity participation: background and overall process. *Appl Physiol Nutr Metab*. 2011 Jul;36(S1):S3-13.
- Bredin SSD, Gledhill N, Jamnik VK, Warburton DER. PAR-Q+ and ePARmed-X+. *Can Fam Physician*. 2013 Mar;59(3):273-7.

Web of culture: Critically assessing online mental health resources for Indigenous youth in northern British Columbia using digital storytelling

Valerie Ward¹, Sarah de Leeuw²

Citation: UBCMJ. 2018; 9.2 (20-22)

Abstract

Objectives: Traditional sources of health information are no longer meeting needs of young generations, including Indigenous youth, who are increasingly turning to the internet with health-related questions. Research has shown that culturally-tailored health education and information resources are best received by Indigenous people. Using a research approach accentuating the voices and experiences of young (ages 19-25) Indigenous peoples in northern British Columbia, this project discovered that online mental health resources need to be conceptualized and implemented differently to have their intended impact.

Methods: This research used a social determinants of health framework and purposefully sought out and accentuated young Indigenous peoples' stories through arts-based methods.

Results: Four relevant themes emerged: 1) definitions of mental health in online resources do not resonate with Indigenous youth in northern British Columbia; 2) existing online resources do not reflect voices of youth, particularly Indigenous and northern youth; 3) understanding of recovery among Indigenous youth in northern British Columbia are not the same as those reflected in existing online resources; and 4) Indigenous youth in northern British Columbia support technology as a means of reaching and giving voice to youth populations.

Conclusions: Existing online mental health resources do not adequately address needs of Indigenous youth living in northern British Columbia. Digital storytelling, an arts-based method, is an effective and engaging research tool to work with youth populations.

Introduction

Traditional sources of health information are no longer satisfying the needs of young generations who increasingly are turning to the internet with health-related questions.^{1,2} The internet has been recognized as an ideal venue for dissemination of health information because it has the capacity to provide anonymity, offers accessible e-health services, and provides tailored health information.³⁻⁵ Broadly speaking, Indigenous youth surf the internet, access social media sites, and are bombarded, like all youth, by popular culture.⁶ Not unlike their non-Indigenous counterparts, the internet is being used by Indigenous youth for seeking out health information, including mental health (MH) information.⁷⁻⁹ What remains poorly understood is whether existing online MH resources are culturally- and age-appropriate for Indigenous youth. This study evaluates if existing online MH resources, especially those catering to a British Columbia audience, are culturally and age appropriate for Indigenous youth (ages 19-25) living in northern British Columbia.

Methods

The majority of prior research with Indigenous peoples—especially conducted in colonized places by non-Indigenous researchers—has been critiqued for perpetuating, aiding, and deepening processes of colonization, particularly if it takes a deficits-based, pathologizing view of Indigenous peoples.^{10,11} In contrast, decolonizing methodologies, those that work against colonization and its harms to Indigenous peoples, are rooted in Indigenous knowledge and highlight Indigenous voices, worldviews, and ways of knowing and being.¹² Nevertheless, following Tuck and Wang's reminder that decolonization is not a metaphor and that it "specifically requires the repatriation of Indigenous land and life,"¹³ we know this research takes only a small step in that direction by taking a critical orientation to colonial power and seeking to emphasize voices and stories of Indigenous youth.

This research used a social determinants of health (SDoH) framework to focus on broader and more contextualized sets of social, political, economic, and historical determinants of health for Indigenous youth in northern British Columbia. The SDoH framework recognized colonialism as a distal determinant of health for Indigenous peoples in Canada.¹⁴⁻¹⁶ These methodological frameworks informed the use of a strengths-based approach¹⁷ which focuses on potentials, strengths, interests, knowledge, and capacities of individuals, rather than their limits.¹⁷ This research positioned youth participants as experts in their own lives, and privileged their voices and stories using arts-based methods. Additionally, stories shared by Indigenous youth participants were perceived as stories of strength and resilience, recognizing the impact of environments and multiple contexts influencing lived realities.¹⁶

Action-based research principles were used in this study. Action-based methodologies attempt to shift power from the researcher to people being researched and are grounded in capacity building and relationships.¹⁸ Research participants provided guidance and input that directed the workshop; they developed rules for their shared space, goals for the workshop, and the question that they wanted to answer with their digital stories. Additionally, youth participants who wished to be co-facilitators in this research were more involved in the research process, for example, helping to facilitate group discussions and verifying identified themes. The results and findings were shared with all participants.

UNBC Research Ethics Board, #E2015.0401.023.00 approved the two-part project: Part one involved collection and analysis of online MH resources to critically assess their relevance to Indigenous youth living in northern British Columbia. Part two involved a digital storytelling workshop to stimulate Indigenous youth's opinions and ideas about identified online MH resources, juxtaposing them with findings of the critical discourse analysis (CDA). The work was iterative, with one part informing the other and vice versa.

Part 1: Collection and analysis of online MH resources

To find out what online MH resources existed for Indigenous youth living in northern British Columbia and which resources were recommended to youth, the primary investigator sought input from seven frontline

¹ MD Program, Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada

² Northern Medical Program, UNBC, Faculty of Medicine (School of Public and Population Health), University of British Columbia, Vancouver, BC, Canada

Correspondence to:
Valerie Ward (valerie.ward@alumni.ubc.ca)

healthcare workers in Prince George including two nurses, one social worker, one mental health/addictions counselor, two researchers, and one physician. Additional resources were included if they contained Indigenous-specific MH information or were created in northern British Columbia. Resources created outside British Columbia were excluded.¹⁹ 15 resources were identified, however, only eight resources were e-knowledge websites, using Usher & Skinner's criteria for classifying websites.²⁰ E-knowledge websites are created for general public and are user-friendly.²⁰ The following eight resources were included and analyzed: 1) heretohelp.ca; 2) keltymentalhealth.ca; 3) princegeorge.cmha.bc.ca; 4) mindcheck.ca; 5) unya.bc.ca; 6) bcass.org; 7) bcmhsus.ca; and 8) FNHA.ca. Screenshots taken of the eight resources between July and October 2015 were analyzed using CDA, a methodology which "focuses on the ways discourse structures enact, confirm, legitimate, reproduce, or challenge relations of power and dominance in society."²¹ CDA moves beyond the content of text alone, and explores the following three dimensions: 1) sociocultural (conditions within which text is created); 2) discourse (processes by which text is produced and received by human subjects); and 3) text analysis (object of analysis, including verbal and/or visual texts).²² This lens has been used in health research for over two decades^{23,24} and has been validated for analyzing web-based resources and online MH resources.²⁵

Part 2: Digital storytelling workshop

Incorporating storytelling into research can bridge Western and Indigenous ways of knowing and can be a respectful and culturally meaningful approach to research.²⁶ Digital storytelling is an effective tool for engaging youth in creating health promotion tools.^{27,28} Digital stories are short narratives combining auditory-, visual-, and text-based storytelling by stitching together pictures, audio, text, music, and video to create an original piece.²⁷ Participants were recruited using a poster sent to existing community contacts. A youth-based organization requested the workshop be held in Terrace, British Columbia, taking place August 19-21, 2015. Thirteen youth who identified as Indigenous signed up and eight attended. Of the eight youth who attended, all between the ages of 19-25, five identified as female, three as male. Three youth wanted to be co-facilitators, as discussed above.

The goal of the digital storytelling workshop was to elicit Indigenous youth's opinions about the identified online MH resources, juxtaposing them with the findings of the CDA. This three-day workshop began with a set of introductory activities, including youth developing shared ground rules and engaging in arts-based activities. The primary investigator did a short presentation about digital storytelling detailing an introduction to digital stories and how to create storyboards. Youth agreed upon the question "what does mental health/wellness mean to you?" as a starting point for their digital stories. Youth also explored the eight resources, discussing questions such as "what makes an online mental health resource appealing?" Youth shared their digital stories with each other on the last day and were given their digital story on a CD to take home.

Analysis

This research draws from four datasets for qualitative analyses: 1) digital stories created by Indigenous youth during a digital storytelling workshop; 2) online MH resources; 3) transcriptions of recorded focus group discussions; and 4) field notes documented by the primary investigator during the workshop. Once all data were collected and transcribed, they were analyzed through critical and close reading. Informed by thematic analysis, data were manually coded and further distilled into themes using an iterative process. At the mid- and end-point of the analysis process, youth co-facilitators reviewed identified themes and provided feedback that was incorporated.

Results and Discussion

(1) Definitions of mental health do not resonate with Indigenous youth
MH resources consist mainly of information about mental illness, MH challenges, or mental disorders, using the terms "mental health"

and "mental illness" seemingly interchangeably. Only two of eight resources, (keltymentalhealth.ca, FNHA.ca) distinguished the terms by defining mental health. During focus groups, youth participants defined mental health as "...taking care of your body, your emotions, physically, emotionally [which is] different than depression and anxiety" and as "chemical imbalances in the brain." Some had never heard the term mental health before.

The language present on many of the online MH resources implied a sense of blame towards individuals about their mental illness or poor mental state. Most of the online MH resources list causes of mental illnesses, with minimal reference to the impact of environmental factors as stressors to the individual. This heavy focus on the role of the individual and the role of individual treatment of mental problems excludes a broad range of contextual factors that may impact Indigenous youth. It is possible this may lead to the implication or assumption that MH issues are related to individual flaws or weakness and can be addressed by simply accessing the right tools, developing the right skills, or accessing the right treatment.

Some resources—notably FNHA.ca—identify the importance of environmental factors and their connection to wellness. This website notes mental wellness is "far more than the absence of mental illness and encompasses all aspects of a person's life. [It] is the presence of factors that promote and maintain physical, mental, emotional and spiritual balance."²⁹ Youth preferred the term "wellness," believing it carries less stigma and "is a more positive way of looking at things...[mental illness] comes with a label."

(2) Under-representation of northern Indigenous youth voices in online resources

Only four of the eight resources were created in collaboration with youth. However, youth had clear preferences describing: "more pictures make [websites] more eye-catching for younger audiences;" "little short video clips instead of reading;" and "not having too much information." These preferences mattered more than the credentials of the website³⁰ making resources more engaging and "easier to focus."

Almost all resources were funded by the Provincial Health Services Authority (PHSA) and were designed to be representative of, and useful to, the entire population of British Columbia. There is little in the way of geographic customization to materials which makes resources less appealing and useful for youth. This was articulated by one participant who said "I feel like it would be better if it was more local. I think it would be easier to find the resources and the resources would be different."

Indigenous voices were largely absent from MH resources. Two of the resources (unya.bc.ca, FNHA.ca) were created for First Nations living in British Columbia. The remaining six resources have Indigenous-specific information that is scarce and hard to find. CDA highlights how silencing Indigenous understandings of MH in online resources perpetuates colonialism through erasure of Indigenous voices and realities. This reinforces dominant biomedical discourses of MH and positions an alternate understanding of being lesser than. In order to counter this colonizing tendency, Indigenous voices, Indigenous realities, and Indigenous knowledge about MH must be emphasized and made available to youth. Youth liked the bcass.org recordings of Elders talking about mental illness in their traditional languages, because it bridges a generational and language gap between youth and Elders. However, most youth felt resources should include information about wellness or MH so they could talk to their Elders about wellness, not just illness. The bcass.org resource also recognized residential school as a risk factor in certain mental illnesses. Youth participants were interested in cultural elements and approaches to wellness being incorporated into online MH resources as a way of "showing that there are different ways to connect and promote wellness."

(3) Definitions of recovery do not resonate with northern Indigenous youth

Youth felt they could be well even when recovering from mental illness.

Some youth participants who shared this understanding of recovery voluntarily disclosed a diagnosis of mental illness. Discussions also revealed that Indigenous youth in northern British Columbia incorporate healthy activities into daily lives to promote wellness and participants articulated that maintaining wellness was an ongoing process. Recovery, one of many pieces that can contribute to wellness, was described as “something that needs hard work. It’s a commitment to get better.” Several youth felt that online MH resources should “try to show the perspective of people with mental illness” and highlight recovery as a process. Most existing online MH resources provided little information about treatment and recovery; instead, most resources discussed risk factors and symptoms of diseases.

(4) Youth support technology for reaching youth populations

Youth spoke supportively about technology as an avenue for their generation to access services or resources with confidentiality that does not exist in their communities because “sometimes it’s easier to talk to someone that that you don’t know.” Youth also spoke about the potential of apps, social media, or video conferencing to access MH information or services. Most participants preferred culturally-tailored MH information that was relevant to their understanding, including a focus on holism and wellness that seems to be true for Indigenous youth elsewhere.³¹⁻³³

The extent to which youth search for MH information online was unclear. In discussions, participants shared positive experiences asking family about health-related information and other frustrating experiences “because generally, you learn at a young age that everybody has their own problems.” Additionally, MH resources might not be ideal for individuals who are in crisis: “I just think when anybody is upset or raging or not in a good place they wouldn’t go directly to a computer...They would first try and get into a saner state and then try and figure it out on their own.”

Youth spoke positively about learning digital storytelling and improving computer skills. Youth participants felt digital storytelling was a relevant and engaging tool because it allowed them to share their own story related to MH or wellness. There was enough interest that the principal investigator was invited to hold another workshop in a neighboring community. This is a testament to the use of computers and digital storytelling in this project and that computer and technology-based skills are appealing to youth.

Limitations

Given the diversity among and between Indigenous peoples in Canada, the findings of this study cannot and should not be assumed to be true of all First Nations, Métis, and Inuit peoples. Additionally, the findings of this research should not be considered reflective of all Indigenous youth in northern British Columbia. This research provides a useful starting point in discussions of online MH resources for this population, an area which needs further exploration.

Youth participants did not report searching the internet for MH information and had not accessed the collected resources prior to participation in the workshop. Therefore, recommendations for online MH resources were based on preferences while engaging with online MH resources during this workshop. Still, the findings of this research offer insight into youth preferences for online resources and suggestions to make MH resources more accessible.

Conclusion

The most important finding of this research was that existing online MH resources do not adequately address the needs of Indigenous youth living in northern British Columbia. Indeed, there is a need to emphasize Indigenous voices, Indigenous realities, and Indigenous understandings within MH resources, specifically those of Indigenous peoples living in northern British Columbia. If this was the case, “it would be easier to find the resources and the resources would be different.” Digital storytelling, as an arts-based method, however, was an effective and engaging research tool to work with in youth populations.

References

1. Maczewski M. Exploring identities through the internet: youth experiences online. *Child Youth Care Forum*. 2002 Apr; 31(2):111–29.
2. Borzekowski D, Rickert V. Adolescent cybersurfing for health information: a new resource that crosses barriers. *Arch Pediatr Adolesc Med*. 2001 Jul;155(7):813–7.
3. Johnson K, Ravert R, Everton A. Hopkins teen central: assessment of an internet-based support system for children with cystic fibrosis. *Pediatrics*. 2001 Feb;107(2):e24.
4. Skinner H, Biscope S, Poland B, Goldberg E. How adolescents use technology for health information: implications for health professionals from focus group studies. *J Med Internet Res*. 2003 Dec;5(4):e32.
5. Woodruff S, Edwards C, Conway T, Elliott S. Pilot test of an Internet virtual world chat room for rural teen smokers. *J Adolesc Health*. 2001;29(4):239–43.
6. Wemigwans J. Indigenous worldviews: cultural expression on the world wide web. *Can Woman Stud Cah Femme*. 2008;26(3):31–8.
7. Geana M, Makosky Daley C, Nazir N, Cully L, Etheridge J, Bledowski C, et al. Use of online health information resources by American Indians and Alaska Natives. *J Health Commun*. 2012 May 29;17(7):820–35.
8. Geana M, Greiner A, Cully A, Talawyma M, Makosky Daley C. Improving health promotion to American Indians in the midwest United States: preferred sources of health information and its use for the medical encounter. *J Community Health*. 2012 Apr 5;37(6):1253–63.
9. Rushing S, Stephens D. Use of media technologies by Native American teens and young adults in the pacific northwest: exploring their utility for designing culturally appropriate technology-based health interventions. *J Prim Prev*. 2011 Aug;32(3–4):135–45.
10. Ermine W, Sinclair R, Jeffery B. The ethics of research involving Indigenous peoples: report of the Indigenous peoples. Regina, SK: Indigenous Peoples’ Health Research Centre. 2004 July. 272 p.
11. Kelm M-E. Colonizing bodies: aboriginal health and healing in British Columbia, 1900–1950. Vancouver, Seattle: University of British Columbia Press; University of Washington Press Distributor; 1999.
12. Smith L.T. Decolonizing methodologies: research and Indigenous peoples. 2nd ed. Zed Books; 1999. 242 p.
13. Tuck E, Yang KW. Decolonization is not a metaphor. *Decolonization Indig Educ Soc*. 2012;1(1):1–40.
14. Meyer J. Qualitative research in health care: Using qualitative methods in health related action research. *BMJ*. 2000 Jan 15;320(7228):178–81.
15. Czyzewski K. Colonialism as a broader social determinant of health. *Int Indig Policy J*. 2011;2(1):1–14.
16. Greenwood M, de Leeuw SN. Social determinants of health and the future well-being of Aboriginal children in Canada. *J Can Paediatr Soc*. 2012 Sep;17(7):381–4.
17. Reading C. Structural determinants of Aboriginal peoples’ health. In: Determinants of Indigenous peoples’ health in Canada: beyond the social. Canadian Scholars’ Press; 2015.
18. Saint Jacques M, Turcotte D, Pouliot E. Adopting a strengths perspective in social work practice with families in difficulty: From theory to practice. *Fam Soc*. 2009;90(4):454–61.
19. Mautner G. Time to get wired: using web-based corpora in critical discourse analysis. *Discourse Soc*. 2005 Nov 1;16(6):809–28.
20. Usher W, Skinner J. Categorizing health websites: e-knowledge, e-business and e-professional. *Health Educ J*. 2011 Sep 1;70(3):285–95.
21. Van Dijk T. Critical discourse analysis. In: Tannen D, Hamilton H, Schiffrin D, editors. The handbook of discourse analysis. 2nd Edition. Malden, MA: John Wiley & Sons; 2015. p. 466–85.
22. Chouliaraki L, Fairclough N. Discourse in late modernity: rethinking critical discourse analysis. Transferred to digital printing. Edinburgh: Edinburgh Univ. Press; 2007. 168 p.
23. Foucault M. Madness and civilization: a history of insanity in the age of reason. Vintage Books Ed., Nov. 1988. New York: Random House; 1988. 299.
24. Smith JL. Critical discourse analysis for nursing research. *Nurs Inq*. 2007 Mar;14(1):60–70.
25. Thompson R. Looking healthy: visualizing mental health and illness online. *Vis Commun*. 2012 Nov 1;11(4):395–420.
26. Archibald L, Dewar J, Reid C, Stevens V. Dancing, singing, painting, and speaking the healing story: healing through creative arts [Internet]. Aboriginal Healing Foundation; 2012 [cited 2015 Jul 1]. Available from: <http://www.ahf.ca/downloads/healing-through-creative-arts.pdf>.
27. Wexler L, Gubrium A, Griffin M, DiFulvio G. Promoting positive youth development and highlighting reasons for living in Northwest Alaska through digital storytelling. *Health Promot Pract*. 2012 Oct 24;14(4):616–23.
28. Gubrium A. Digital storytelling: an emergent method for health promotion research and practice. *Health Promot Pract*. 2009 Apr;10(2):186–91.
29. First Nations Health Authority. Mental wellness and substance use [Internet]. Mental Wellness and Substance Use. 2015. Available from: <http://www.fnha.ca/what-we-do/mental-wellness-and-substance-use>.
30. Eysenbach G. Credibility of health information and digital media: new perspectives and implications for youth. In: Metzger M, Flanagan A, editors. Digital media, youth and credibility. Cambridge, MA: The MIT Press; 2008. p. 123–54.
31. Iwasaki Y, Byrd N, Onda T. Promoting identities and mental health via cultural/community activities among racially/ethnically mixed urban American Indians. *Fam Community Health*. 2011;34(3):62–65.
32. Kirmayer L, Simpson C, Cargo M. Healing traditions: culture, community and mental health promotion with Canadian Aboriginal peoples. *Australas Psychiatry*. 2003 Oct 6;11(s1):15–23.
33. Varcoe C, Bottorff J, Carey J, Sullivan D, Williams W. Wisdom and influence of elders: possibilities for health promotion and decreasing tobacco exposure in First Nations communities. *Can J Public Health*. 2010 Mar;101(2):154–8.

Medical student second language abilities and confidence in clinical use: Mandarin pilot

Meiying Zhuang^{1†}, Wynn Tran^{1†}, Kendall Ho²

Citation: UBCMJ. 2018; 9.2 (23-26)

Abstract

Objectives: Medical students may have conversational skills in non-English languages (NELs) but find it cumbersome to use these languages in a clinical setting. We investigated the demand for resources to enhance medical communication across language barriers and the role for workshops in achieving this purpose.

Methods: Mandarin workshops and a phrasebook with medical terms were created and delivered to medical students, along with the opportunity to practice at a community blood pressure clinic. Surveys of medical students before and after the workshops, and three months following, were collected to determine the impact of different resources. Community members attending the blood pressure clinic were surveyed to gauge their preferences.

Results: Among 58 medical student respondents, 86% spoke NELs, but only 24% were at least "quite a bit" confident in communicating with patients in a NEL. After the Mandarin workshops, 82% of participants reported perceived benefits to their confidence in communicating with patients in Mandarin. The phrasebook and peer coaching in Mandarin were rated as the most useful resources. Mandarin-speaking community members (n = 32) reported they would be more comfortable seeing healthcare providers who had learned basic Mandarin (7.5/10) compared to no Mandarin at all (4.4/10).

Conclusions: Medical students' confidence communicating in Mandarin can be bolstered with resources including workshops and phrasebooks. This approach could be used for other languages to improve communication and contribute to more satisfying, effective, and comfortable care for patients with limited English.

Introduction

Vancouver is a rapidly growing, culturally diverse city. More than 1 in 20 Vancouver residents do not speak English.¹ Additionally, 2016 Canadian Census data shows that 21.1% of the population of Canada speaks an immigrant language at home, a 14.7% increase from 2011.² Cantonese, Mandarin, and Punjabi are the three most common non-English languages (NELs) spoken in Vancouver.² Health professionals in this city need to work with diverse patient populations with varying language abilities.

Language barriers can contribute to miscommunication and present a barrier to care. Medical students in Vancouver often encounter clinical situations where they struggle to interact meaningfully with patients due to a language barrier. Conceivably, basic knowledge of the patient's language can help medical students begin to overcome language barriers when interpreters are not available, establish better rapport with non-English speaking patients, and respond to patient needs in a timely manner. Many medical students already have conversational knowledge of a NEL, and learning medical vocabulary may allow them to provide more effective patient care and have a more meaningful educational experience during encounters with non-English speaking patients.³

Patients with limited English face healthcare disparities. These patients have significantly more tests ordered, increased radiation exposure, and significantly longer time before CT scan orders are placed in the Emergency Department.^{4,5} Non-English speaking patients are less likely to receive screening for colorectal cancer.⁶ For certain medical and surgical conditions, including acute coronary syndromes and elective hip replacements, patients with limited English proficiency have longer hospital stays.⁷ While the use of professional interpretation services increases patient and healthcare worker satisfaction during Emergency Department visits, these resources are often not readily available.⁸

NEL fluency and cultural competence are independently associated with improved primary care.⁹ While there is interest in medical language exposure beginning in medical school, there is little research examining the language abilities of healthcare providers and resources available to them.^{10,11} It is also unclear whether augmenting healthcare providers' language skills benefits patient care. A past survey of University of British Columbia (UBC) medical students demonstrated that, although they have NEL abilities, they are not comfortable using them clinically.¹² We therefore investigated the following research questions:

1. What is the current ability of medical students to provide care to patients in NELs?

2. Is there a demand among medical students for more learning opportunities to provide care to patients in NELs?

3. Do basic introductory workshops and medical phrasebooks in Mandarin improve medical students' confidence in communicating with Mandarin-speaking patients?

4. Would Mandarin-speaking patients feel more comfortable seeing healthcare providers who have learned basic Mandarin than those who speak none at all?

Materials and Methods

We surveyed the need for language workshops among UBC medical students at four sites across British Columbia (Vancouver, Victoria, Kelowna, and Prince George) and developed a medical Mandarin workshop. We obtained ethics approval from the UBC Behavioural Research Ethics Board in January 2016, and the project was carried out in accordance with the approved ethics application.

This project included multiple components: 1) an initial online needs survey for students in all four years of the UBC medical undergraduate class, which was collected in early January 2016; 2) a two-part medical Mandarin workshop for medical students in Vancouver in late January 2016, with pre- and post-workshop surveys; 3) a blood pressure clinic in which medical students practiced taking blood pressure in Mandarin, with surveys for medical students and Mandarin-speaking community members; and 4) a follow-up online survey sent to the medical undergraduate class in April 2016, three months following the workshops. The process of participant selection and subsequent data analysis therefore differed for each component based on its purposes.

All surveys mentioned herein are reproduced in the Appendix. The surveys were designed with support from a UBC eHealth Strategy Office survey design expert. Surveys for Mandarin-speaking community members were translated into Chinese by a professional translator.

Selection and recruitment of participants

We invited students from all four years of the UBC medical undergraduate class by email to participate in the needs survey, medical Mandarin workshops, and blood pressure clinic. The blood pressure clinic was held at a public library in Richmond, British Columbia, and advertised to community members via posters and library promotional materials. We invited participants at the Mandarin workshops and the blood pressure clinic to complete surveys regarding their experience. Finally, we sent our follow-up survey to students from all four years of the medical undergraduate class three months following the workshops to assess for any longer-term benefit.

Of 1150 eligible participants in the medical undergraduate class, 64 students responded to the class-wide needs survey online, and 41 students responded to the follow-up survey. Responses to the online surveys were included in analysis if they were complete, and, in the case of the follow-up survey, if the respondents had participated in any of the workshops or used

[†]Co-authors

¹MD Program, Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada

²Department of Emergency Medicine, Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada

Correspondence to:
Meiying Zhuang (meiyingz@alumni.ubc.ca)

any of the resources provided. From 48 total participants at all four workshop sessions, we obtained 35 pre-workshop surveys and 28 post-workshop surveys, and all of these were included in analysis. Finally, from the blood pressure clinic, we obtained 7 surveys from medical students and 32 surveys from community members. Responses from community members were included in further analysis if the respondent's self-rated Mandarin ability was higher than their self-rated English ability, to reflect a population that was more comfortable with Mandarin.

Workshops for medical students and blood pressure clinic

The medical Mandarin workshops were delivered in two parts, as summarized in Figure 1. Workshop 1 taught basic Mandarin pronunciation and grammar to students without a background in Mandarin (19 participants), with Mandarin-speaking peer volunteers to help participants practice pronunciation. Workshop 2 taught medical Mandarin phrases to participants of Workshop 1 and students with prior knowledge of Mandarin (29 participants), and participants practiced common scenarios with Mandarin-speaking volunteer patients. Additionally, we created and distributed a medical Mandarin phrasebook at the workshops (online access: <http://digem.med.ubc.ca/2016/03/23/a-chinese-english-phrasebook-for-english-speaking-medical-students/>). Each part of the workshop lasted two hours and was offered twice, for a total of four workshop sessions. Pre-workshop surveys were offered to participants prior to Workshop 1 or Workshop 2, depending on which part the participants attended first, and post-workshop surveys were offered to all participants at the end of Workshop 2.

Following the workshops, we invited medical students who attended these workshops to participate in the blood pressure clinic. Seven medical students participated to practice taking community members' blood pressures in Mandarin. We prepared materials in English and Chinese regarding blood pressure for community members, and had a Mandarin-speaking physician counsel community members whose blood pressure was elevated. We then invited medical students and community members to complete surveys regarding their experience.

Statistical analysis

We performed data analysis using Microsoft Excel and wrote Python scripts to reorganize spreadsheets and perform basic calculations. We performed statistical testing in Microsoft Excel, using unpaired t-tests for comparisons between two groups and paired t-tests for comparisons of responses to two related questions within groups. We used ANOVA to compare multiple groups together and follow-up t-tests to compare individual pairs of groups. We report 95% confidence intervals throughout.

Conversion of Likert-type scales

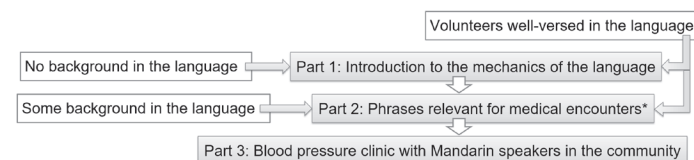
In analyzing responses to questions utilizing Likert-type scales (such as those asking medical students about their confidence in communicating with patients in a particular language), we utilized the scheme shown in Table 1 to convert responses into values, as described by Sullivan & Artino and Bosse et al.^{13,14}

We accompanied questions asking medical students about their confidence in communicating with patients in Mandarin or other languages with a follow-up question asking about their confidence in communicating with patients in English. These responses, after conversion into numerical values as described above, were then expressed as a proportion of the respondents' confidence communicating with patients in each language divided by their confidence communicating with patients in English ("confidence relative to English"). Two responses that indicated being "Not at all" confident in communicating with patients in English were excluded from the confidence data.

Results

Current language abilities and needs

Of 64 medical student responses, 58 were complete, and of these respondents, 86% spoke at least one NEL: 41% spoke one NEL, 38% spoke two NELs, and 7% spoke three or more. Respondents reported understanding or speaking 18 different languages to varying levels (Figure 2). The top five most prevalent languages reported were French (57% of respondents), Mandarin (22%), Spanish (17%), Cantonese (16%), and Taiwanese (5%). Twenty-four percent of respondents reported speaking other languages including Russian, Japanese, Hungarian, Vietnamese, Bangla, German, Dutch, Dagbani, Hebrew, Korean, Swedish, Farsi, and Punjabi.



*A phrasebook containing medically relevant phrases was distributed at Part 2

Figure 1 | Structure of medical Mandarin workshops and blood pressure clinic.

Table 1 | Conversion chart of survey Likert scale ratings to numerical scores for statistical analysis.

Response		Score given
Not at all	Not useful	0
Partly	Partly useful	1
Quite a bit	Quite useful	2
Completely	Extremely useful	3

While 60% of respondents reported being at least "Partly" confident in communicating with patients in a NEL, only 24% reported being "Quite a bit" or "Completely" confident. Increased self-rated speaking ability in a language was associated with increased confidence in communicating with patients in that language (Figure 3). The mean confidence relative to English varied from 0.06 ± 0.07 in those with "Poor" self-rated ability, to 0.72 ± 0.18 in those with "Fluent or Native" self-rated ability, and there was a significant difference between these groups by one-way ANOVA ($F_{3,68} = 39.1$, $p < .0001$) and follow-up t-tests.

In terms of exposure to NELs, 84% of respondents reported clinical encounters in which they felt use of another language would be helpful but was not used. The top five languages reported were Mandarin (53%), Cantonese (36%), Punjabi (24%), Farsi (10%), and Spanish (9%). Forty-one percent of respondents reported having used NELs to communicate with patients. The top three languages were Mandarin (19%), French (14%), and Cantonese (10%), and 12% reported having used other languages.

Seventy-six percent of respondents expressed interest in medical workshops or resources in NELs, including Mandarin (59%), Cantonese (26%), French (26%), Punjabi (26%), Spanish (16%), and others (41%).

Effect of Mandarin workshops on student confidence

In the post-workshop survey, 93% of respondents believed the workshop benefited their ability to speak Mandarin, 71% believed it benefited their ability to understand Mandarin, and 82% of respondents believed it benefited their confidence communicating with patients in Mandarin.

Consistent with this, there was a statistically significant increase in respondents' confidence in Mandarin relative to English from the pre-

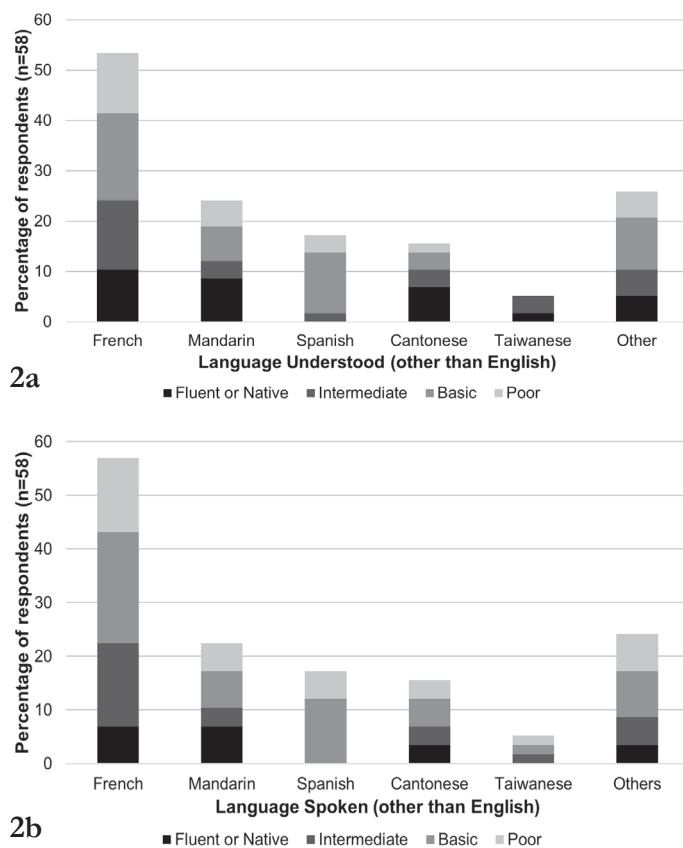


Figure 2 | Percentage of respondents who (a) understood or (b) spoke non-English languages. Respondents (n = 58) were asked to rank their understanding and speaking abilities from poor, basic, intermediate, to fluent or native.

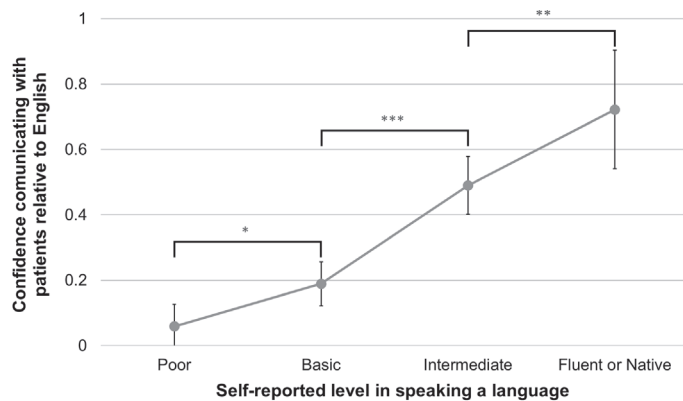


Figure 3 | Effect of level of ability in a non-English language on confidence in communicating with patients in that language. Confidence was calculated relative to English by converting responses to questions about confidence in communicating with patients on a Likert scale to numbers (i.e. from Not at all = 0 to Completely = 3), and then dividing the respondent's confidence in communicating in each non-English language by their confidence in communicating in English. * indicates $p < 0.05$, ** indicates $p < 0.01$, and *** indicates $p < 0.005$. Error bars represent 95% confidence interval.

workshop to post-workshop surveys ($p < 0.05$), from an average of 0.21 ± 0.10 prior to the workshops to 0.42 ± 0.14 following the workshops. When we grouped respondents by self-rated Mandarin ability, we found that this was most pronounced among those with "None" to "Basic" Mandarin ability (0.06 ± 0.05 pre-workshop vs. 0.25 ± 0.16 post-workshop, $p < 0.01$), while "Intermediate" or "Fluent or Native" speakers showed no statistically significant change (0.63 ± 0.19 pre-workshop vs. 0.64 ± 0.18 post-workshop, $p = 0.95$) (Figure 4).

Respondents to the post-workshop survey had higher average self-rated Mandarin speaking ability (2.2 ± 0.6 out of 4, converted Likert-type scale) compared to respondents to the pre-workshop survey (1.6 ± 0.5 out of 4), but this did not reach statistical significance. More respondents to the post-workshop survey rated their Mandarin ability as "Intermediate" or "Fluent or Native" (43%) than in the pre-workshop survey (25%).

Usefulness of workshop components

We asked respondents to rate the usefulness of various components of the workshop in the post-workshop survey ($n = 28$) and the follow-up survey ($n = 41$). Among 41 respondents to the follow-up survey, 14 (34%) had attended the workshops or utilized resources from them. Participants rated the Mandarin phrasebook as the most useful component immediately after Workshop 2, with a rating of 2.7 ± 0.6 out of 3 by 27 respondents, followed by practice with Mandarin-speaking peers in Workshop 1, at 2.3 ± 0.6 out of 3 by 10 respondents (Table 2). Confidence intervals in the follow-up survey were wide, owing to low response rates. The phrasebook's usefulness was rated 2.1 ± 0.6 out of 3 by 10 respondents in the follow-up survey.

Blood pressure clinic

Seven medical students attended the blood pressure clinic, all of whom had attended at least Workshop 2. Of these, 5 rated their Mandarin ability as "Intermediate", while one student each rated their ability as "Basic" or "Fluent or Native", respectively. All reported feeling "Quite a bit" or "Completely" able to gain community members' trust, and most felt "Quite a bit" or "Completely" confident in introducing themselves (apart from one medical student with "Basic" Mandarin ability who felt "Partly" confident introducing themselves). On a 10-point scale, they rated their satisfaction with their ability to provide care as 7.4 ± 1.4 out of 10, and their overall experience as 8.7 ± 0.9 out of 10.

The survey for community members asked about their experiences at the blood pressure clinic, as well as their values regarding language in healthcare. Among 32 community member respondents, 25 rated their Mandarin ability as better than their English ability. Among these, all reported that the medical student gained their trust "Quite a bit" or "Completely", regardless of their ratings of the students' Mandarin ability, which ranged from "Basic" to "Fluent or Native". They rated their satisfaction with the care they received as 9.9 ± 0.1 out of 10, and their overall experience as 9.6 ± 0.3 out of 10. There were no significant differences in their responses based on whether the student's ability in Mandarin was deemed "Basic" ($n = 3$), "Intermediate" ($n = 9$), or "Fluent or Native" ($n = 13$) by the respondent, by one-way ANOVA ($F_{2,22} < 1.75$ for all, $p > .19$ for all).

In terms of their values about language in healthcare, on a ten-point scale, they rated the importance of having a healthcare provider who could speak to them in their own language as 9.6 ± 0.5 out of 10. Additionally, they expressed significantly greater comfort with the idea of seeing healthcare providers

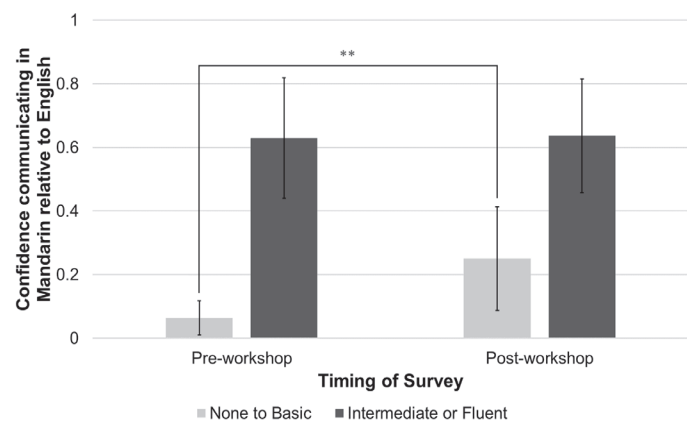


Figure 4 | Effect of medical Mandarin workshops on confidence in communicating with patients in Mandarin. Medical students participating in a medical Mandarin workshop completed a pre-workshop ($n = 35$) and post-workshop survey ($n = 28$), in which they were to rate their ability in speaking in Mandarin and their confidence in communicating with patients in Mandarin or English. Confidence was calculated relative to English by converting responses into numbers (i.e. from Not at all = 0 to Completely = 3), and then dividing the respondent's confidence in communicating in Mandarin by their confidence in communicating in English. ** indicates $p < 0.01$. Error bars represent 95% confidence interval.

who had learned basic Mandarin phrases (7.5 ± 0.9 out of 10) compared to a healthcare provider who only spoke English (4.4 ± 1.4 out of 10) ($p < 0.001$ by paired t-test).

Discussion

Our results demonstrate that many medical students speak NELs but generally do not feel very confident in communicating with patients in these languages. This is consistent with findings from a 2009 study of UBC medical students.¹² Language barriers are a common experience among medical students, and there is demand for medical workshops and resources in NELs, most commonly Mandarin, Cantonese, French, Punjabi, and Spanish among UBC medical students. Our study suggests that language training through medical NEL workshops and phrasebooks can improve medical students' confidence in communicating with patients in NELs, such as Mandarin.

Additionally, our survey of Mandarin-speaking community members suggests that patients who speak Mandarin better than English value receiving care in Mandarin and would feel more comfortable even if healthcare providers can speak their language only to a basic level, compared to speaking English only. Similarly, the community members expressed high satisfaction with the care provided by students in Mandarin, even by those with only basic Mandarin.

The short-term benefit demonstrated by this study is encouraging. Given that increased self-efficacy in working with patients with limited English is a predictor of increased resident satisfaction in caring for patients with limited English, further research should be done on the long-term impact of language resources.¹⁵ These resources should also be translated into other commonly spoken languages, particularly Cantonese, Punjabi and French, which followed Mandarin in terms of demand in our initial survey.

Limitations of the study

There were several limitations to this study. The response rate of the initial

Table 2 | Usefulness of the workshops by component. In a follow-up survey done three months after the workshops, respondents were asked about the usefulness of individual resources and the components that benefited them the most. Responses to these questions were converted into numbers for analysis (ranging from "Not at all useful" = 0 to "Extremely useful" = 3).

Resource	Average usefulness rating (out of 3)	
	After Workshop Part 2	3 Months Following
Workshop Presentation, Part 1	1.8 ± 0.7	2.0 ± 2.3
Mandarin-speaking peer volunteers, Part 1	2.3 ± 0.5	2.7 ± 1.4
Workshop Presentation, Part 2	2.1 ± 0.3	1.7 ± 1.1
Mandarin-speaking volunteer patients, Part 2	2.1 ± 0.3	2.0 ± 1.5
Phrasebook	2.7 ± 0.2	2.1 ± 0.6
Blood Pressure Clinic	--	2.3 ± 2.9

survey was only 6% (64 out of 1150). This could introduce a selection bias for respondents with an interest in the study topic, who might speak a NEL or frequently encounter non-English speaking patients. A more robust method of survey recruitment to boost the response rate would improve the generalizability of the results.

Additionally, subjects were asked to self-rate their abilities in NELs. There is conflicting evidence regarding the accuracy of self-assessment of language abilities. In one study, medical students were reported to be accurate in their self-rated language abilities with correlation to scores on a language exam.¹⁶ Another study demonstrated that physicians may overestimate their abilities, especially if they speak two or more NELs.¹⁷ The Interagency Language Roundtable (ILR) scale, used as the standard grading scale for language proficiency for federal services in the United States, is a more objective language assessment test that could be used in future studies.^{17,18} While the formal test might not be feasible for medical students participating extracurricularly, a modified ILR scale has shown promise in self-assessment of physician language abilities when compared with the Clinician Cultural and Linguistic Assessment, a validated oral proficiency interview, at the high and low ends of the scale, although more research is required on the accuracy of intermediate ratings on the scale.¹⁹

Participants with prior knowledge in Mandarin were given the option to participate in only Workshop 2, and some participants from Workshop 1 did not participate in Workshop 2. This resulted in a demographics shift between Workshop 1 and 2, with more participants having a stronger Mandarin background at Workshop 2, where the post-workshop survey was administered. In order to reduce any possible bias this would introduce, we stratified comparisons of pre- and post-workshop confidence levels by participants' self-rated Mandarin ability. The workshops were most effective in increasing confidence for participants with "None" to "Basic" Mandarin ability. This is likely because the workshops were offered at a more basic level and thus not as effective in increasing the confidence of those with "Intermediate" to "Fluent or Native" Mandarin ability. This was mitigated by the provision of a phrasebook with more advanced terminology including organs, names of screening and imaging tests, and common history-taking questions. In the future, separate workshops for medical students who are advanced speakers of NELs could be developed to better support this group.

There were only seven medical students at the blood pressure clinic, and most rated their Mandarin ability as "Intermediate" or "Fluent or Native". It is therefore difficult to draw conclusions from this study about community members' response to healthcare providers with only basic Mandarin ability. However, in this limited study, there was no significant difference in patient satisfaction with the care received from a student with "Basic" versus "Fluent or Native" Mandarin ability. Additionally, as we did not perform a blood pressure clinic in which medical students spoke only English, we could not determine the degree to which the overall high patient satisfaction with the blood pressure clinic was a result of the students' use of Mandarin, as opposed to satisfaction with the screening intervention. A larger study involving healthcare providers with basic ability in a non-English language, and a control condition with the same intervention in English, could shed more light on this.

Finally, as data collection was anonymized, three-month follow-up data could not be collected directly from all those who had participated in the workshops or previously responded to the initial needs survey. The follow-up survey was sent to the entire school and had a lower response rate than the initial needs survey, at 4%. Among these 4%, only 34% had utilized the resources, including the workshops. Thus, many participants were lost to follow-up.

Future directions

Further research could explore whether the increase in confidence after receiving language resources enhances students' learning experience in clinical settings with a higher proportion of non-English speaking patients. Surveying ongoing cohorts of workshop participants over the course of their medical school education and into residency could investigate any long-lasting benefits from these resources, such as whether access to language resources in medical school expands physicians' eventual scope of practice.

While the resources we developed and studied were extracurricular, other groups have piloted incorporating NEL support into the medical curriculum. In the United States, where some cities have predominantly Spanish-speaking populations, residency programs face the challenge of language training for residents. One program found significant improvement in Spanish competency after first year residents took a 10-day immersion program at a nearby language institute, followed by ongoing one-on-one instruction from a translator during continuity clinics throughout the year.²⁰ However, this cost \$5000 per resident.²⁰ When considering competency in an official or predominant NEL in a community, it might be possible to justify this cost. In Canadian residencies that are based in predominantly French-speaking communities, proficiency in the French language is a requirement to apply, which avoids extra language training costs. However, for other NELs, more cost-effective methods are

likely necessary if they are to be integrated into the medical curriculum. One feasible method would be to have more extensive training in the use of medical interpreters. For example, the current extent of training at the UBC Faculty of Medicine involves viewing a 20-minute instructional video of a sample history taken with a professional interpreter, as part of the first-year Communication Skills course. This could be furthered by introducing a practical session with feedback from a tutor, where students have the opportunity to practice with volunteer patients and interpreters, as is already done for other sessions in the course. Previous training in interpreter use is associated with increased professional interpreter use in practice, as well as increased provider satisfaction with the medical care provided.²¹ However, beyond interpreter use, there is demand for resources in specific languages, which could be satisfied through extracurricular resources. Our data suggest that phrasebooks would be a useful resource, and further research could explore their cost-effectiveness.

Conclusions

In conclusion, there is demand for resources to help medical students better communicate with patients who do not speak English. Language workshops can enhance medical students' confidence in communicating with patients who speak non-English languages. This could also improve patients' experiences in receiving care, and medical schools should consider using this approach not only in Mandarin training but also other languages appropriate to the communities that they serve.

Acknowledgements

We would like to thank Ms. Sophia Khan and Ms. Barbara Ho of inter-Cultural Online Health Network initiative (iCON) and UBC Digital Emergency Medicine, as well as our UBC DPAS 420 supervisor Dr. Nerkeza Andjelic, for all of their support in the development of this project. We would like to thank Dr. Yun Zhang for her support in developing and teaching Workshop 2, Ms. Tracy Thain for her advice on survey design, and Ms. Irene Lee for translating our surveys and consent forms. Finally, we would like to thank Dr. Kendall Ho for his support and mentorship throughout the project.

References

- Statistics Canada. *Knowledge of official languages by age (Total), 2016 counts for the population excluding institutional residents of Canada and census metropolitan areas and census agglomerations, 2016 Census - 100% Data (table)*. "Language Highlight Tables, 2016 Census." "Highlight tables, 2016 Census." "Data products, 2016 Census." 2006 Census: Release topics. Census[Internet]. Statistics Canada Catalogue no. 98-402-X2016005. Ottawa, Ontario. 2017 Aug 2 [cited 2017 Sept 19]. Available from: <http://www12.statcan.gc.ca/census-recensement/2016/dp-pd/hlt-fst/lang/Table.cfm?Lang=E&T=22&Geo=00>
- Statistics Canada. 2016 Census: immigrant languages in Canada. "Infographics." Census[Internet]. Statistics Canada Catalogue no. 11-627-M. Ottawa, Ontario. 2017 Aug 2 [cited 2017 Sept 19]. Available from: <http://www.statcan.gc.ca/pub/11-627-m/11-627-m2017025-eng.htm>
- Vanneste R, Chiu SM, Russell I, Fitzpatrick J. Effects of second language usage on genetic counseling training and supervision. *J Genet Couns*. 2013 Feb;22(1):58-75.
- Waxman MA, Levitt MA. Are diagnostic testing and admission rates higher in non-English-speaking versus English-speaking patients in the emergency department? *Ann Emerg Med*. 2000 Nov;36(5):456-61.
- Lehnert B, Hippe D, Lee E, Whiteside L, Linnau K. Effect of patient primary spoken language on CT utilization in the Emergency Department. *Proceedings of the Radiological Society of North America 2014 Scientific Assembly and Annual Meeting*[Internet]. 2014 Nov 30 [cited 2016 Mar 19]; Chicago, IL, USA. Available from: <http://archive.rsna.org/2014/14008732.html>
- Lin SC, McKinley D, Sripipatana A, Makaroff L. Colorectal cancer screening at US community health centers: Examination of sociodemographic disparities and association with patient-provider communication. *Cancer*[Internet]. 2017 Jul 14 [cited 2017 Sept 13]. Available from: <http://onlinelibrary.wiley.com/doi/10.1002/cncr.30855/epdf> DOI:10.1002/cncr.30855
- John-Baptiste A, Nagle G, Tomlinson G, Alibhai SM, Etchells E, Cheung A, et al. The effect of English language proficiency on length of stay and in-hospital mortality. *J Gen Intern Med*. 2004 Mar;19(3):221-8.
- Bagchi AD, Dale S, Verbitsky-Savitz N, Andrecheck S, Zavotsky K, Eisenstein R. Examining effectiveness of medical interpreters in emergency departments for Spanish-speaking patients with limited English proficiency: results of a randomized controlled trial. *Ann Emerg Med*. 2011 Mar;57(3):248-56.e4.
- Fernandez A, Schillinger D, Grumbach K, Rosenthal A, Stewart AI, Wang F, et al. Physician language ability and cultural competence. An exploratory study of communication with Spanish-speaking patients. *J Gen Intern Med*. 2004 Feb; 19(2):167-74.
- Morales R, Rodriguez L, Singh A, Stratta E, Mendoza L, Valerio MA, et al. National survey of medical Spanish curriculum in U.S. medical schools. *J Gen Intern Med*. 2015 Oct;30(10):1434-9.
- Hardin KJ, Hardin DM. Medical Spanish programs in the United States: a critical review of published studies and a proposal of best practices. *Teach Learn Med*. 2013;25(4):306-11.
- Siu T, Mann M, Mangat B, Rawstron B, Dharami S. Language skills of UBC medical students: working toward cultural competency in health care. *BC Med J*. 2009 Apr;51(3):108-11.
- Sullivan GM, Artino AR Jr. Analyzing and interpreting data from Likert-type scales. *J Grad Med Educ*. 2013 Dec;5(4):541-2.
- Bosse HM, Nickel M, Huwendick S, Jünger J, Schultz JH, Nikendei C. Peer role-play and standardised patients in communication training: a comparative study on the student perspective on acceptability, realism, and perceived effect. *BMC Med Educ*. 2010 Mar 31;10:27.
- Hernandez RG, Cowden JD, Moon M, Brands CK, Sisson SD, Thompson DA. Predictors of resident satisfaction in caring for limited English proficient families: a multisite study. *Acad Pediatr*. 2014 Mar-Apr;14(2):173-80.
- Reuland DS, Frasier PY, Olson MD, Slatt LM, Aleman MA, Fernandez A. Accuracy of self-assessed Spanish fluency in medical students. *Teach Learn Med*. 2009 Oct;21(4):305-9.
- Diamond LC, Luft HS, Chung S, Jacobs EA. "Does this doctor speak my language?" Improving the characterization of physician non-English language skills. *Health Serv Res*. 2012 Feb;47(1 Pt 2):556-69.
- Interagency Language Roundtable. Descriptions of proficiency levels. Language skill level descriptions - speaking [Internet]. United States ILR; 2011 [updated 2012 Dec 3; cited 2017 Dec 1]. Available from: <http://www.govvltc.org/Skills/ILRscale1.htm>
- Diamond L, Chung S, Ferguson W, Gonzalez J, Jacobs EA, Gany F. Relationship between self-assessed and tested non-English-language proficiency among primary care providers. *Med Care*. 2014 May;52(5):435-8.
- Valdini A, Early S, Augart C, Cleghorn GD, Miles HC. Spanish language immersion and reinforcement during residency: a model for rapid acquisition of competency. *Teach Learn Med*. 2009 Jul;21(3):261-6.
- Karlner LS, Pérez-Stable EJ, Gildengorin G. The language divide. The importance of training in the use of interpreters for outpatient practice. *J Gen Intern Med*. 2004 Feb;19(2):175-83.

Rapid resolution of a gastric lymphoma with *Helicobacter* eradication therapy

Leah B. Kosyakovsky¹, Muhammad Laghari², Yazeed Alwelaie³, Kerry Savage⁴, Eric Yoshida²

Citation: UBCMJ. 2018; 9.2 (27-29)

Abstract

As one of the most prevalent chronic bacterial infections, *Helicobacter pylori* (*H. pylori*) has had a uniquely sizeable impact on human pathology. Infection with *H. pylori* has been shown to be involved in a wide array of gastrointestinal diseases, from peptic ulcer disease to gastric malignancy. Here, we present an 82-year-old patient who was found to have a large ulcerated gastric mass along with a concomitant *H. pylori* infection. Gastric biopsies later revealed a gastric mucosa-associated lymphoid tissue (MALT) lymphoma, suspicious of transformation to a high-grade diffuse large B-cell lymphoma. Notably, primary treatment with *Helicobacter* eradication therapy resulted, remarkably, in complete endoscopic and histologic resolution of the lymphoma only three weeks after the completion of triple therapy. Through this illustrative case, we review the controversies in the management of high-grade gastric lymphoma as well as the clinical practice surrounding endoscopic surveillance for malignancy follow-up.

Background

Ever since the paradigm-shifting discovery of the role of *Helicobacter pylori* (*H. pylori*) infection in peptic ulcer disease was made in 1982, this now notorious curved bacillus has become associated with an ever-broadening spectrum of human pathology. Colonizing an estimated 50% of the world's population, *H. pylori* is a prime example of the unique capacity of pathogens to adapt to the hostile conditions of their host environments.¹ These adaptations, from the pilus-based epithelial adhesion to the utilization of ureases and proteases to both neutralize and escape from gastric acid production, combined with the subsequent host inflammatory response, are responsible for the mucosal damage that precipitates symptomatic disease.² The consequent oxidative stresses result in rapid cellular damage and turnover, ultimately depleting the host's damage-repair resources and leading to the accumulation of significant DNA damage. This combination of direct epithelial toxicity and chronic gastric inflammation is thought to be a key element in the development of *H. pylori*-associated carcinogenesis.³

Here we review a case of a patient with a large ulcerated gastric mass, which was ultimately identified as a *Helicobacter*-driven extranodal marginal lymphoma (specifically, a mucosa-associated lymphoid tissue [MALT] lymphoma) with a region suspicious for transformation into high-grade diffuse large B-cell lymphoma (DLBCL). MALT lymphoma, a low-grade Non-Hodgkin's lymphoma comprising 50% of all gastric lymphomas, is associated in more than 90% of cases with *H. pylori* infection. As such, MALT lymphomas are traditionally treated with *Helicobacter* eradication as first-line therapy; this approach has been shown to achieve remission in 77.5% of patients without need for further therapy.⁴ In contrast, gastric DLBCL is an example of a high-grade Non-Hodgkin's lymphoma, which can be subdivided into malignancies either with evidence of transformation from underlying MALT lymphoma or without (categorized as *de novo* DLBCL).⁵ However, the role of *H. pylori* in the pathogenesis and treatment of gastric DLBCL, which has been traditionally managed with chemotherapy and radiation, is still controversial. Here we report

the complete endoscopic and histologic resolution of a gastric MALT lymphoma a mere three weeks after *Helicobacter* eradication therapy, and we discuss the case's implications on our understanding of the management of high-grade gastric lymphoma.

Case

An 82-year-old Caucasian woman initially presented to medical attention complaining of constant, long-standing atypical chest pain. The discomfort was neither related to exertion nor meals. There were no associated constitutional symptoms nor were there any associated gastrointestinal symptoms such as nausea, vomiting, or blood per rectum. Her past medical history included type 2 diabetes mellitus, hypercholesterolemia, hypertension, and hypothyroidism. She was a lifetime non-smoker and did not consume alcohol.

Initial cardiac investigations, including exercise stress test, were all negative. Ultimately, a gastroscopy demonstrated a large, 2-3 cm ulcerated mass on her gastric incisura. Multiple biopsies were taken, and the histopathology revealed an atypical lymphoid infiltrate composed mainly of small lymphocytes, but which also included large, poorly differentiated malignant cells with hyperchromatic nuclei and scanty cytoplasm (Figure 1A,B). There was no glandular formation, and immunohistochemical staining was CD20 positive, indicating B cell lineage (Figure 1C). *H. pylori* organisms were present, further supporting a diagnosis of MALT lymphoma (Figure 1D). However, the final characterization of the lymphoma was challenging. Although there was clearly evidence of low-grade MALT lymphoma, there were also regions of large cells that were concerning for transformation into high-grade DLBCL. Ki-67 analysis demonstrated that areas with a higher concentration of large cells had an increased proliferative rate relative to the smaller neoplastic cells, but the higher degree of gastric epithelial inflammation in these areas made the results difficult to interpret. Further detailed B-cell marker analysis demonstrated CD43 positivity and CD23 negativity, and cytogenetic analysis established consistent MUM1 and patchy Bcl-2 positivity. All of these findings supported the diagnosis of a MALT lymphoma but could not definitively rule out the presence of high-grade transformation. Notably, c-myc was negative, which can confer a poor prognosis in DLBCL.⁶

Given the substantial difference in the accepted first-line treatment

¹MD Program, Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada

²Division of Gastroenterology, Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada

³Department of Laboratory Medicine, Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada

⁴Division of Medical Oncology, Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada

Correspondence

Leah Belle Kosyakovsky (leah.kosyakovsky@alumni.ubc.ca)

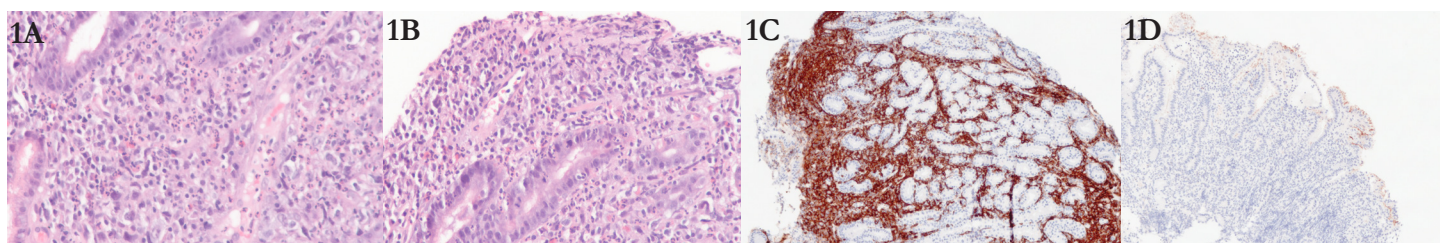


Figure 1 | Histological findings from pre-treatment biopsies stained with hematoxylin and eosin (A: 200x; B: 400x) include gastric mucosa with florid active gastritis and dense atypical lymphoid infiltrate. The lymphoid infiltrate is composed mainly of small lymphocytes, but some large atypical cells are also present. Immunohistochemical staining for (C) CD20, a B-cell marker, shows strong positivity in the neoplastic cells and (D) *Helicobacter pylori* antibody reveals numerous *H. pylori* organisms. (C: 10x; D: 10x)

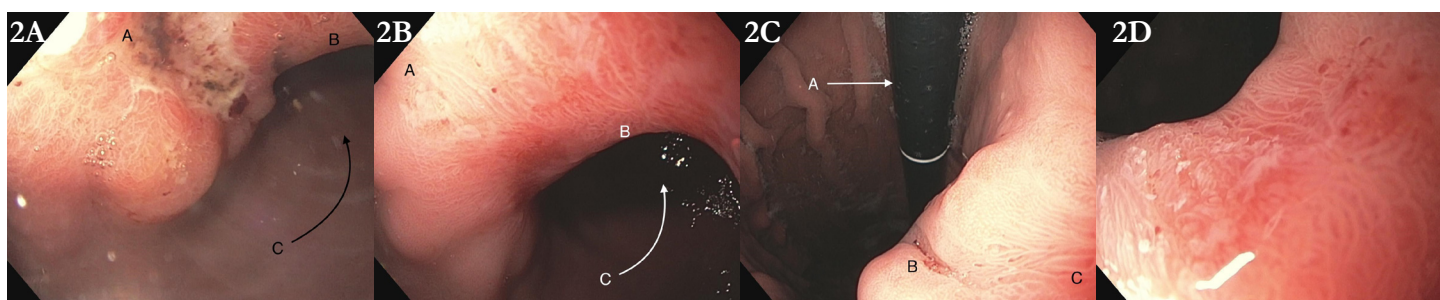


Figure 2 | (A) Pre-treatment endoscopy in forward view. A: Gastric ulcer at the incisura. B: Incisura angularis. C: Pyloric Channel. (B) Post-treatment anterograde view. A: Site of previous gastric ulcer. B: Incisura angularis. C: Pyloric channel. (C) Post-treatment retrograde view, with endoscope retroflexed. A: Proximal portion of endoscope in retroflexed position. B: Small erosion at the site of the previous ulcer. C: Incisura angularis. (D) En face view of the site of the previous ulcer.

between MALT lymphoma and DLBCL, multiple pathologists and a multidisciplinary lymphoma conference reviewed the case. Ultimately, the conference concluded that the presence of high-grade transformation to DLBCL could not be diagnosed with certainty, especially given the extensive concurrent gastritis complicating the diagnosis. Therefore, the consensus was to manage the mass as a low-grade MALT lymphoma. Importantly, as part of the staging process, full-body CT scans, a PET scan, and a bone marrow aspirate and analysis were conducted, all of which were negative for disease spread.

As a trial, the patient was treated with *H. Pylori* eradication triple therapy (including amoxicillin, clarithromycin, and pantoprazole) twice daily for 14 days, the standard therapy for low-grade MALT lymphoma. Three weeks after completion of triple therapy, our patient returned for follow-up, her symptoms having completely resolved. Her gastroscopy was repeated and, remarkably, no further evidence of the mass was found. At the incisura where the previous ulcerated mass had been, there was only subtle residual scarring (Figure 2). Pathologic review of the gastric biopsies demonstrated complete resolution of the lymphoproliferative disease with no remaining evidence of *H. pylori* infection (Figure 3A,B).

Discussion

In this case, the ambiguity of the pathologic diagnosis became a critical factor in the determination of definitive treatment, making it an exceptional illustration of the many controversies in our understanding of the management of *Helicobacter*-associated high-grade lymphoma. Whereas the role of first-line triple therapy in the treatment of low-grade MALT lymphoma has been widely accepted since the early 1990s, for years, the understanding in the medical community was that high-grade transformation eliminated the dependence of the tumour on the original inciting infection. As a result, gastric DLBCL has traditionally been treated with first-line chemotherapy and radiation, although concomitant bacterial eradication was advised in order to avoid further oncogenic stimulus.⁵

However, in the past decade, there have been emerging data to

suggest that *Helicobacter* eradication could have an important role in the initial management of DLBCL as well. A multicentre prospective trial in Taiwan assessed the effect of first-line antibiotic therapy on low-stage (stage IE/IIIE1) MALT-transformed DLBCL, comparing

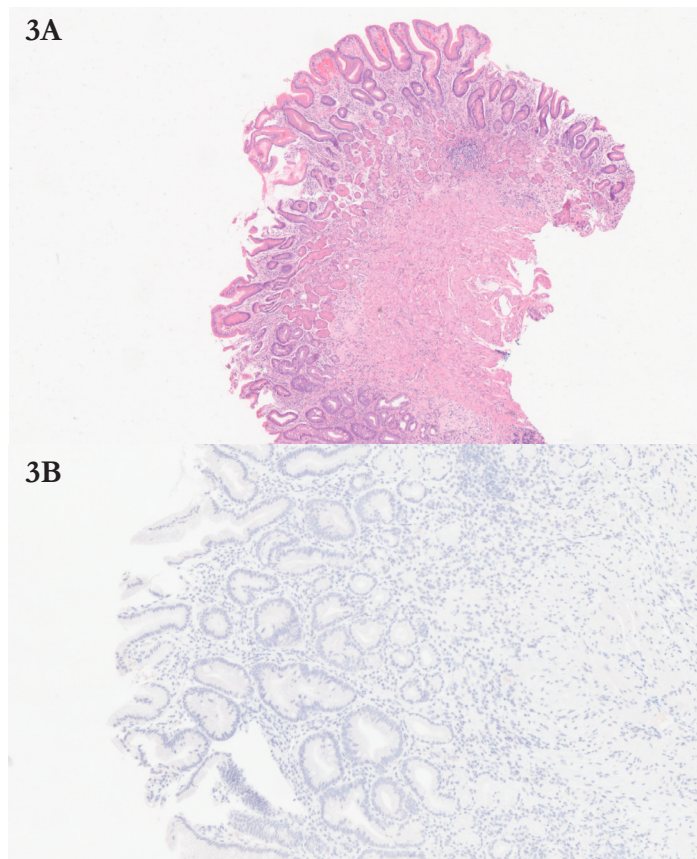


Figure 3 | Post-treatment gastric biopsies stained with (A: 4x) hematoxylin and eosin demonstrate complete resolution of active gastritis and regression of the atypical lymphoid infiltrate. Focal chronic nonspecific gastritis is present. Immunohistochemical staining with (B: 4x) *Helicobacter pylori* antibody is negative.

the results with a retrospective review on the role of antibiotic therapy in *de novo* (non-MALT) DLBCL. In this seminal study, 58% of patients experienced complete remission with anti-bacterial therapy alone, with no signs of recurrence after five years. When split into histological subtypes, there was a 68% remission rate in *de novo* DLBCL, with 56.3% complete pathological remission for those with underlying MALT lymphoma. The median time to complete pathologic remission was 2.1 months in the former group, and 5.1 months in the latter.⁷ A follow-up multicentre trial (the HGL-1 study) corroborated these results, reporting that a full two-thirds of patients underwent long-term remission on triple therapy alone.⁸

However, while these studies have challenged the paradigm of the management of gastric DLBCL, the use of triple therapy as a sole first-line treatment in these cases has not been as widely accepted as it has been for low-grade MALT lymphoma. To begin with, the standard chemotherapeutic regimens (typically R-CHOP therapy) for stage IE/IIIE disease undoubtedly have a significantly higher remission rate, quoted as 95% in recent studies.⁹ Understandably, there is concern that for the considerable proportion of patients who do not respond to antibiotics, the delay to accessing chemotherapy may worsen prognosis. To address this concern, in the initial studies investigating the efficacy of triple therapy, endoscopic evaluations were performed every six weeks and any patients with stable or progressive disease were immediately initiated on standard chemotherapy regimens. Fortunately, the safety of this approach was ultimately supported; of these patients, 100% of the *de novo* DLBCL group and 93.8% of the MALT-transformed group achieved complete remission with chemotherapy. In this latter group, one of the sixteen patients did, however, die of disease progression.⁷

Although these preliminary results have been encouraging, in order to consider *Helicobacter* eradication as a legitimate first-line therapy for gastric DLBCL, it is imperative to understand the patient-specific factors that could influence response to antibiotic therapy. Despite extensive study on these factors in low-grade MALT lymphoma, identifying genetic abnormalities such as the translocation t(11;18) and aberrant nuclear BCL10 as high-risk features, research on similar genetic factors in DLBCL has not been pursued.⁵ Additionally, gross pathologic features may play an important role, as the original 2012 Taiwanese trial demonstrated that depth of tumour invasion was significantly correlated with response to antibiotics in MALT-associated DLBCL; 87% of patients with tumours confined to the submucosa achieved complete remission, as opposed to only 39% in those with tumour infiltration into the muscularis propria.⁷

All in all, the use of *Helicobacter* triple therapy as a first-line treatment for gastric lymphoma, both low and high-grade, has exceptional potential, as demonstrated by the rapid endoscopic

remission achieved by our patient. Apart from lending insight into the interdependence of *Helicobacter* infection and tumour survival, this concept could represent a new direction in patient care, enabling patients who may otherwise have been very vulnerable to the effects of chemotherapy (such as the elderly, as in our case) to achieve a cure with a short course of generally well-tolerated antibiotic therapy. However, further research is necessary to identify pathologic and epidemiological factors that could predict those with the highest likelihood of response, as well as those at risk for requiring subsequent salvage chemotherapy. Furthermore, the case highlights the potential for a new paradigm for the timing of endoscopic surveillance. Although there are no set guidelines for the timeframe for endoscopic re-evaluation, low-grade MALT lymphomas are typically reassessed from six weeks to three months after completing antibiotic therapy, though some cases may take up to twelve months to demonstrate histologic regression.¹⁰ Given the potential for such rapid remission as demonstrated in this case, moving towards an earlier surveillance system would enable more timely identification of responders; in similar cases of diagnostic uncertainty, early assessment could be crucial for identifying those in need of further therapy.

Further research into the intimate connection between *Helicobacter* infection and gastric lymphoma could have far-reaching implications in the broader field of oncology. There are numerous associations between chronic infections and neoplasia, from Epstein-Barr virus and lymphoma to schistosomiasis and bladder cancer. As we continue to learn more about the interdependence between malignancies and their underlying infectious etiologies, it will be fascinating to see if our burgeoning understanding of *Helicobacter*-associated lymphoma will lend insight, on a larger scale, to our approach to cancer therapeutics.

References

1. Wang AY, Peura DA. The prevalence and incidence of *Helicobacter pylori*-associated peptic ulcer disease and upper gastrointestinal bleeding throughout the world. *Gastrointest Endosc Clin N Am*. 2011 Oct;21(4):613-35.
2. Smoot DT. How does *Helicobacter pylori* cause mucosal damage? Direct mechanisms. *Gastroenterology*. 1997 Dec; 113(6):S31-4.
3. Kim SS, Ruiz VE, Carroll JD, Moss SF. *Helicobacter pylori* in the pathogenesis of gastric cancer and gastric lymphoma. *Cancer Lett*. 2011 Jun 28; 305(2):228-38.
4. Zullo A, Hassan C, Ridola L, Repici A, Manta R, Andriani A. Gastric MALT lymphoma: old and new insights. *Ann Gastroenterol. The Hellenic Society of Gastroenterology*; 2014; 27(1):27-33.
5. Paydas S. *Helicobacter pylori* eradication in gastric diffuse large B cell lymphoma. *World J Gastroenterol*. 2015 Apr 7; 21(13):3773-6.
6. Zhou K, Xu D, Cao Y, Wang J, Yang Y, Huang M. C-MYC aberrations as prognostic factors in diffuse large B-cell lymphoma: A meta-analysis of epidemiological studies. *PLoS One*. 2014 Apr 16; 9(4):e95020.
7. Kuo SH, Yeh KH, Wu MS, Lin CW, Hsu PN, Wang HP, et al. *Helicobacter pylori* eradication therapy is effective in the treatment of early-stage H pylori-positive gastric diffuse large B-cell lymphomas. *Blood*. 2012 May 24;119(21):4838-44.
8. Ferreri AJM, Govi S, Ponzoni M. The role of *Helicobacter pylori* eradication in the treatment of diffuse large B-cell and marginal zone lymphomas of the stomach. *Curr Opin Oncol*. 2013 Sep; 25(5):470-9.
9. Avilés A, Castañeda C, Cleto S, Neri N, Huerta-Guzmán J, Gonzalez M, et al. Rituximab and chemotherapy in primary gastric lymphoma. *Cancer Biother Radiopharm*. 2009 Feb; 24(1):25-8.
10. Bacon CM, Du MQ, Dogan A. Mucosa-associated lymphoid tissue (MALT) lymphoma: a practical guide for pathologists. *J Clin Pathol*. 2007 Apr; 60(4):361-72.

Diagnosing pediatric mild traumatic brain injury: Current techniques in a vulnerable demographic

Jacob L. Stubbs^{1,2}

Citation: UBCMJ. 2018; 9.2 (30-31)

Abstract

The Centers for Disease Control and Prevention considers mild traumatic brain injury (mTBI), commonly known as concussion, a genuine public health issue. Emerging research is revealing serious long-term sequelae from repeated concussive blows, yet no single test can definitively diagnose mTBI. Pediatric brains are more sensitive to injury, lending a heightened need for accurate and reliable diagnostic tools. Many tools exist that ostensibly serve as diagnostic tools for mTBI, though most have low diagnostic performance and lack specificity towards the pediatric population. Experimental tools and potential biomarkers are being investigated to improve the sensitivity and specificity of mTBI diagnosis, though they are still in experimental stages and rarely investigated in pediatrics. Research for diagnosing mTBI in the pediatric population presents unique challenges, and is ultimately lacking.

Introduction

Every year, approximately 42 million individuals sustain a mild traumatic brain injury (mTBI), with more than a third of all reported injuries occurring in the pediatric population.^{1,2} The Centers for Disease Control and Prevention have viewed mTBI as a serious public health issue for more than a decade, and it has gained widespread public attention following a highly publicized series of studies examining chronic traumatic encephalopathy in NFL players.³⁻⁶ Large meta-analyses have linked mTBI to long-term neurodegenerative diseases such as Alzheimer's, Parkinson's, and amyotrophic lateral sclerosis.⁷⁻¹⁰ Despite widespread prevalence and public awareness of the issue, no single test can definitively diagnose or prognosticate recovery of mTBI.¹¹ The pediatric population was long thought to be less prone to mTBI, as they were considered to have a higher degree of neuroplasticity and "cognitive reserve", which would expedite recovery; however, subsequent research suggests that the pediatric brain is more vulnerable to mTBI.^{12,13} The need for an objective diagnostic method is of heightened importance in the pediatric population, and yet, the literature remains scant and conflicting.

Historically, clinical diagnostic tools for mTBI have been developed and validated in adult populations, and some of these have been reformatted for individuals under the age of 18.¹⁴ Definitive diagnosis of mTBI is a key first step to receiving the highest standard of care, and although there are additional factors that make the diagnosis of pediatric mTBI challenging, the largest barrier is simply that there are fewer clinically relevant instruments to work with. A variety of multidimensional diagnostic tools for mTBI exist, the most prominent of which have inherently subjective components, which lend questions surrounding their accuracy. Novel research tools such as magnetic resonance diffusion tensor imaging (MR-DTI) and potential biomarkers such as cerebrovascular functioning and eye movements are being investigated yet remain largely experimental.¹⁵⁻¹⁷

Sizeable government and research infrastructure is being devoted to the development of valid and reliable diagnostics, yet in the current clinical context, two concerns persist. First, which diagnostic tools are most able to reliably, validly, and accurately diagnose mTBI? Second, which of these, if any, lend the highest degree of clinical utility in the pediatric population?

Current diagnostic tools for mTBI

An overview of some commonly used and experimental diagnostic tools is provided in Table 1. The fifth version of the Sport Concussion

Assessment Tool (SCAT5), although imperfect, is widely considered the gold-standard clinical tool and has been developed and refined by an international consortium of experts.¹⁸ The SCAT5 uses a multimodal approach, including tests of neuropsychological functioning, balance, and self-reported symptoms.¹⁹ Despite widespread usage, the previous versions of the SCAT lend only moderate diagnostic utility.²⁰ The same consortium also released a reformatted Child SCAT5, intended for ages 5-12. Similar neuropsychological tests have been integrated into computer-based programs, including AxonSports, which only tests athletes above age ten, and IMPACT, which offers a pediatric version marketed towards ages 5-11. These computer-based tests are widely used in the context of sport despite yielding an accuracy of only approximately 70%, and providing limited clinical utility due to low validity and reliability.²¹

Prospective biomarkers of mTBI

MR-DTI is an imaging modality that yields parameters indicative of white-matter integrity in the brain.¹⁵ Primary DTI variables characterize the diffusion of water along white-matter tracts with alteration after mTBI indicative of microstructural damage.¹⁵ The literature on MR-DTI in pre-adolescence is scarce and indicates damage in areas other than those seen in adult populations; however, studies on adolescent patients demonstrate findings closer to those found in adults.²²⁻²⁴ Whereas MR-DTI is an invaluable research tool with which to further our mechanistic understanding of mTBI, current techniques lack the individual-level sensitivity and specificity required for it to reliably be used as a diagnostic tool.²⁵

Emerging technologies have spurred the investigation of behavioural biomarkers such as eye movements, as well as physiological biomarkers such as cerebral blood flow and blood proteins, as more objective mTBI diagnostics.^{16,17,26} Increased variability of smooth pursuit eye movement has been shown to correlate with MR-DTI markers of mTBI and has a moderate to strong reliability in adults.^{17,27,28} However, accurate eye-tracking equipment is expensive and eye movements mature at different rates in childhood, adding specific challenges in the pediatric population that have yet to be fully investigated. Cerebral blood flow decreases following mTBI and can be measured with novel ultrasound and neuroimaging techniques.¹⁶ Ultrasound machines are both relatively portable and quick to administer, though these tools require both the proper equipment and a trained technician. Recently, altered levels of specific blood proteins have been examined as a biomarker of mTBI and combinations of these proteins lend strong sensitivity and specificity for diagnosis.^{26,29} However, clinical studies of prospective mTBI biomarkers in pediatrics are sparse. Eye-tracking and blood biomarker research remains largely experimental and have only been investigated in adult populations, and investigations of

¹School of Kinesiology, University of British Columbia, Vancouver, BC, Canada

²Department of Psychiatry, Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada

Correspondence to:
Jacob L. Stubbs (stubbs.jacobliam@gmail.com)

Table 1 | Comparison of established and experimental diagnostic tools for mTBI.

	Diagnostic tool	Time to administer	Validity & reliability	Strengths	Limitations	Pediatric usage
Established	SCAT5 ¹⁸	15-20 minutes	Moderate ²⁰	Multimodal and has established normative scores	Requires training to administer, potential for subjectivity in experimenter scoring	Child SCAT5 for ages 5-12
	AxonSports	10-15 minutes	Low ²¹	Easy and fast to administer	Found to be not clinically useful ²¹	Only children 10+
	ImPACT	10-15 minutes	Low ²¹	Easy and fast to administer	Found to be not clinically useful ²¹	Pediatric version for ages 5-11
Experimental	MR-DTI ¹⁵	4-8 minutes (for DTI only)	Undetermined	Can examine neural integrity in vivo	Expensive, impractical, different findings in pediatrics	Yes
	Eye-tracking ¹⁷	<1 minute	Moderate to strong in adults, undetermined in pediatrics ¹⁷	Quick, noninvasive prospective biomarker	Expensive equipment, prone to maturation confounds in pediatrics	Not yet investigated
	Cerebral blood flow ¹⁶	Approx. 5 minutes	Undetermined	Quick, noninvasive prospective biomarker	Expensive equipment, requires technician	Imaging only
	Blood proteins ²⁶	Approx. 10 minutes	Undetermined	Quick, prospective biomarker	Involves blood draw	Not yet investigated

cerebrovascular alterations in pediatric populations is in early stages.³⁰

Discussion

The vast majority of mTBI biomarker research is done in adults and none of the outlined prospective biomarkers have been validated in either adults or children.¹⁴ A primary issue hindering high-quality pediatric mTBI research is that controlling for factors such as selection bias and maturation threats to internal validity are far more challenging than in adult populations. Adult diagnostics are challenged by the heterogeneity of symptoms in mTBI which is further amplified in pediatrics. Baseline testing, followed by post-injury testing to measure intra-individual differences continues to be a research method used to minimize maturation confounds; however, baseline testing is no longer a recommended practice to inform diagnosis.³¹

The injury-prevention organization Parachute Canada provides national guidelines called “Return to Sport”³² and “Return to Learn”³³ to aid parents, coaches, and teachers of children to safely reintegrate activities following mTBI. However, return to activity guidelines can be best implemented only insofar as there are valid tools to accurately diagnose mTBI. The largest barrier to effective mTBI diagnosis in the pediatric population is simply the incontrovertible fact that we do not have accurate methods of diagnosis in the adult population and thus there are few promising tools to reformat into the pediatric context.

The highest standard of care for all individuals with mTBI can only be provided following a definitive diagnosis, and this is additionally challenging in pediatric mTBI as there are fewer valid and reliable tools available. Widely used computerized tests with pediatric-friendly versions have low validity and reliability and thus provide little clinical utility.²¹ The Child SCAT5 is currently the most evidence-based and validated tool for pediatric mTBI diagnosis,¹⁸ although it is still far from a reliable and objective measure. The current gold-standard diagnostic tools provide some degree of clinical utility but often present subjectivity or reliability issues. Emerging technologies show promise in the search for objective biomarkers of mTBI; however, these tools are still in early experimental stages and few are being investigated in pediatrics.

References

- Cassidy J, Carroll L, Peloso P, Borg J, von Holst H, Holm L, et al. Incidence, risk factors and prevention of mild traumatic brain injury: results of the WHO Collaborating Centre Task Force on Mild Traumatic Brain Injury. *J Rehab Med*. 2004;(43 Suppl):28-60.
- Zhang A, Sing D, Rugg C, Feeley B, Senter C. The rise of concussions in the adolescent population. *Orthop J Sports Med*. 2016;4(8):1-7.
- Gerberding J, Binder S. Report to congress on mild traumatic brain injury in the United States: steps to prevent a serious public health problem. Atlanta, GA; 2003.
- Omalu B, DeKosky S, Hamilton R, Minster R, Kamboh M, Shakir A, et al. Chronic traumatic encephalopathy in a national football league player: part II. *Neurosurg*. 2006;59(5):1086-92.
- Omalu B, DeKosky S, Minster R, Kamboh M, Hamilton R, Wecht C. Chronic traumatic encephalopathy in a national football league player. *Neurosurg*. 2005;57(1):128-34.
- Mez J, Daneshvar D, Kiernan P, Abdolmohammadi B, Alvarez V, Huber B, et al. Clinicopathological evaluation of chronic traumatic encephalopathy in players of american football. *JAMA*. 2017;318(4):360-70.
- Fleminger S, Oliver D, Lovestone S, Rabe-Hesketh S, Giora A. Head injury as a risk factor for Alzheimer's disease: the evidence 10 years on; a partial replication. *J Neurol Neurosurg Psych*. 2003;74(7):857-62.
- Mortimer J, Van Duijn C, Chandra V, Fratiglioni L, Graves A, Heyman A, et al. Head trauma as a risk factor for Alzheimer's disease: a collaborative re-analysis of case-control studies. *Int J Epidemiol*. 1991;20(Suppl. 2):S28-S35.
- Jafari S, Etminan M, Aminzadeh F, Sami A. Head injury and risk of Parkinson disease: a systematic review and meta-analysis. *Mov Disord*. 2013;28(9):1222-9.
- Chen H, Richard M, Sandler D, Umbach D, Kamel F. Head injury and amyotrophic lateral sclerosis. *Am J Epidemiol*. 2007;166(7):810-6.
- West T, Marion D. Current recommendations for the diagnosis and treatment of concussion in sport: a comparison of three new guidelines. *J Neurotrauma*. 2014;31(2):159-68.
- Satz P. Brain reserve capacity on symptom onset after brain injury: a formulation and review of evidence for threshold theory. *Neuropsychology*. 1993;7:273-95.
- Kirkwood M, Yeates K, Wilson P. Pediatric sport-related concussion: a review of the clinical management of an oft-neglected population. *Pediatrics*. 2006;117(4):1359-71.
- McCarthy M, Kosofsky B. Clinical features and biomarkers of concussion and mild traumatic brain injury in pediatric patients. *Ann N Y Acad Sci*. 2015;1345:89-98.
- Xiong K, Zhu Y, Zhang W. Diffusion tensor imaging and magnetic resonance spectroscopy in traumatic brain injury: a review of recent literature. *Brain Imaging Behav*. 2014;8(4):487-96.
- Len T, Neary J. Cerebrovascular pathophysiology following mild traumatic brain injury. *Clin Physiol Funct Imag*. 2011;31(2):85-93.
- Maruta J, Heaton K, Maule A, Ghajar J. Predictive visual tracking: specificity in mild traumatic brain injury and sleep deprivation. *Mil Med*. 2014;179(6):619-25.
- McCorry P, Meeuwisse W, Dvorak J, Aubry M, Bailes J, Broglio S, et al. Consensus statement on concussion in sport—the 5th international conference on concussion in sport held in Berlin, October 2016. *Br J Sports Med*. 2017;Online:1-10.
- Iverson GL, Lange RT. Post-concussion syndrome. In: Schoenberg M, Scott J, editors. *The little black book of neuropsychology*. New York: Springer; 2011. p. 745-63.
- Chin E, Nelson L, Barr W, McCorry P, McCrea M. Reliability and validity of the Sport Concussion Assessment Tool-3 (SCAT3) in high school and collegiate athletes. *Am J Sports Med*. 2016;44(9):2276-85.
- Nelson L, Lange RT, Maule A, Lerner E, Hammke T, Randolph C, et al. Prospective, head-to-head study of three computerized neurocognitive assessment tools (CNTs): reliability and validity for the assessment of sport-related concussion. *J Int Neuropsych Soc*. 2016;22:24-37.
- Wozniak J, Krach L, Ward E, Mueller B, Muetzel R, Schnoebelen S, et al. Neurocognitive and neuroimaging correlates of pediatric traumatic brain injury: a diffusion tensor imaging (DTI) study. *Arch Clin Neuropsychol*. 2007;22(5):555-68.
- Virji-Babul N, Borich M, Makin N, Moore T, Frew K, Emery C, et al. Diffusion tensor imaging of sports-related concussion in adolescents. *Ped Neurol*. 2013;48:24-9.
- Wilde E, McCauley S, Hunter J, Bigler E, Chu Z, Wang Z, et al. Diffusion tensor imaging of acute mild traumatic brain injury in adolescents. *Neurology*. 2008;70(12):948-55.
- Eierud C, Craddock R, Fletcher S, Aulakh M, King-Casas B, Kuehl D, et al. Neuroimaging after mild traumatic brain injury: review and meta-analysis. *Neuroimage Clin*. 2014;4:283-94.
- Shan R, Szmydynger-Chodobska J, Warren O, Mohammad F, Zink B, Chodobska A. A new panel of blood biomarkers for the diagnosis of mild traumatic brain injury/concussion in adults. *J Neurotrauma*. 2016;33(1):49-57.
- Maruta J, Heaton K, Kryskow E, Maule A, Ghajar J. Dynamic visuomotor synchronization: quantification of predictive timing. *Behav Res Methods*. 2013;45:289-300.
- Maruta J, Suh M, Niogi S, Mukherjee P, Ghajar J. Visual tracking synchronization as a metric for concussion screening. *J Head Trauma Rehabil*. 2010;25(4):293-305.
- Diaz-Arastia R, Wang K, Papa L, Sorani M, Yue J, Puccio A, et al. Acute biomarkers of traumatic brain injury: relationship between plasma levels of ubiquitin C-terminal hydrolase-L1 and glial fibrillary acidic protein. *J Neurotrauma*. 2014;31(1):19-25.
- Maugans T, Farley C, Altaye M, Leach J, Cecil K. Pediatric sports-related concussion produces cerebral blood flow alterations. *Pediatrics*. 2012;129(1):28-37.
- Parachute Canada. Statement on concussion baseline testing in Canada [Internet]. Toronto, ON: Paracut Canada; 2017. Available from: <http://www.parachutecanada.org/downloads/injurytopics/BaselineTestingStatement-Parachute.pdf>.
- Parachute Canada. After a concussion guidelines for return to sport [Internet]. Toronto, ON: Paracut Canada; 2017. Available from: <http://www.parachutecanada.org/downloads/resources/return-to-play-guidelines.pdf>.
- Parachute Canada. Protocol for return to learn after a concussion [Internet]. Toronto, ON: Paracut Canada; 2017. Available from: http://www.parachutecanada.org/downloads/programs/safekidsweek/Return_to_Learn.pdf.

Perspectives in pediatric oncology: Understanding the experiences of two Syrian refugee families at B.C. Children's Hospital

Alexandra Rice¹, Caron Strahlendorf²

Citation: UBCMJ. 2018; 9.2 (32-33)

Abstract

This study focuses on the unique experiences of two Syrian refugee families at the Pediatric Oncology Clinic at B.C. Children's Hospital. Overall, both families expressed that they felt well supported and were happy with their care. We learned that services provided, particularly easily accessible translation and transportation services, are essential to help relieve stress and barriers to care. Additionally, access to emotional support services, such as psychology referrals, may help to further improve refugee care. Engaging with Syrian refugee families allowed for a better understanding of their unique needs and how to support them better in the future.

Introduction

In late 2015, the government of Canada implemented a rapid humanitarian resettlement of 25,000 Syrian refugees.¹ Health settlement of refugees refers to an evidence-based health assessment and integration of refugees into the healthcare system. Prior to arrival in Canada, refugee families will have had a complete medical history and a focused physical exam in accordance with the standard Immigration Medical Examination (Box 1). In preparation, health practitioner networks were developed to support refugees upon arrival. Additionally, refugee-specific resources were developed. These include guidelines from the Canadian Collaboration for Immigrant and Refugee Health and specific pediatric resources from the Canadian Paediatric Society (Box 1).

Box 1 | Refugee-specific resources.^{2,4}

- Immigration Medical Examination, Citizenship and Immigration Canada: www.cic.gc.ca/english/resources/publications/dmp-handbook/
- Caring for Kids New to Canada, resources from Canadian Paediatric Society: www.kidsnewtocanada.ca/
- Clinical e-checklist for immigrants from the Canadian Collaboration for Immigrant and Refugee Health: www.ccirhken.ca/ccirh/checklist_website/index.html

Syrian refugee families have unique healthcare and psychosocial needs. Many experience mental health issues and require additional psychosocial support.^{5,6} Post-traumatic stress disorder, depression, and anxiety prompted by violence, displacement, and relocation are commonly experienced by refugee patients.^{1,5} Empathy, reassurance, and advocacy have been demonstrated to be key components of recovery for refugees with mental health issues. Furthermore, facilitating resettlement and optimizing conditions to assure access to safe and adequate housing, employment, and income, as well as promoting family cohesion can have protective health effects.¹ Previous studies have shown that adopting a patient-centered care approach, and incorporating physical and mental health, as well as social situation, into the conversation will improve patient-practitioner communication and support refugee health.⁵

In addition to the many stressors of relocating, some refugee

families have children requiring hospital care, which forces refugee families to suddenly become intensively immersed in their new society's healthcare system. This new healthcare system may feel unfamiliar for patients and their families; healthcare customs may be very different from their home country and language barriers may prevent direct communication with physicians. These dynamics create an additional level of stress for refugee families. Thus, special attention to the mental health needs of refugee families and their children who are receiving care is required.

This study focused on the unique experiences of Syrian refugee families at the Pediatric Oncology Clinic at B.C. Children's Hospital. Areas explored include access and barriers to healthcare services, translation services, and supportive care services. The goal of this study was to better understand the experiences of refugee families in pediatric oncology to provide appropriate support services in the future.

Materials and Methods

This study was approved by U.B.C. Behavioural Research Ethics Board.

Two Syrian refugee families with children who were diagnosed with cancer and patients of the B.C. Children's Hospital Pediatric Oncology Clinic were identified and approached to participate in an interview session about their experiences in Canadian healthcare. Prior to the interview, written consent was obtained.

To understand the families' experiences in pediatric oncology and improve future support, two separate, informal, free-flowing interviews, with the support of a translator, were conducted. Interviews lasted between thirty minutes and one hour. Interviews focused on past experiences in Canadian healthcare, and support services offered and utilized upon relocation to Canada. Although interviews were intended to be free-flowing and unscripted, several guiding questions were asked to learn about the family's current living situation, previous healthcare interventions prior to relocation, and type and length of treatment received at B.C. Children's Hospital. Additionally, questions were asked about the families' support system during relocation, services offered and accessed in the healthcare system, experiences in the pediatric oncology clinic, incorporation of their culture in care plans, and challenges or barriers they have experienced in healthcare. Lastly, interviews included an opportunity to provide feedback and recommendations on how to improve care for Syrian refugee families and their children.

¹MD Program, Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada

²Department of Hematology and Oncology, BC Children's Hospital, Vancouver, BC, Canada

Correspondence to:
Alexandra Rice (amrice17@gmail.com)

Results and Discussion

Two Syrian refugee families were interviewed separately at B.C. Children's Hospital. Both families had recently immigrated within the past twelve months and had children who were patients in the pediatric oncology clinic at B.C. Children's Hospital.

Overall, both families felt well supported at the pediatric oncology clinic. Both families expressed gratitude for their treatment and care and felt their culture was respected and integrated into their care plan throughout their experience. The families were thankful for the support provided by physicians, nurses, and other hospital staff, and appreciated the time spent to help them understand care plans. When asked to provide suggestions to improve care, neither family had suggestions for improvement. However, upon prompting, one family discussed how language barriers were an initial concern. Easy access to in-person translators and phone conversations with Arabic-speaking physicians helped to alleviate these worries. Barriers to care, such as communication difficulties and transportation to the hospital, were overcome with support of hospital services, such as translators and transportation vouchers for taxis. Understanding that language barriers and transportation access are sources of stress for families emphasizes the need to address these barriers to reduce families' anxiety. Additionally, addressing these barriers may help to relieve feelings of isolation and ensure that families do not feel alienated during hospital experiences.

Both families expressed they felt well supported and welcomed in Canada, and felt they had more support than in their previous countries. They "do not feel like immigrants" and are happy in Canada. Support services accessed by the families included Immigration Services Society of B.C. and the Food Share Network. These services helped provide access to healthcare, housing, language and career services. Both families were connected with a social worker and supported by welfare. A common theme was the lack of access to emotional support services provided through these organizations. After having endured the sensitive process of relocation, access to emotional support services would likely be something the families would have benefited from. Access and awareness to emotional services, such as a psychology referral, may be an area to improve upon in future care.

Interviewing refugee families at B.C. Children's Hospital helped

us to understand the challenges and concerns that the families face upon relocation to Canada, particularly in terms of communication barriers and cultural differences. We learned that services provided, particularly easily accessible translation services, are essential to help support families and involve them in care plans. Additionally, access to emotional support services, such as psychology referrals, may help to further improve refugee care. Finally, ensuring that refugee families are aware of all services available and how to access these services is imperative to maximizing usage. Engaging with Syrian refugee families allowed for a better understanding of their past, their values, and how to support them better in the future.

As a medical student, participating in interviews provided practice engaging in difficult conversations, as many emotional topics were discussed regarding families' journeys. This project has served as a reminder that to best meet the needs and understand the values of patients, we, as healthcare providers, must work directly with our patients to develop appropriate and achievable treatment plans.

A challenge to this study included the small sample size. There were only a handful of refugee families in the Pediatric Oncology clinic, and scheduling interview times was difficult. In the future, reaching out to refugee families in different specialty clinics may provide more information as to what services are being accessed, and experiences in different settings.

References

1. Pottie K, Greenaway C, Hassan G, Hui C. Caring for a Newly Arrived Syrian Refugee Family. *CMAJ* [internet] 2015 Dec [cited 2017 Oct 5]; Available from: <http://www.cmaj.ca/site/misc/caring-for-a-newly-arrived-syrian-refugee-family-cmaj.151422.xhtm>
2. Immigration, Refugees and Citizenship Canada [internet]. Ottawa: Government of Canada; c2013-2016 [cited 2017 Oct 5]. Panel Members' Handbook 2013; available from: www.cic.gc.ca/english/resources/publications/dmp-handbook/kidsnewtocanada.ca [internet]. Canada: Canadian Pediatric Society; c 2017 [cited 2017 Oct 5]. Available from: www.kidsnewtocanada.ca/
3. Canadian Collaboration for Immigrant and Refugee Health [internet]. Ottawa: University of Ottawa, Faculty of Medicine; c2016 [cited 2017 Oct 5]. Evidence-Based Preventative Care Checklist for New Immigrants and Refugees. Available from: www.ccirhken.ca/ccirh/checklist_website/index.html
4. Hassan G, Kirmayer LJ, Mekki-Berrada A, Quosh C, el Chammay R, Deville-Stoetzel, J.B., et al. Geneva: UNHCR; c2015 [cited 2017 Oct 5]. Culture, Context and the Mental Health and Psychosocial Wellbeing of Syrians: A Review for Mental Health and Psychosocial Support staff working with Syrians Affected by Armed Conflict. Available from: <http://www.unhcr.org/55f6b90f9.pdf>
5. Pottie K, Greenaway C, Feightner J, Welch V, Swinkels H, Rashid M, et al. Evidence-based clinical guidelines for immigrants and refugees. *CMAJ* 2011 Sep 6;183(12):824-925.

Youth and the opioid crisis: Strategies for intervention and the British Columbian experience

Christina Schweitzer¹, Stephanie J. Gill¹, Alex Kennedy¹, Kate Eppler¹

Citation: UBCMJ. 2018; 9.2 (34-35)

Abstract

The opioid crisis is a growing public health concern in Canada, especially in British Columbia, where it has been declared a public health emergency. In response to the rising number of youth overdose deaths, British Columbia has implemented a number of harm reduction and prevention strategies. Areas for continued improvement include naloxone kit training, encouraging users to not use alone and for bystanders to call 911 in the event of an overdose, and minimizing risk factors for addiction while maximizing protective factors. As the opioid crisis continues its spread east, other jurisdictions have much to learn from the British Columbian experience.

The opioid crisis is a growing public health concern in Canada, especially in British Columbia, where it has been declared a public health emergency.¹ Continuing its upward trend since 2012, the number of fatal overdoses in British Columbia rose to 1,422 in 2017 (an average of 3.9 deaths per day), a 43% increase from the 993 overdose deaths in 2016 (Table 1).²

Nationwide, young people aged 15-24 had the fastest growing rates of hospitalization for opioid poisoning in the last decade.^{3,4} In British Columbia, overdose deaths amongst youth and young adults continue to rise in 2017 (Table 1). While British Columbia has implemented a number of strategies, there is an unmet need for understanding factors contributing to drug use and overdose in youth, and for effective prevention and harm reduction programs.

Delay in seeking medical treatment is a major contributor to overdose fatalities.⁵ Using in the presence of others who can recognize the signs of overdose, call for help, and provide medical interventions (e.g. naloxone) reduces fatalities and is a strength of INSITE, a supervised injection site in Vancouver.⁶ There has never been a death at a supervised injection site anywhere in the world.⁷ A review of overdose deaths in British Columbia from 2009-2013 found that 77% of youth aged 13-18 were with other people when they overdosed.⁵ While not using drugs alone is an important step in reducing the risk of fatal overdose, in 15% of youth overdose deaths, someone had placed them in the recovery position or performed a welfare check but did not call 911.⁵ Educating people likely to witness an overdose and reducing barriers to seeking medical assistance are of utmost importance. The Coroners Service of British Columbia has recommended that the physical education curriculum in schools address the issue of calling 911 when witnessing someone in medical distress, including overdose.⁵ A common misconception among drug users is that by calling 911 for an overdose they risk facing sanctions for drug possession.^{8,9} Education surrounding the Good Samaritan Drug Overdose Act, which provides legal protection for people seeking emergency support while experiencing or witnessing an overdose, is important for encouraging people to call 911 in these situations.¹⁰

Of youth who died of overdose in British Columbia, 50% lived with family, and none lived on the street exclusively.⁵ In 62% of youth who lived with family and 100% of those who did not, people living with them knew about their drug use.⁵ Most fatal youth overdoses occurred at residential addresses.⁵ Educating those living with drug users about the signs of overdose and how to respond is an important measure in preventing fatalities; this could be provided through pharmacies or by the Ministry of Child and Family Development, who had contact with 77% of youth who died of overdose.⁵ 31% of youth

Table 1 | Overdose deaths in Canada and British Columbia, 2016-2017

		Deaths		Deaths per 100,000 population	
		2016	2017	2016	2017
Opioid-related deaths in Canada ³⁴	All	2,861		7.9	
Illicit drug overdose deaths in British Columbia ²	All	993	1422	20.9	29.6
	Youth (age 10 - 18)	12	23	2.7	5.2
	Youth (age 19 - 29)	207	269	29.3	38.0

who died had previous hospitalizations for overdose, which constitute opportunities for education for these youth and their families.⁵ Families can be referred to advocacy campaigns providing resources, tools, and information about drug use, addiction, and harm reduction, such as Moms Stop the Harm.¹¹ Medications prescribed to someone else were involved in 31% of youth overdose deaths, usually involving medications prescribed to a family member (23%).⁵ This highlights the need, when prescribing and dispensing opioids, for patient education on risk to others, the importance of securing medications, and safe disposal.¹²

Educating frontline staff involved with high-risk youth (e.g. group home workers, police, and school outreach programs) about naloxone kits (a lifesaving tool that can reverse opioid overdose), increasing knowledge about signs of overdose and where youth and their families can access free kits (e.g. through towardtheheart.com), and furthering awareness of resources for prevention and addiction treatment could reduce the impact of opioids.^{9,13-18} Several school districts in British Columbia and higher education institutions, including the University of British Columbia, have already implemented or begun planning to make naloxone kits publically available.^{19,20} Naloxone training was viewed positively by participants of the Vancouver Inner City Youth program, suggesting that this could be beneficial elsewhere.²¹

The recent epidemic of drug overdose deaths has been attributed to the increased prevalence of illicit fentanyl, a potent opioid detected in 5% of overdose deaths in 2012 and 81% in 2017.^{1,2} The number of illicit drug overdose deaths that did not involve fentanyl has remained relatively stable since 2011, at an average of 300 deaths per year.² Of youth in British Columbia who died of overdose from 2009-2013, 23% had either consumed a drug which they had mistaken for another or a drug that had been adulterated with another substance (e.g. MDMA adulterated with fentanyl).⁵ Increasing the availability of drug-testing kits could reduce the number of these accidental deaths. Free, nonjudgmental drug testing at festivals in British Columbia has been

¹Cumming School of Medicine, University of Calgary, Calgary, AB, Canada

Correspondence
Christina Schweitzer (christina.schweitzer@ucalgary.ca)

shown to reduce the risk of drug use where it is already occurring, as exemplified by the efforts of the AIDS Network Kootenay Outreach and Support Society (ANKORS).^{22,23} This is a critical opportunity for drug education in a trusting environment, the “hook” that engages users in conversations about harm reduction.^{22,23}

Youth engagement in harm reduction approaches is essential in preventing opioid-related harm and overdoses.²⁴ Peer-to-peer programs, involving peers with lived experience of drug use, are an effective method of engaging and empowering youth and have been effective in reducing mortality amongst adult drug users in the Vancouver Downtown Eastside area.²⁵⁻²⁷ Preventative measures to both minimize risk factors for addiction, like childhood trauma or mental illness, and maximize protective developmental assets, including family, school, and community support systems, are another key aspect of reducing substance misuse.²⁸⁻³⁰

British Columbia has implemented many effective strategies for overdose prevention and harm reduction in youth, which could serve as an effective model for other regions as the opioid crisis spreads east.^{31,32} While increasing the availability of naloxone kits, encouraging bystanders to call 911, and minimizing risk factors for addiction are areas for further improvement in British Columbia, a bolder approach would be decriminalization of all illegal drugs. This would improve the safety of drug consumption and allow policing costs to be redirected towards treatment and prevention programs. While a controversial strategy, it has been highly successful in Portugal, which, in the midst of a heroin epidemic, decriminalized drugs in 2001 and now has one of the lowest fatal overdose rates in the world.³³ What is clear is that the opioid crisis is a complex issue that will require a multipronged approach to overcome.

References

1. British Columbia Centre for Disease Control. Public health emergency in BC [Internet]. 2017 [cited 2017 Oct 14]. Available from: <http://www.bccdc.ca/about/news-stories/stories/public-health-emergency-in-bc>
2. Coroners Service of British Columbia. Illicit drug overdose deaths in BC (January 1, 2007-December 31, 2017) [Internet]. 2018[cited 2018 Jan 31]; [20 p.]. Available from: <https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/death-investigation/statistical/illicit-drug.pdf>
3. Canadian Institute for Health Information. Opioid-related harms in Canada [Internet]. 2017 [cited 2017 Nov 26]; [42 p.]. Available from: <https://www.cihi.ca/sites/default/files/document/opioid-harms-chart-book-en.pdf>
4. Ubelacker S. Rising hospitalizations due to opioid crisis puts a burden on Canada's health system: report. The Toronto Star [Internet]. 2017 Sep 14[cited 2017 Nov 26]. Available from: <https://www.thestar.com/news/canada/2017/09/14/rising-hospitalizations-due-to-opioid-crisis-puts-a-burden-on-canadas-health-system-report.html>
5. Coroners Service of British Columbia Child Death Review Panel. Preventing death after overdose: a review of overdose deaths in youth and young adults 2009-2013 [Internet]. 2016 [cited 2017 Nov 26]; [34 p.]. Available from: <https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/death-investigation/child-death-review-unit/reports-publications/overdose-death-youth-young-adult.pdf>
6. Kerr T, Small W, Moore D, Wood E. A micro-environmental intervention to reduce the harms associated with drug-related overdose: evidence from the evaluation of Vancouver's safer injection facility. *Int J Drug Policy*. 2007 Jan 16;18(1):37-45.
7. British Columbia Centre on Substance Abuse. BC Centre on Substance Use releases new provincial guidelines for operating supervised consumption services [Internet]. 2017 [cited 2017 Nov 26]. Available from: <https://www.bccsu.ca/news-release/bc-centre-on-substance-use-releases-new-provincial-guidelines-for-operating-supervised-consumption-services/>
8. MacLean A. “People are afraid”: why some Canadians don't call 911 during an overdose. Global News [Internet]. 2017 May 9 [cited 2017 Nov 26]. Available from: <https://globalnews.ca/news/3438774/people-are-afraid-why-some-canadians-dont-call-911-during-an-overdose/>
9. Banjo O, Tzemis D, Al-Qutub D, Amlani A, Kesselring S, Buxton JA. A quantitative and qualitative evaluation of the British Columbia Take Home Naloxone program. *CMAJ*. 2014 Jul 22;136(3):153-61.
10. Government of Canada. Good Samaritan Drug Overdose Act [Internet]. Canada; 2017 [cited 2017 Oct 14]. Available from: <https://www.canada.ca/en/health-canada/services/substance-abuse/prescription-drug-abuse/opioids/about-good-samaritan-drug-overdose-act.html>
11. Moms Stop the Harm. Moms Stop the Harm [Internet]. 2017 [cited 2017 Oct 14]. Available from: <http://www.momsstoptheharm.com/>
12. Binswanger IA, Glanz JM. Pharmaceutical opioids in the home and youth: implications for adult medical practice. *Subst Abuse*. 2015 Feb 11;36(2):141-3.
13. Toward the Heart. Toward the Heart [Internet]. 2017 [cited 2017 Nov 26]. Available from: <http://towardtheheart.com/>
14. Green TC, Heimer R, Grau LE. Distinguishing signs of opioid overdose and indication for naloxone : an evaluation of six overdose training and naloxone distribution programs in the United States. *Addiction*. 2008 Apr 16;103(6):979-89.
15. Williams A V, Marsden J, Strang J. Training family members to manage heroin overdose and administer naloxone: randomized trial of effects on knowledge and attitudes. *Addiction*. 2013 Oct 28;109(2):250-9.
16. McDonald R, Strang J. Are take-home naloxone programmes effective? Systematic review utilizing application of the Bradford Hill criteria. *Addiction*. 2016 Mar 30;111(7):1177-87.
17. McDonald R, Campbell ND, Strang J. Twenty years of take-home naloxone for the prevention of overdose deaths from heroin and other opioids – conception and maturation. *Drug Alcohol Depend*. 2017 Sep 1;178:176-87.
18. Giglio RE, Li G, Dimaggio CJ. Effectiveness of bystander naloxone administration and overdose education programs: a meta-analysis. *Inj Epidemiol*. 2015 May 22;2(1):10.
19. Wells N. B.C. school trustee pushes for province-wide naloxone kits. CTV News [Internet]. 2017 Sep 26 [cited 2017 Oct 14]. Available from: <http://www.ctvnews.ca/health/b-c-school-trustee-pushes-for-province-wide-naloxone-kits-1.3606173>
20. The Canadian Press. Canadian universities stock up on naloxone kits to treat opioid overdoses. The Toronto Star [Internet]. 2017 Sep 6 [cited 2017 Oct 14]. Available from: <https://www.thestar.com/news/canada/2017/09/06/canadian-universities-stock-up-on-naloxone-kits-to-treat-opioid-overdoses.html>
21. Mitchell K, Durante SE, Pellatt K, Richardson CG, Mathias S, Buxton JA. Naloxone and the Inner City Youth Experience (NICYE): a community-based participatory research study examining young people's perceptions of the BC take home naloxone program. *Harm Reduct J*. 2017 Jun 7;14(1):34.
22. Sage C. ANKORS: Drug testing at Shambhala Music Festival: 15 years and counting. [Internet]. 2016 [cited 2017 Oct 14]; [26 p.]. Available from: <http://www.ankorsvolunteer.com/uploads/4/6/9/3/46939087/clubhealthpp.pdf>
23. Munn MB, Lund A, Golby R, Turris SA. Observed benefits to on-site medical services during an annual 5-day electronic dance music event with harm reduction services. *Prehosp Disaster Med*. 2016 Feb 2;31(2):228-34.
24. Paterson BL, Panessa C. Engagement as an ethical imperative in harm reduction involving at-risk youth. *Int J Drug Policy*. 2008 Feb;19:24-32.
25. United Nations Office on Drugs and Crime. Peer to peer: using peer to peer strategies in drug abuse prevention [Internet]. 2003 [cited 2017 Nov 26]; [56 p.]. Available from: https://www.unodc.org/pdf/youthnet/handbook_peer_english.pdf
26. Thomson E, Lampkin H, Maynard R, Karamouzian M, Jozaghi E. The lessons learned from the fentanyl overdose crises in British Columbia, Canada. *Addiction*. 2017 Sep 12;112(11):2068-70.
27. Jozaghi E, Lampkin H, Andresen MA. Peer-engagement and its role in reducing the risky behavior among crack and methamphetamine smokers of the Downtown Eastside community of Vancouver, Canada. *Harm Reduct J*. 2016 Jun 8;13(19):1-9.
28. Canadian Centre on Substance Abuse. Stronger together: Canadian standards for community-based youth substance abuse prevention [Internet]. 2010 [cited 2017 Nov 26]; [160 p.]. Available from: http://www.ccsa.ca/Resource_Library/2010_CCSA_Community-based_Standards_en.pdf
29. West Virginia Department of Health and Human Resources Adolescent Health Initiative. 40 developmental assets [Internet]. 2002 [cited 2017 Nov 26]; [3 p.]. Available from: <https://www.wvdhhr.org/ahi/assets.pdf>
30. Search Institute. 40 developmental assets for adolescents [Internet]. 2017 [cited 2017 Nov 26]. Available from: <http://www.search-institute.org/content/40-developmental-assets-adolescents-ages-12-18>
31. The Canadian Press. Fentanyl crisis moving east and leaders in Toronto hope to stop the epidemic's spread. National Post [Internet]. 2017 Jan 8 [cited 2017 Oct 14]. Available from: nationalpost.com/news/toronto/fentanyl-crisis-moving-east-and-leaders-in-toronto-hope-to-stop-the-epidemics-spread
32. Howlett K, Robertson G. Health Canada to explore national plan to deal with opioid abuse. The Globe and Mail [Internet]. 2016 Apr 18 [cited 2017 Oct 14]. Available from: <https://www.theglobeandmail.com/news/national/health-canada-to-explore-national-plan-to-deal-with-opioid-abuse/article29672196/>
33. McElroy J. How decriminalizing drugs helped Portugal solve its overdose crisis. CBC News [Internet]. 2017 Feb 3 [cited 2017 Nov 26]. Available from: <http://www.cbc.ca/news/canada/british-columbia/portugal-drug-crisis-british-columbia-1.3962714>
34. Government of Canada. National report: apparent opioid related deaths (December 2017) [Internet]. 2017 [cited 2018 Jan 31]. Available from: <https://www.canada.ca/en/public-health/services/publications/healthy-living/apparent-opioid-related-deaths-report-2016-2017-december.html>

Confronting the disparity in nonmedical prescription opioid use among rural and urban youth: A call for broader recognition in the era of clandestine fentanyl

Perry Tompkins¹

Citation: UBCMJ. 2018; 9.2 (36-37)

Abstract

Nonmedical prescription opioid use (NMPOU) among Canada's rural youth is a public health problem largely overshadowed by the opioid crisis in metropolitan centres. In this commentary, the author explores the unique socioeconomic factors that underpin NMPOU among rural youth and draws attention to its potential to prime and promote exposure to increasingly prevalent clandestine fentanyl, often disseminated and disguised as common prescription opioids. In turn, the author argues for mitigating strategies to curb NMPOU, informed by greater awareness of the unique vulnerabilities of rural youth.

In 2017, the Canadian Institute for Health Information identified youth aged 15-24 as one of the fastest growing cohorts in terms of opioid-related hospitalization,¹ driven in part by the increasing prevalence of clandestine fentanyl, particularly in British Columbia and Alberta.^{2,3} While the urban impact of this phenomenon has been widely covered, the threat to Canada's rural communities has received less attention. This is concerning not only because of the relative undersupply of rural mental health and addictions treatment services compared to urban communities, but also owing to the higher prevalence of nonmedical prescription opioid use (NMPOU) among rural youth.⁴ As its name implies, NMPOU involves taking prescription opioids in any manner inconsistent with how they were prescribed or by a person for whom they were not prescribed; it can involve borrowing from friends or family, using higher-than-recommended doses, or pure recreational use.⁵ Apart from serving as a gateway to heroin,⁶ greater NMPOU may be priming Canadian rural youth to the threat posed by the spread of potent clandestine fentanyl, often masquerading as prescription pain medicine.⁷ Averting the attendant morbidity and mortality in rural communities will require broader recognition of the geographic disparity in NMPOU, which is also a prerequisite to developing viable public health responses.

Despite its potential impact, lack of awareness of greater NMPOU among rural youth is unsurprising given the recently emergent literature on geographic differences in prescription drug misuse. While rurality has been broadly identified as a risk factor for youth prescription drug misuse, including pain medication,^{8,9} the most direct evidence stems from a recent analysis of the 2011-12 U.S. National Survey on Drug Use and Health[†] by Monnat and Riggs, which identified a 35% greater adjusted odds of past-year NMPOU in rural versus urban youth.¹⁰ This parallels Canadian data from the 2011 Ontario Student Drug Use and Health Survey[‡], which identified a 95% greater adjusted odds of past-year NMPOU among rural female students in Ontario.¹¹ Explanations for the geographic disparity in youth prescription drug misuse, including NMPOU, generally invoke three related factors: 1) greater availability; 2) adverse economic drivers of use; and 3) social parameters that facilitate misuse.¹² In the first case, rural communities are often older demographically and more reliant on physically

demanding industries (e.g., agriculture or resource extraction).¹³ Both of these factors increase the prevalence of acute and chronic pain, for example via injury or chronic arthritis, resulting in greater overall medical opioid use and yielding opportunities for subsequent NMPOU through youth diversion.¹⁴ Also, greater use within rural populations may distort youth perception of the harms of prescription opioids, promoting normalization,¹⁵ and this may explain the earlier age of initiation noted in rural localities.¹⁶ Finally, it has been suggested that NMPOU within rural communities may be facilitated by more efficient circulation of diverted opioids, enabled by the close kinship networks less frequently found in urban settings.¹⁷

Beyond greater prescription opioid availability, economic determinants may drive NMPOU among rural youth. For example, Carpenter et al. recently noted that higher unemployment rates are associated with a greater incidence of opioid use disorder,¹⁸ and lower income status is a known risk factor for NMPOU.¹⁹ This is relevant as rural communities often exhibit higher unemployment rates,¹³ with geographic differences in financial stressors potentially driving differences in youth NMPOU. For example, relative to comparators, higher rates of depression, anxiety, and suicide have been noted among farming families in the U.S. struggling to maintain financial solvency and, in this context, youth NMPOU may represent a maladaptive coping strategy.²⁰ Moreover, when misuse evolves into dependence, limited financial means can undermine access to important harm reduction strategies. For example, while buprenorphine/naloxone (Suboxone®) and methadone hydrochloride (Methadose®) for opioid substitution are eligible for full coverage under B.C. Pharmacare, they are still subject to its deductible policy.²¹ As such, B.C. rural youth whose families do not qualify for income assistance, while still potentially financially constrained, must fund at least part of the costs of these treatments, potentially limiting access.

Apart from economic factors, unique aspects of rural life may promote NMPOU as a coping strategy for mental health adversities, or limit access to resources that might otherwise curb NMPOU. For example, data from the B.C. Adolescent Health Survey, administered every five years to youth in grades 7-12, indicate that rural youth are more likely to have family or friends that have attempted suicide, more

¹Cumming School of Medicine, University of Calgary, Calgary, AB, Canada

Correspondence:
Perry Tompkins (perry.tompkins@ucalgary.ca)

[†]The U.S. *National Survey on Drug Use and Health* is an annual survey of approximately 70,000 youth aged 12 and older.

[‡]The *Ontario Student Drug Use and Health Survey* is a biennial survey administered to Ontario students in grades 7-12.

likely to report problematic drinking, and are more likely to report a lack of mental health services in their community.²² Additionally, excessive idle time and boredom among rural youth has been identified as a driver of NMPOU, owing in part to limited extracurricular activities in their communities.²³ Perhaps most problematic, rural youth may avoid seeking treatment resources, even when available, for fear of being recognized by neighbours or due to cultural prohibitions on acknowledging vulnerability, rooted in small-town value systems.²⁴

With a fuller appreciation of possible social and economic determinants of rural NMPOU, mitigating strategies can be developed. For example, dedicated funding for life skills training programs in middle school might reduce rates of NMPOU among rural youth, a strategy proven effective in the United States.²⁵ In conjunction, delivering joint parental-adolescent education programs, which explore the harms of prescription drug misuse, might counteract normalization of NMPOU, further limiting its incidence.²⁶ Finally, expanding rural cultural competency training for Canadian medical learners, adapted from successful approaches in the U.S.,²⁷ might yield broader awareness of cultural drivers of NMPOU. This could position future rural physicians for earlier intervention. Ultimately, as Canada's opioid crisis continues to evolve, it's unlikely that rural NMPOU and related harms of clandestine opioids can be completely neutralized. Nevertheless, recognizing and counteracting the specific vulnerabilities of rural youth might keep a manageable problem from becoming an outright disaster.

References

1. Canadian Institution for Health Information. Opioid-related harms in Canada [Internet]. 2017 Sep [cited 2017 Nov 22]. Available from: <https://www.cihi.ca/sites/default/files/document/opioid-harms-chart-book-en.pdf>
2. BC Coroners Service. Fentanyl-detected illicit drug overdose deaths January 1, 2012 to September 30, 2017 [Internet]. 2017 Nov 9 [cited 2017 Nov 22]. Available from: <https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/death-investigation/statistical/fentanyl-detected-overdose.pdf>
3. Kalaichandran A. National Post. 'These drugs are killing our kids': Why teen brains are more vulnerable to fentanyl and opioid addiction [Internet]. 2017 Apr 21 [cited 2017 Nov 22]. Available from: <http://nationalpost.com/health/these-drugs-are-killing-our-kids-why-teen-brains-are-more-vulnerable-to-fentanyl-and-opioid-addiction>
4. McInnis OA, Young MM, Saewyc E, Jahrig J, Adlaf E, Lemaire J, Taylor S, Pickett W, Stephens M, Di Gioacchino L, Pica L, Levin D, Tonita A, Wang H, Xiong H. Urban and rural student substance use: technical report [Internet]. 2015 Sep [cited 2017 Nov 22]. Available from: <http://www.ccsa.ca/Resource%20Library/CCSA-Urban-Rural-Student-Substance-Use-Report-2015-en.pdf>
5. National advisory committee on prescription drug misuse. First do no harm: responding to Canada's prescription drug crisis [Internet]. 2013 Mar [cited 2017 Nov 27]. Available from: <http://www.ccsa.ca/Resource%20Library/Canada-Strategy-Prescription-Drug-Misuse-Report-en.pdf>
6. Palamar JJ, Shearston JA, Dawson EW, Mateu-Gelabert P, Ompad DC. Non-medical opioid use and heroin use in a nationally representative sample of US high school seniors. *Drug Alcohol Depend*. 2016 Jan 1;158:132-8.
7. Howlett K, Giovannetti J, Vanderklippe N, Perreux L. Globe and Mail. A killer high: how Canada got addicted to fentanyl [Internet]. 2016 Apr 8 [cited 2017 Nov 22]; Available from: <https://www.theglobeandmail.com/news/investigations/a-killer-high-how-canada-got-addicted-to-fentanyl/article29570025/>
8. Young AM, Glover N, Havens JR. Nonmedical use of prescription medications among adolescents in the United States: a systematic review. *J Adolesc Health*. 2012 Jul;51(1):6-17.
9. Pulver A, Davison C, Pickett W. Recreational use of prescription medications among Canadian young people: identifying disparities. *Can J Public Health*. 2014 Apr 16;105(2):e121-126.
10. Monnat SM, Rigg KK. Examining rural/urban differences in prescription opioid misuse among US adolescents. *J Rural Health*. 2016;32(2):204-18.
11. Fischer B, Ialomiteanu A, Boak A, Adlaf E, Rehm J, Mann RE. Prevalence and key covariates of nonmedical prescription opioid use among the general secondary student and adult populations in Ontario, Canada. *Drug Alcohol Rev*. 2013 May;32(3):276-87.
12. Rigg KK, Monnat SM. Urban vs. rural differences in prescription opioid misuse among adults in the United States: informing region specific drug policies and interventions. *Int J Drug Policy*. 2015 May;26(5):484-91.
13. Moazzami B. Strengthening rural Canada: fewer & older—the population and demographic dilemma in rural British Columbia [Internet]. 2015 Apr [cited 2017 Nov 26]. Available from: <http://strengtheningruralcanada.ca/file/Fewer-Older-The-Population-and-Demographic-Dilemma-in-Rural-British-Columbia1.pdf>
14. Cerdá M, Gaidus A, Keyes KM, Ponicki W, Martins S, Galea S, Gruenewald P. Prescription opioid poisoning across urban and rural areas: identifying vulnerable groups and geographic areas. *Addiction*. 2017 Jan;112(1):103-12.
15. Fleary SA, Heffer RW, McKyer ELJ. Understanding nonprescription and prescription drug misuse in late adolescence/young adulthood. *J Addict* [Internet]. 2013 Jan 28 [cited 2017 Nov 25]. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4007747/> DOI: 10.1155/2013/709207
16. Young AM, Havens JR, Leukefeld CG. A comparison of rural and urban non-medical prescription opioid users' lifetime and recent drug use. *Am J Drug Alcohol Abuse*. 2012 May;38(3):220-7.
17. Keyes KM, Cerdá M, Brady JE, Havens JR, Galea S. Understanding the rural-urban differences in nonmedical prescription opioid use and abuse in the United States. *Am J Public Health*. 2014 Feb;104(2):e52-9.
18. Carpenter CS, McClellan CB, Rees DI. Economic conditions, illicit drug use, and substance use disorders in the United States. *J Health Econ*. 2017 Mar; 52:63-73.
19. Saha TD, Kerridge BT, Goldstein RB, Chou SP, Zhang H, Jung J, Pickering RP, Ruan WJ, Smith SM, Huang B, Hasin DS, Grant BF. Nonmedical prescription opioid use and DSM-5 nonmedical prescription opioid use disorder in the United States. *J Clin Psychiatry*. 2016 Jun;77(6):772-80.
20. Rhew IC, Hawkins JD, Oesterle S. Drug use and risk among youth in different rural contexts. *Health Place*. 2011 May;17(3):775-83.
21. BC Ministry of Health—Medical Beneficiary and Pharmaceutical Subdivision. BC PharmaCare Newsletter Edition 17-001 [Internet]. 2017 Jan 18 [cited 2017 Nov 24]. Available from: <https://www2.gov.bc.ca/assets/gov/health/health-drug-coverage/pharmacare/newsletters/news17-001.pdf>
22. Smith A, Stewart D, Poon C, Peled M, Saewyc E, & McCreary Centre Society. From Hastings Street to Haida Gwaii: provincial results of the 2013 BC Adolescent Health Survey [Internet]. 2014 [cited 2017 Nov 24]. Available from: http://www.mcs.bc.ca/pdf/From_Hastings_Street_To_Haida_Gwaii.pdf
23. Pulver A, Davison C, Pickett W. Time-use patterns and the recreational use of prescription medications among rural and small town youth. *J Rural Health*. 2015;31(2):217-28.
24. Pullen E, Oser C. Barriers to substance abuse treatment in rural and urban communities: a counselor perspective. *Subst Use Misuse*. 2014 Jun;49(7):891-901.
25. Spoth R, Trudeau L, Shin C, Redmond C. Long-term effects of universal preventive interventions on prescription drug misuse. *Addiction*. 2008 Jul;103(7):1160-8.
26. Spoth R, Trudeau L, Shin C, Ralston E, Redmond C, Greenberg M, Feinberg M. Longitudinal effects of universal preventive intervention on prescription drug misuse: three randomized controlled trials with late adolescents and young adults. *Am J Public Health*. 2013 Apr;103(4):665-72.
27. Schuller KA, Amundson M, McPherson M, Halaas GW. An interprofessional programme to culturally sensitise students to the needs of patients and realities of practice in rural areas. *J Interprof Care*. 2017 May;31(3):410-2.

Houston, we have a doctor

Ciarán Galts¹

Citation: UBCMJ. 2018; 9.2 (38-39)

A clear majority of the universe remains unexplored to humans despite thousands of years of evolution and progress. Piece by piece, explorer after explorer, we go deeper, we learn more, and we remain inspired to keep pushing. A Canadian contribution to this realm of exceptional explorers is Dr. Robert Thirsk. Having spent more time in space than any other Canadian, Dr. Thirsk has done far more than the typical engineer or physician.

After growing up in British Columbia, and graduating from both the Massachusetts Institute of Technology (1978) and McGill University medical school (1982), he was accepted into the Canadian Space Agency (CSA) in 1983. He launched into orbit on two occasions as a Crew Medical Officer (CMO), the first time for 17 days in 1996, then for six months in 2009 on a mission to the International Space Station. Thirsk, who at 63 is the Chancellor at the University of Calgary, says he hopes to inspire the next generation of Canadian pioneers to dream big and help represent Canada in humanity's journey to Mars. We spoke to him recently about his incredible career.

Becoming an astronaut

When did you start thinking about being an astronaut?

It started when I was in grade three in Powell River, British Columbia. My teacher turned on the class radio one morning when the base-to-ground communication of the mission of John Glenn [the first American to circle the globe] was broadcasted. Our teacher told us all about space and astronauts. That really caught my attention and I decided, if I ever had the opportunity, I'd sure like to become an astronaut.

Then, many years later, I was finishing up rounds in a small community hospital in New Brunswick when I opened up the newspaper and saw a huge advertisement saying that the CSA was recruiting. I thought I had lots of the qualifications, but so did about 4000 other people. I applied and it was a long screening process but I was very fortunate at the end of 1983 to be selected.

How did your education affect your training?

I was in the first real cohort of astronauts so there was no real proper way of preparing medically for a career as an astronaut. Once you become an astronaut, you become a generalist and you should have the capability to do whatever is asked of you onboard a space ship. For example, when a medical doctor joins the astronaut program, certainly they'll be designated as a CMO, but they're also going to learn how to fly a high-performance jet, operate robotics, and read schematic diagrams. Similarly, a jet pilot is going to have to learn how to diagnose a hip fracture, start an IV, and manage a cardiopulmonary resuscitation session. So, everyone becomes cross-trained. Everyone becomes a generalist.

How is mental health screened for?

The astronaut profession is unlike any other job in the world. It really takes you to your mental, your physical, and your emotional limits. Some medical issues will exclude someone from spaceflight, like a history of schizophrenia or depression. In the selection process there are hours of testing and interviews from psychiatrists and psychologists to make sure that the person considered has got the right stuff. Then, you begin your training and there's a lot of training that's given for some of these soft

skills. In astronaut lingo, we call them "expeditionary behaviors." These are self-care, self-management, leadership, followership, teamwork, and cross-cultural sensitivity. Also, once you're in space, you can contact family and friends by radio every day and by video every week.

What space feels like

What does space feel like?

The feeling in space is a surreal and magical experience unlike anything that we've ever experienced on earth. Imagine what it's like to be superman to fly from point A to point B with no pressure around any part of your body. It takes a few days to adapt to moving around in the weightlessness. You learn how to move efficiently and how to avoid hurting yourself or your crew mates with stray elbows and knees. After a week or so, it becomes very graceful. We're like swans and it's like we were born up there. It's remarkable how quickly the human body can adapt to the new environment.

Physiologically how does it feel?

There's a lot of goofy stuff that happens to your body in a weightless environment. Within seconds of arriving in space you feel this headward redistribution of fluid from the sinuses and major veins of the legs and pelvis. Within an hour of arriving in space, you've got this congested feeling in your head. Looking in the mirror, your face looks rounder than it did on the ground, all the creases around your forehead are gone, and your jugular veins are constantly sticking out because your head is edematous. I didn't feel any headaches but some people do when they go up there.

In fact, data from NASA suggest that 71% of astronauts experience space headache. This has been attributed to alterations in blood and cerebrospinal fluid (CSF) flow in zero gravity environments.¹ A possible complication of these alterations may result from a relatively increased level of CSF diffusion posterior to the orbit causing papilledema and optic nerve sheath dilation.^{2,3} This can result in reduced visual acuity with prolonged exposure to zero gravity. While Dr. Thirsk was the first to experience this phenomenon, it has since occurred in multiple astronauts.¹

Just for fun, we marked our height against a wall because we increase in height by about 4-6 cm in space. Some people feel that as a persistent, dull lumbar pain. Also, in spite of the fact that we work out religiously for two hours every day with aerobic and muscle resistance while in space, we still lose our strength.

What did it feel like when you landed back on earth?

The first couple days were the toughest. Usually my blood pressure is about 120/80 but when I got back it was 80/60. Right away my flight surgeon gave me a liter of saline to try to get my blood pressure up. Also, when you're in space your vestibular apparatus is basically on vacation for six months. When I got back, the slightest motion like walking was very nauseating. My stance was very wide-based and I needed someone right next to me to hold me up. But after six weeks of rehab I felt normal again.

The rule of thumb for bone recovery is that for every month in space you need two months on the ground to recover the bone you've lost. This is monitored with bone density scans and it probably took me one-and-a-half years to get back to my preflight level. My vision didn't come back entirely. You would think that whatever happened in zero gravity would be reversible but a lot of people are still trying to figure out what's going on.

Data from NASA suggest a profound impact of weightlessness

¹MD Program, Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada

Correspondence
Ciarán Galts (galts@alumni.ubc.ca)

on bone strength with evidence of 10% of femur bone resorption after six months in flight.⁴ The rate of bone loss experienced by astronauts can be up to 10 times that of patients with osteoporosis here on Earth.⁴ Therefore, the use of typical pharmaceuticals for osteoporosis has been suggested for astronauts to enable a quicker recovery upon return to Earth.⁴

Being a doctor in outer space

What medical complications can happen without the pull of gravity?

I categorize them into groups according to the duration of the flight. On short duration flights of days or weeks, the main problems are motion sickness and cardiovascular deconditioning. On a long flight of approximately six months, the problems we deal with are bone demineralization and muscle atrophy. For very long missions, like a year's length, it's ionizing radiation and psychosocial implications of being in a confined environment.

What did you do as a doctor in space?

Like on any routine flight we took care of upper respiratory infections, gastritis, back pain, and motion sickness. We also continued to train for medical emergencies while in orbit. By funny coincidence on my second flight, the two medical doctors, including me, became hyperopic so we had vision problems. The two of us did visual acuity tests, electron ophthalmoscopy to take images of our retinas, and ultrasounds on our eyeballs and optic nerve sheaths. We had to have those skills to diagnose the problem and we were the first two people to experience it. It is a problem unique to long duration space flight and, since we flew, 12 others have been affected by it and they still don't know what the cause is. But once you're in space, there is not a whole lot they can do so they sent up a new prescription for reading glasses for us on the next shuttle flight.

How do people get sick in space?

One week prior to launch, astronauts go into quarantine in order to minimize the exposure to infectious agents. But quarantine doesn't always work and sometimes someone comes up to space harboring a viral respiratory infection. About halfway through my six-month stay, the shuttle came up and one crew member had a viral infection, and it went rampant throughout everyone immediately. It was remarkable. Studies have shown that lack of gravity impedes early T-cell activation and can lead to alterations in organization of cell cytoskeleton so we're kind of set up to get bad infections up there.

Consistent with Dr. Thirsk's experience, cell-mediated immunity is impaired in space. Specifically, zero gravity alters signaling for cytokine production and lymphocyte proliferation.⁵ However, confounding factors such as sleep disruption, neuroendocrine adaptations and stress associated with space flight cannot be overlooked as additional contributors to immunosuppression in space.⁵

What did you do in your spare time?

Getting together with other crewmates was one of my favorite things. We were an international crew representing five countries so the conversation was very global. It was a really nice time. It felt like you were part of humanity rather than a Canadian or a Vancouverite. My other favorite thing to do was looking down at the beautiful planet. If I knew that we would be flying over Canada, I would stop what I was doing for five minutes and look at the Canadian cities I used to live in. That was special.

Lessons learned in space and thoughts about Mars

What perspectives for you changed?

Number one, we need to be taking care of our planet so that it's a suitable place to live. We should also be doing a better job of fighting poverty which is easily visible from space. Finally, we should be thinking of going elsewhere in our solar system for the survival of humanity

because Earth is a single point failure. We have one accident on Earth and millions of years of evolution is wasted.

What needs to be done before we shoot off to Mars?

When I travel across Canada, everyone is asking about Mars, and I definitely think that's going to be the next major destination in space and Canada needs to be a part of that. But it's going to be a really difficult mission and a lot of the obstacles are not only engineering or financial, they are medical. I would not volunteer for a Mars mission until we address the issue of radiation shielding or therapeutics. The risk would be too high. A mission to Mars, even without a major solar flare, would expose you to the amount of radiation that would accumulate if you were on earth for over 300 years. So if I was in your shoes, I would focus on protection against ionizing radiation and looking at the social implications of long duration confinement. That would be a major role for Canada.

Mars is situated 50,000,000 km from Earth, a distance that NASA estimates would take 30 months to cover on a return mission.^{6,7} As Dr. Thirsk highlights, this much time in unprotected regions of space would expose astronauts to approximately 900 millisieverts of radiation, nearly twenty times the maximum allowable annual work-site exposure.^{8,9} This estimate does not include any exposure to galactic cosmic rays, which may occur in deep space with outstanding radiation levels.⁸

What is your message to the next generation of aspiring Canadian astronauts?

I always want to be out of my comfort zone and pushing a frontier. I've never defined myself as an astronaut. I've defined myself as an explorer and now I'm keeping pretty busy exploring.

Ideal jobs don't fall out the sky into your lap. You have to plan, you have to focus, you have to sacrifice, and you have to get a really good educational background. I want to get that message out to today's generation. Dream audacious dreams, not all dreams come true but the ones that do are truly fulfilling. When I was in university, the Apollo moon program was occurring and I thought my chances of being an astronaut were zero. I want people like you to dream about going to Mars. I want to make sure that Canada is well represented in the future human space missions to Mars in the next 20 years. We need to encourage Canadians to dare the impossible.

References

1. Berdahl JP, Yu DY, Morgan WH. The translaminal pressure gradient in sustained zero gravity, idiopathic intracranial hypertension, and glaucoma. *Med Hypotheses*. 2012 Dec 31;79(6):719-24.
2. Lawley JS, Petersen LG, Howden EJ, Sarma S, Cornwell WK, Zhang R, et al. Effect of gravity and microgravity on intracranial pressure. *J Physiol*. 2017 Mar 15;595(6):2115-27.
3. National Aeronautics and Space Administration. Space headaches [Internet]. 2017 [cited 2017 Nov 13]. Available from: https://www.nasa.gov/mission_pages/station/research/experiments/181.html
4. National Aeronautics and Space Administration. Preventing bone loss in space flight with prophylactic use of bisphosphonate [Internet]. 2012 [cited 2017 Oct 1]. Available from: http://www.nasa.gov/mission_pages/station/research/benefits/bone_loss.html
5. Sonnenfeld G, Butel JS, Shearer WT. Effects of the space flight environment on the immune system. *Rev Environ Health*. 2013 Jan-Mar;18(1):1-18.
6. Locke PA, Weil MM. Personalized cancer risk assessments for space radiation exposures. *Front Oncol*. 2016 Feb 22;6:38.
7. Cucinotta FA, Hu S, Schwadron NA, Kozarev K, Townsend LW, Kim MH. Space radiation risk limits and Earth-Moon-Mars environmental models. *Space Weather*. 2010 Dec 16;8(12).
8. National Aeronautics and Space Administration. NASA's journey to Mars [Internet]. 2014 [cited 2017 Oct 22]. Available from: <https://www.nasa.gov/content/nasas-journey-to-mars>
9. National Aeronautics and Space Administration. One year mission: About [Internet]. 2015 [cited 2017 Oct 28]. Available from: <http://www.nasa.gov/1ym/about>

Cannabis in Canada: What the upcoming legalization of one of Canada's most popular drugs means for young people

Braedon R. Paul¹

Citation: UBCM]. 2018: 9.2 (40-41)

With the Canadian legalization and regulation of cannabis slated for a debut no later than July 2018,¹ many Canadians are eagerly awaiting the day when one of Canada's most popular drugs^{2,3} can be legally purchased and consumed for recreational purposes. Bill C-45 [the Cannabis Act], introduced to the House of Commons in early 2017,⁴ is set to legalize and regulate the production, distribution, and sale of recreational cannabis across Canada, fulfilling an election promise made by the Liberal Party of Canada [LPOC] in 2015.⁵ Although many are in favour of the incoming legislation, an equally vocal group has expressed concern over its pitfalls, particularly those regarding the potential impacts on Canadian youth. Given what is currently understood about the effects of cannabis usage on adolescent health, these concerns are not unwarranted. However, when it comes to setting legal boundaries, the LPOC has stressed the importance of balancing such health concerns with other real-world considerations in the social and economic realms in order to most effectively protect Canadian youth.

Of the several concerns brought forward by opponents of the proposed Cannabis Act, perhaps most noteworthy is the listed minimum age of 18 for the use and purchase of cannabis,⁴ despite the recommended age of 21 from the Canadian Medical Association [CMA]. To justify their sub-21 age limit, the LPOC underlined the importance of striking a balance between the harms and benefits of stricter limits.

According to current evidence,⁶⁻⁸ exposure at too young an age risks harming the brain during crucial periods in development, with a mounting body of research suggesting risks to brain development persist until age 25.^{2,9} This includes risks of psychobehavioural nature, such as psychiatric illness and substance abuse disorders,^{6,9-11} which are largely related to reduced grey matter volume in brain regions linked to emotional and motivational processing.⁷ Indeed, current evidence from a number of studies has shown associations between earlier onset psychiatric illness and cannabis use.⁶ A causal relationship, however, is not unanimously supported, with some researchers arguing that demographic variables such as socioeconomic status may help explain the relationship,¹² further stressing the need for continued research and larger-scale longitudinal studies. Nonetheless, medical experts agree that delayed exposure to cannabis reduces risk of developmental harms.¹³

Perhaps more well-understood are the short-term health effects of cannabis use, which include impaired concentration, problem solving skills, attention span, working memory, and verbal fluency, among others.^{9,14} Clearly, such symptoms are likely to interfere with classroom learning and are thus exceptionally important to consider in adolescent populations. While these impairments are largely short-

term, some have shown residual effects lasting well beyond abstinence of cannabis use,¹⁴ particularly if chronic and heavy use was initiated in earlier adolescence. Additionally, chronic use of smoked cannabis has been associated with symptoms of chronic bronchitis and large airway inflammation, while the links between smoking cannabis and lung cancer have been suggested by some but not conclusively determined.¹⁵

If the age limit is set too high, however, illicit sales from organized crime groups, which currently reap an estimated \$7 billion annually in Canada alone,¹⁶ will continue to supply the underage market—a substantial concern given that Canadian youth are understood to be the highest young users of cannabis in the world³ and are more than double that of the general Canadian population.² Inevitably, such high cannabis use by Canadian youth will continue into the future regardless of legality, leaving cannabis-using youth at risk of criminal offence charges and a criminal record.

Despite the risks of using cannabis at a young age, even the CMA acknowledges that, although ideal, an age limit of 25 is less than feasible. Instead, they officially recommended a minimum age limit of 21, a figure aligned with the federal US age limit on recreational cannabis use.² Interestingly, however, the CMA's position was markedly less firm than that supported by the American Academy of Pediatrics [AAP], which continues to voice opposition to the ongoing legalization of cannabis in the remaining US states where the substance is still illegal.⁹ However, regardless of the AAP's firm stance, epidemiological data from a number of US studies suggests that cannabis use by minors has either remained the same or decreased following state legalizations of medical cannabis,^{17,18} with one study even demonstrating an increase in perceived harmfulness of cannabis among US eighth graders following the passage of medical cannabis laws.¹⁹ Nevertheless, results should be approached cautiously and without the use of blanket statements, as trends vary between US states and are thus unlikely to be entirely generalizable to Canadian youth. Considering the current data, however, the CMA's notably softer stance than its American counterpart is reasonably supported, especially given the negligible impact that a firm anti-cannabis position would have on the future of Bill C-45.

Acknowledging the inevitability of cannabis legislation, the CMA is instead focusing attention more proactively, with public health measures designed to minimize negative impacts of cannabis use.²⁰ Their recommendations include banning cannabis marketing and advertising, expanding access to support services such as mental health and substance abuse services, and introducing educational resources directed at youth and families.² In addition, the CMA has recommended limits be placed on cannabis quantity and potency for those under 25² in an effort to minimize exposure until brain development is no longer a risk factor. However, given the absence of these restrictions in the Cannabis Act, the onus will lie with provincial and territorial governments, raising concern over future complications surrounding inter-jurisdictional enforcement.

¹MD Program, Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada

Correspondence
Braedon Paul (braedon.paul@alumni.ubc.ca)

Ultimately, while the LPOC and the CMA have failed to come to terms on an age limit for cannabis legalization, both groups acknowledge the importance of ongoing public education for youth, families, and vulnerable populations. Clearly, the issue of cannabis legality and its potential impacts on Canadian youth is far from simple, requiring an interplay of prudent decision-making, dedicated research, and a myriad of real-world considerations to help maintain the delicate balance required to protect Canadian youth and clear the smoke on their continued use of cannabis.

References

1. Service Canada. Introduction of the Cannabis Act: questions and answers [Internet]. 2017 [cited 2017 Sep 29]. Available from: <https://www.canada.ca/en/services/health/campaigns/introduction-cannabis-act-questions-answers.html>
2. McLellan AA, Ware MA, Boyd S, Chow G, Jesso M, Kendall P, et al. A framework for the legalization and regulation of cannabis in Canada [Internet]. Task Force on Cannabis Legalization and Regulation. 2016 [cited 2017 Sep 29]. Available from: <http://www.parl.ca/DocumentViewer/en/42-1/bill/C-45/first-reading>
3. Adamson P. Child well-being in rich countries. 2013 [cited 2017 Sep 29]; Available from: http://www.unicef.ca/sites/default/files/legacy/imce_uploads/DISCOVER/OUR_WORK/ADVOCACY/DOMESTIC/POLICY_ADVOCACY/DOCS/unicef_report_card_11.pdf
4. Bill C-45: An Act respecting cannabis and to amend the Controlled Drugs and Substances Act, the Criminal Code and other Acts [Internet]. 2016. Available from: <http://www.parl.ca/DocumentViewer/en/42-1/bill/C-45/first-reading>
5. Liberal Party of Canada. A new plan for a strong middle class [Internet]. 2015 [cited 2017 Oct 1]. Available from: <https://www.liberal.ca/wp-content/uploads/2015/10/New-plan-for-a-strong-middle-class.pdf>
6. Large M, Sharma S, Compton MT, Slade T, Nielssen O. Cannabis use and earlier onset of psychosis. *Arch Gen Psychiatry*. 2011 Jun 6;68(6):555.
7. Battistella G, Fornari E, Annoni J-M, Chitoui H, Dao K, Fabritius M, et al. Long-term effects of cannabis on brain structure. *Neuropsychopharmacology*. 2014 Aug;39(9):2041–8.
8. James A, James C, Thwaites T. The brain effects of cannabis in healthy adolescents and in adolescents with schizophrenia: a systematic review. *Psychiatry Res Neuroimaging*. 2013 Dec 30;214(3):181–9.
9. Ammerman S, Ryan S, Adelman WP. The impact of marijuana policies on youth: clinical, research, and legal update. *Pediatrics*. 2015;135(3):e769–85.
10. Mayes LC, Suchman NE. Developmental pathways to substance abuse, in *Developmental Psychopathology* [Internet]. 2nd ed. Cicchetti D, Cohen DJ, editors. Hoboken, NJ, USA: John Wiley & Sons, Inc.; 2015 [cited 2017 Sep 29]. 599–619 p. Available from: <http://doi.wiley.com/10.1002/9780470939406.ch16>
11. Ellickson PL, Martino SC, Collins RL. Marijuana use from adolescence to young adulthood: multiple developmental trajectories and their associated outcomes. *Heal Psychol*. 2004;23(3):299–307.
12. Sevy S, Robinson DG, Napolitano B, Patel RC, Gunduz-Bruce H, Miller R, et al. Are cannabis use disorders associated with an earlier age at onset of psychosis? A study in first episode schizophrenia. *Schizophr Res* [Internet]. 2010 Jul [cited 2017 Nov 29];120(1–3):101–7. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/20471224>
13. Government of Canada. Task force on marijuana legalization and regulation [Internet]. 2016 [cited 2017 Oct 1]. Available from: <https://www.cma.ca/Assets/assets-library/document/en/advocacy/submissions/2016-aug-29-cma-submission-legalization-and-regulation-of-marijuana-e.pdf>
14. Crean RD, Crane NA, Mason BJ. An evidence based review of acute and long-term effects of cannabis use on executive cognitive functions. *J Addict Med* [Internet]. 2011 Mar [cited 2017 Nov 29];5(1):1–8. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/21321675>
15. Joshi M, Joshi A, Bartter T. Marijuana and lung diseases. *Curr Opin Pulm Med* [Internet]. 2014 Mar [cited 2017 Nov 29];20(2):173–9. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/24384575>
16. Government of Canada. Toward the legalization, regulation and restriction of access to marijuana: discussion paper [Internet]. 2016 [cited 2017 Oct 1]. Available from: <http://www.healthycanadians.gc.ca/health-system-systeme-sante/consultations/legalization-marijuana-legalisation/alt/legalization-marijuana-legalisation-eng.pdf>
17. Lynne-Landsman SD, Livingston MD, Wagenaar AC. Effects of state medical marijuana laws on adolescent marijuana use. *Am J Public Health*. 2013;103(8):1500–6.
18. Cerdá M, Wall M, Feng T, Keyes KM, Sarvet A, Schulenberg J, et al. Association of state recreational marijuana laws with adolescent marijuana use. *JAMA Pediatr* [Internet]. 2017;171(2):142. Available from: <http://archpedi.jamanetwork.com/article.aspx?doi=10.1001/jamapediatrics.2016.3624>
19. Keyes KM, Wall M, Cerdá M, Schulenberg J, O'Malley PM, Galea S, et al. How does state marijuana policy affect US youth? Medical marijuana laws, marijuana use and perceived harmfulness: 1991–2014. *Addiction* [Internet]. 2016 Dec [cited 2017 Nov 24];111(12):2187–95. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/27393902>
20. Canadian Medical Association. CMA statement – legalization of marijuana [Internet]. 2016 [cited 2017 Oct 1]. Available from: <https://www.cma.ca/En/Lists/Medias/cma-statement-legalization-of-marijuana.pdf>

MIND Speaks Up: An online platform for youth mental health

Meghan J. Smith¹, Eric Zhao¹, Connor Hawkins¹, Megan Lucey¹, Jordan Yeo¹, Kelly Zerr¹

Citation: UBCMJ. 2018; 9.2 (42-43)

Abstract

Mental health disorders are common and stigmatized health issues that often present during youth. Although effective prevention and treatment strategies exist, an estimated two-thirds of individuals with mental illnesses do not seek help, and stigma has been identified as a significant barrier. We developed *MINDSpeaksUp.com*, a website designed both to be a local resource for mental health and to lower the barrier to seeking help by reducing stigma. The website hosts videos featuring members of the University of British Columbia community sharing stories of their personal struggles with mental health. It also includes a portrait project, written submissions, and a resources tab.

MIND Speaks Up: <http://mindspeaksup.com/>

Facebook: Mental Illness Network for Destigmatization – MIND

Twitter: @ubcmedmind

Instagram: mindexperiences

Introduction

Canadians have a 20% lifetime risk of mental illness, yet only one in three seek treatment.¹ Among Canadian youth, 10-20% are affected by mental illness, with suicide among the leading causes of death.^{2,3} These rates are even higher for university populations, with 30% of students experiencing depressive symptoms.^{4,5} Given that mentally ill children and youth are particularly vulnerable, there exists a strong imperative to focus on child and youth mental health.⁶

Although more Canadian youth are using mental health care services than in the past, many factors still limit access.⁷ Lack of a regular family physician results in increased use of acute services for mental health.⁸ Low availability and funding for cognitive therapy imposes barriers to treatment,⁹ and nearly a third of Canadians seeking mental health care report unmet needs.¹⁰

Another barrier to the diagnosis and treatment of mental illness is stigma.^{11,12} According to a 2008 Canadian Medical Association report,¹³ 42% of Canadians would no longer socialize with a friend with a mental illness, and 84% would be unlikely to enter a spousal relationship with someone with a mental illness. Given this, it is unsurprising that 50% of Canadians reported they would not tell others about a family member's mental illness.¹³

The Speaks Up initiative

Social media provides an avenue for community-building amongst youth. Internet video, in particular, allows for personal discourse between content producers and viewers that can challenge stigma through empowerment and hope.¹⁴⁻¹⁶ Therefore, we developed a website through the Mental Illness Network for Destigmatization (MIND), a student club that promotes mental health awareness.¹⁷ *MINDSpeaksUp.com* aims to address the stigma surrounding mental illness by highlighting personal mental health experiences. The website is inspired by *Harvard Speaks Up*,¹⁸ and campaigns such as “In One Voice”¹⁹ and “It Gets Better”,²⁰ which have generated discussion surrounding experiences with mental illness. The mission of the project is to show viewers that they are not alone, to empower them to

seek assistance, and to speak openly.

MINDSpeaksUp.com features members of the University of British Columbia (UBC) community—students, alumni, faculty, and staff—sharing stories about their experiences through videos, photos, text, and artwork. Initial submissions were gathered through personal invitations to individuals and were incorporated into a launch trailer to generate excitement. Video submissions are typically brief and conclude with the message “Speak Up, You’re Not Alone.” Contributors film videos on any device, upload to their personal YouTube channel, and then submit the link through a submission page on the site. This process allows the contributor to retain content ownership and the freedom to remove the submission.

Because video can be an intimidating medium, MIND introduced additional ways to join the conversation. Participants can “Take the Pledge,” which involves a photo submission holding a sign pledging to be a mental health advocate. “MIND Experiences” is an Instagram platform allowing anonymous submissions on mental health-related topics.²¹ “MIND Portraits” profiles members of the community and their responses to questions about wellbeing, particularly in relation to the medical profession. The diversity of modalities improves inclusivity and reduces barriers to contribution.

Primary outcomes are assessed through website analytics evaluating uptake and engagement. In the first year of launch, *MINDSpeaksUp.com* was accessed 566 times by 414 unique users. These statistics represent viewership following website launch, and do not include repeat visits by authors and members of the development team. Traffic increased by 720% in the month when portrait photography was introduced, suggesting a correlation between viewership and new content. Visitors to the site come from across Canada and even as far away as the United Kingdom.

Presently, our efforts have been aimed at curating additional content for *MINDSpeaksUp* across all modalities. While a formal relaunch has not yet happened, the authors have been involved in developing curricular sessions on stigma delivered to medical students annually. The *Speaks Up* initiative is introduced to students at these sessions, providing an avenue to engage with our target audience. The project has also been presented at various mental health conferences.

¹MIND Program, Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada

Correspondence:
Meghan J. Smith (mjsmith@alumni.ubc.ca)

MINDSpeaksUp ultimately aims to provide a safe platform to foster community and encourage discussions around the experience of mental illness. This initiative specifically provides UBC students with an approachable, interactive medium for learning about mental health, along with information about appropriate resources, thus reducing barriers and allowing for earlier interventions. Similarly, members of the broader community may also benefit. Through its online format, *MINDSpeaksUp* has the potential to reach and inspire students at other universities. In November 2017, students at the University of Ottawa School of Medicine launched *UOMed Speaks Up* and have begun sharing portraits and stories, with plans to expand to other avenues.²²

Considerations for implementing a Speaks Up initiative

Based on our experience developing *MINDSpeaksUp*, we suggest the following timeline for those interested in starting a similar platform in their community:

- 2 months for production of an introductory video and for securing sponsorship to fulfill technical needs, including website development and maintenance fees
- 2-4 months for website development, including user experience testing
- 1 week for website launch events
- Ongoing need to collect video, photo, and written submissions
- Ongoing need to update resources and ensure links are usable
- An annual relaunch event may be beneficial to maintain viewership

Please note, *MINDSpeaksUp.com* does not provide immediate support or crisis intervention. It does, however, provide contact information for emergency medical services and local resources.

Conclusion

As mental health emerges as a global issue, the medical community is well positioned to take a leadership role. The prevalence of mental disorders in youth makes this an essential population to impart change. Through discussions on mental health, medical student groups, such as ours, help the public understand that mental health issues are universal medical disorders that can, and should, be treated promptly. This can be as involved as pharmacological therapies or psychotherapy, but can also be as simple as sharing a story. “Speak Up, You’re Not Alone.”

References

1. Corrigan PW, Druss BG, Perlick DA. The impact of mental illness stigma on seeking and participating in mental health care. *Psychol Sci Public Interest*. 2014 Oct;15(2):37-70.
2. Suicide among youth [Internet]. Centres for Disease Control and Prevention; 2017 [cited 2017 Sept 20]. Available from: <https://www.cdc.gov/healthcommunication/toolstemplates/entertainmented/tips/SuicideYouth.html>.
3. Making the case for investing in mental health in Canada [Internet]. Mental Health Commission of Canada; 2013 [cited 2017 Sept 21]. Available from: https://www.mentalhealthcommission.ca/sites/default/files/2016-06/Investing_in_Mental_Health_FINAL_Version_ENG.pdf
4. Rotenstein LS, Ramos MA, Torre M, Segal JB, Peluso MJ, Guille C, et al. Prevalence of depression, depressive symptoms, and suicidal ideation among medical students: a systematic review and meta-analysis. *JAMA*. 2016;316(21):2214-36.
5. Robinson A, Jubenville T, Renny K, Cairns S. Academic and mental health needs of students on a Canadian campus. *CJC*. 2016;50(2).
6. Gore FM, Bloem PJ, Patton GC, Ferguson J, Joseph V, Coffey C, et al. Global burden of disease in young people aged 10–24 years: a systematic analysis. *Lancet*. 2011;377(9783):2093-102.
7. Gandhi S, Chiu M, Lam K, Cairney J, Guttmann A, Kurdyak P. Mental health service use among children and youth in Ontario: population-based trends over time. *Can J Psychiatry*. 2016;61(2):119-24.
8. Toward quality mental health services in Canada: a comparison of performance indicators across 5 provinces [Internet]. Simon Fraser University; 2017 [cited 2017 Sept 19]. Available from: https://www.sfu.ca/carmha/publications/prov_indic_2017.html
9. Payne KA, Myhr G. Increasing access to cognitive-behavioural therapy (CBT) for the treatment of mental illness in Canada: a research framework and call for action. *Healthc Policy*. 2010;5(3):e173-85.
10. Tracking access to psychiatric care needed to chart a way forward say psychiatrists [Internet]. Canadian Psychiatric Association; 2015 [cited 2017 Sept 20]. Available from: <https://www.cpa-apc.org/tracking-access-to-psychiatric-care-needed-to-chart-a-way-forward-say-psychiatrists/>.
11. Stigma and Discrimination [Internet]. Mental Health Commission of Canada; 2017 [cited 2017 Sept 20]. Available from: <https://www.mentalhealthcommission.ca/English/focus-areas/stigma-and-discrimination>.
12. Clement S, Schauman O, Graham T, Maggioni F, Evans-Lacko S, Bezborodovs N, et al. What is the impact of mental health-related stigma on help-seeking? A systematic review of quantitative and qualitative studies. *Psychol Med*. 2015;45(1):11-27.
13. Annual Report 2008–2009 [Internet]. CMHA, Ontario; 2009 [cited 2017 Sept 21]. Available from: <http://ontario.cmha.ca/wp-content/uploads/2016/10/cmhaannualreport20082009.pdf>
14. Highton-Williamson E, Priebe S, Giacco D. Online social networking in people with psychosis: A systematic review. London, England: SAGE Publications; 2015. p. 92-101.
15. Naslund JA, Grande SW, Aschbrenner KA, Elwyn G. Naturally occurring peer support through social media: The experiences of individuals with severe mental illness using YouTube. *PLoS One*. 2014;9(10):e110171.
16. Naslund JA, Aschbrenner KA, Marsch LA, Bartels SJ. The future of mental health care: peer-to-peer support and social media. *Epidemiol Psychiatr Sci*. 2016;25(2):113-10.
17. MIND Speaks Up at UBC [Internet]. MIND; 2017 [cited 2017 Sept 22]. Available from: <http://mindspeaksup.com>.
18. Harvard Speaks Up [Internet]. Harvard Student Mental Health Liaisons; 2017 [cited 2017 Sept 22]. Available from: <http://www.harvardsmhl.org/harvardspeaksup/>.
19. In One Voice [Internet]. mindcheck.ca; 2012 [cited 2017 Sept 22]. Available from: <https://mindcheck.ca/inonevoice>.
20. It Gets Better Project [Internet]. It Gets Better Project; 2017 [cited 2017 Sept 22]. Available from: <https://www.youtube.com/user/itgetsbetterproject>.
21. MIND Experiences [Internet]. MIND; 2017 [cited 2017 Sept 22]. Available from: <https://www.instagram.com/mindexperiences/>.
22. UOMed Speaks Up [Internet]. UOMed Speaks Up; 2017 [cited 2017 Sept 22]. Available from: <https://www.facebook.com/UOMEDSpeaksUp/>.

SCOPE and the Live 5–2–1–0 initiative – implementation and impact of a community based participatory project on childhood obesity prevention

Clark J. Fruhstorfer¹

Citation: UBCMJ. 2018; 9.2 (44-45)

Abstract

Childhood obesity is a wide-spread problem often accompanied by an array of co-morbidities influencing the quality of life of children. Addressing this issue, Sustainable Childhood Obesity Prevention through Community Engagement (SCOPE) was established as a community-based participatory organization to disseminate an interdisciplinary, multi-sided prevention initiative — referred to as the Live 5–2–1–0 initiative. Since its inception, Live 5–2–1–0 has formed numerous partnerships with local community organizations to implement programs and activities to engage children across British Columbia. Moreover, the impact of SCOPE within communities has been facilitated on an individual level in the form of ‘champions’, or local stakeholders/coordinators who maintain Live 5–2–1–0 momentum. Taken together, the Live 5–2–1–0 initiative represents a movement that has demonstrated an outstanding ability to engage individuals within communities to work together to improve child health.

Introduction

Physiological diseases typically observed in adulthood have become increasingly commonplace in obese children — examples include diabetes, cardiovascular disease, and cancer.¹ Moreover, many social and psychological illnesses have been shown to be rising in prevalence due to childhood obesity.² These illnesses impact childhood well-being, thereby disadvantaging the child early in life. These challenges extend beyond the individual and into society by increasing demands on healthcare expenditure and resources. To complicate matters, traditional treatment strategies (e.g., short-term behavior therapies, pharmacologic treatments, or bariatric surgery) for obese children have been shown to be largely ineffective, thereby necessitating preventative strategies.³ As such, childhood obesity has been identified as a complex public health problem in need of a strategic, multi-focused, and interdisciplinary preventative approach.

Community-Based Participatory Research (CBPR) is a partnership-based approach to disease prevention and health promotion between community members, public health officials, and researchers. The equitable sharing of information between stakeholders from diverse backgrounds amounts to a robust knowledge-base that is well equipped to investigate public health issues. In addition to local studies demonstrating the benefits of CBPR on other public health issues, international studies have identified it as an effective approach to tackling the complexity of childhood obesity.⁴⁻⁶ Based on these revelations, SCOPE (Sustainable Childhood Obesity Prevention through Community Engagement) was created to translate CBPR-based principles to local prevention strategies for childhood obesity.

SCOPE—Overview, Implementation/Principals, and Impact Overview

SCOPE (www.live5210.ca) represents the backbone organization of the Live 5–2–1–0 initiative. It is rooted in CBPR-based childhood obesity prevention strategies in a manner that partners with communities across British Columbia (BC) to promote healthy living in children.

Central to the organization, and based out of BC Children’s Hospital, is the SCOPE team. The team works to coordinate, coach, and support community members and stakeholders—which includes local mayors, city council, school administrators, and health care professionals—in an effort to disseminate the Live 5–2–1–0 initiative.⁷

Live 5–2–1–0 Initiative

Live 5–2–1–0 is a SCOPE initiative that integrates all members of a community to advocate for healthy behaviors in children.⁷ Part of the initiative is the evidence based, easy to understand Live 5–2–1–0 message, which stands for the following daily lifestyle recommendations: five or more fruits/vegetables, two hours or less of screen time, one hour of physical activity, and zero drinks high in sugars. This message originated from the report of the Childhood Obesity: Assessment, Prevention, and Treatment Expert Committee,⁸ a publication that reviewed evidence-based healthy living recommendations from scientists and clinicians from over 15 professional organizations. Since its publication, the findings have been formally endorsed by the Canadian Pediatric Society and integrated into local obesity prevention strategies as the Live 5–2–1–0 message.

SCOPE and Live 5–2–1–0 Implementation

SCOPE functions as a ‘Collective Impact’ model, which is defined as a “long term commitment of a group of important actors from different sectors to a common agenda for solving a specific societal problem.”⁹ The model is composed of five key pillars: 1) common agenda; 2) mutually reinforcing activities; 3) continuous communication; 4) backbone support organization; and 5) shared measurement system.

With the support of SCOPE, the Live 5–2–1–0 initiative was implemented in two phases. Phase I (2009–2012) piloted the program in two large communities, mapped community resources, engaged community members, and implemented initiatives. Phase II (2012–2014) strengthened existing programs by identifying needs and how best to address them.

A key principle to the successful implementation of the Live 5–2–1–0 initiative has been the need for knowledge translation and exchange (KTE).¹⁰ This refers to a linking system such that the SCOPE Central

¹MD Program, Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada

Correspondence:
Clark J. Fruhstorfer (clarkf1986@gmail.com)

Team supplies community-tailored, evidence based information and resources to community coordinators and stakeholders for the purpose of influencing local organizations. This provides a supportive setting for communities to implement and fine-tune their efforts toward childhood obesity prevention. In addition, SCOPE works to connect coordinators and stakeholders from one community to those from another through workshops, quarterly webinars, and an online 'Live 5-2-1-0 Resource Map' (www.live5210/resource).⁷ Taken together, engagement within and outside communities ultimately targets childhood obesity from multiple angles.

SCOPE Impact

The impact of SCOPE can be described based on three levels: provincial, community, and individual.

Provincially, an increasing number of communities across BC have prioritized childhood obesity and sought the support of SCOPE. Specifically, during Phase II of implementation, one such community, familiar with a longer-standing SCOPE community, approached the SCOPE team for inclusion in the initiative.¹¹ This demonstrated two important points: first, the inherent desire of some communities to improve childhood health, and second, the "spill-over" of Live 5-2-1-0 initiatives from one community to another. In addition, interest from other communities has continued to grow. New partnerships have formed with communities such as Delta, New Westminster, Maple Ridge, Nanaimo, Comox Valley, and the Tri-Cities area.¹¹ These new partnerships have increased demand on Live 5-2-1-0 resources, evidenced by expanded site visits, increased unique website users from over 68 communities across BC, and more than 26,000 Live 5-2-1-0 resource downloads.¹¹

On a community level, an indicator used to measure progress and impact of Live 5-2-1-0 has been the number of new partnerships formed with local organizations, and progression of these organizations from action-planning to action-implementation.⁷ Abbotsford, which formed a partnership with SCOPE in 2009 and is the longest-standing community partner, has experienced a consistent increase in the number of local partnerships and a significantly increased number of actions performed by these organizations. This has also been observed in other communities, including Chilliwack, Kimberly, and Hope.⁷ Additionally, over 40,000 copies of Live 5-2-1-0 resources have been distributed to local partners in Abbotsford, Chilliwack, and Kimberly.¹¹ Taken together, these developments illustrate growth in the reach of the Live 5-2-1-0 message.

Finally, a key factor in the success of SCOPE's Live 5-2-1-0 initiative has been its ability to engage individuals — referred to as 'Champions' — that maintain local stakeholder involvement and community momentum.¹⁰ These individuals, who are typically leaders of local or regional organizations, or local family physicians, communicate with the SCOPE central team to provide valuable information on the needs and challenges of each community. With this information, the SCOPE team advises and supports these champions to advance the Live 5-2-1-0 initiative.

SCOPE Future Directions

Evaluating the impact of the Live 5-2-1-0 initiative on incidence of childhood obesity in participating communities has been challenging due to SCOPE's limited funding and the time required to achieve population-level or system-wide change. Measurement of individual physiological indicators (e.g., BMI) in children at a population level is a complex, costly, and ethically controversial undertaking that is further complicated by a lack of baseline data in BC for this population. Up to this point, data collection has largely been focused on process indicators, which have illustrated the initiative's success in sustained community engagement, capacity-building, and implementation of action. However, demonstrating health behavior change in children due to the Live 5-2-1-0 initiative remains a future priority. The SCOPE team is currently investigating the possibility of utilizing existing infrastructure for primary data collection and evaluation of changes in daily healthy behaviours in children related to the Live 5-2-1-0 recommendations.¹⁰

Conclusion

The Live 5-2-1-0 Initiative was implemented in response to the rising problem of childhood obesity in British Columbia. Key to its success has been the formation of partnerships between the SCOPE team and local community organizations, stakeholders, and champions. The ability of communities to track their progress via an online Partnership Tracking Tool has shown a growth in the reach of the Live 5-2-1-0 message both locally and provincially. Further, this tool has shown an increase in the number of actions implemented by communities at the policy, practice, and environmental levels to create healthier environments for children. To this end, the Live 5-2-1-0 initiative is increasingly becoming a movement that resonates with community members across the province.

References

1. McCambridge T, Bernhardt D, Brenner J, Congeni J, Gomez J, Gregory A, et al. Active healthy living: prevention of childhood obesity through increased physical activity. *Pediatrics*. 2006 Sep;117(5):1834-42.
2. Rankin J, Matthews L, Cobley S, Han A, Sanders R, Wiltshire H, et al. Psychological consequences of childhood obesity: psychiatric comorbidity and prevention. *Adolesc Health Med Ther*. 2016 Nov;7:125-46.
3. Whitlock E, O'Connor E, Williams S, Beil T, Lutz K. Effectiveness of weight management programs in children and adolescents. *Evid Rep Technol Assess*. 2008 Sep;170:1-308.
4. Zani B, Cicognani E. Evaluating the participatory process in a community-based health promotion project. *J Prev Interv Community*. 2010 Oct;38(1):55-69.
5. Naqshbandi M, Harris S, Macaulay A, Comeau J, Piche J, Montour-Lazare D. Lessons learned in using community-based participatory research to build a national diabetes collaborative in Canada. *Prog Community Heal Partnersh*. 2011 Dec;5(4):405-15.
6. Swinburn B, Malakellis M, Moodie M, Waters E, Gibbs L, Millar L, et al. Large reductions in child overweight and obesity in intervention and comparison communities 3 years after a community project. *Pediatr Obes*. 2014 Dec;9(6):455-62.
7. Amed S, Naylor PJ, Pinkney S, Shea S, Masse LC, Berg S, et al. Creating a collective impact on childhood obesity: lessons from the SCOPE initiative. *Can J Public Health*. 2015 Oct;106(6):426-33.
8. Barlow S. Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: summary report. *Pediatrics*. 2007 Dec;120(Supplement):S164-92.
9. Kania J, Kramer M. Collective impact. *Stanford Soc Innovation Rev*. 2011 Winter; 36-41.
10. Amed S, Shea S, Pinkney S, Higgins JW, Naylor PJ. Wayfinding the live 5-2-1-0 initiative—at the intersection between systems thinking and community-based childhood obesity prevention. *Int J Environ Res Public Health*. 2016 Jun;13(6):1-16.
11. Sustainable Community Obesity Prevention Through Community Engagement. British Columbia's Live 5-2-1-0 initiative: communities working collectively to raise healthy kids—report on achievements 2009-2016 [Internet]. 2016 Aug. Available from: http://www.live5210.ca/wp-content/uploads/2014/01/SCOPE_Summary-Report-2016_Final.pdf

Can mobile applications improve non-adherence in diabetes management?

Sewon Bann¹

Citation: UBCMJ. 2018; 9.2 (46-47)

Diabetes has remained a silent yet dangerous epidemic for decades, with nearly 7% of the Canadian population diagnosed as of 2015.¹ Though advances in drug development, medical technology, and physician education make it possible for many patients to prevent and manage diabetes, there is a discordance between medical knowledge and clinical outcomes. An estimated half of Canadian patients fail to meet hemoglobin A1c targets, suggesting a high rate of non-adherence to recommended treatments.^{2,3,4} In response to such concerns, mobile applications (apps) for patients with diabetes have emerged with the goal of simplifying diabetes management. The Google Play Store alone lists over a thousand diabetes apps, and this number is projected to increase.^{5,6} With the revolutionary integration of smartphone apps into our daily lives in the past decade, such apps offer the promise of making diabetes management more approachable and of improving treatment adherence.

Perhaps what has drawn 4.1 million users⁷ to the diabetes app market is the convenience and clarity that the apps offer to diabetes self-management. A typical recommended regimen for patients with diabetes consists of diet and exercise, appointments, self-monitoring, and more⁸ in the context of other daily priorities—a daunting responsibility considering the devastating consequences of diabetes left untreated.^{9,10} Adolescents with type 1 diabetes who are already undergoing physical and psychological transition can find these responsibilities especially disruptive.¹¹ Since the mainstay of diabetes treatment lies in the motivation and availability of patients to implement the physician's recommendations,^{3,12} patients can experience stress and frustration when these tasks become overwhelming.¹³ Diabetes apps can help alleviate this tension by simplifying multiple domains of diabetes management into one platform and by relieving patients of some of the pressures of making their own health-related decisions.

The current diabetes app market consists of roughly two categories. The first includes tracking/monitoring apps such as MyNetDiary, BGMonitor, and Glucose Buddy, which allow users to record their blood glucose, exercise, carbohydrate intake, and medication regimens in visually appealing pie charts and trend graphs.⁵ Some “gamify” treatments with virtual points to encourage users to achieve personal goals.^{5,14} The second category of apps have support/feedback, data transfer, and social media features in addition to tracking/monitoring features. These apps, which include Health2Sync, MySugr, and SocialDiabetes, provide timely advice in response to blood glucose levels. Some allow import of data from insulin pumps or fitness devices (e.g., Fitbit) and export of data to physicians. Many also feature community boards and messaging systems to help patients connect to other patients and family members.^{5,15,16}

Features such as visual graphs, personalized feedback, and gamification can encourage patients to reflect on their progress

and develop intrinsic motivation, thereby improving treatment adherence.^{14,17,18,19} These tools offer opportunities especially for youth with diabetes, for whom analog monitoring methods have proven suboptimal due to high error rates, lack of data, and discontinuity of real-time feedback and motivation.¹⁴ Furthermore, improved data availability to physicians and timely feedback can provide better opportunities for patient education and reduce patient anxiety over fluctuations in blood glucose.²⁰

Of course, the rise of mobile diabetes apps is not without concern—those apps that do not follow clinical guidelines pose potential danger to patients.²¹ In response to these concerns, some researchers and health care professionals (HCPs) have developed their own apps. Diabetes in Check and MyBCD, developed here in B.C. by the multidisciplinary team at BC Diabetes, are two examples. In addition to the monitoring, feedback, gamification, and social media features of other apps, these apps allow patients to message nurse case managers or certified diabetes educators directly from their phones.^{5,15} This personalized and accessible expert care paradigm can potentially further encourage patient adherence by cultivating a stronger sense of support and empowering patients to openly communicate realistic expectations with their HCPs.

Though more research is needed in this rapidly growing field, existing studies show improved blood glucose measures and patient satisfaction, demonstrating the potential of mobile apps to aid in diabetes management.^{6,14,17,22} Evident in their high user ratings, mobile diabetes apps are already helping millions of users better integrate diabetes self-management into their everyday lives.⁵ With continued development and ongoing HCP support, these apps have the potential to empower patients via an evolution from expert-led care to that of patient-physician collaboration, fostering motivation and responsibility. In effect, mobile applications may themselves be a treatment for the issue of non-adherence in diabetes and have the potential to greatly benefit the millions of Canadians living with this condition.

References

1. Statistics Canada. Health Fact Sheets: Diabetes, 2015 [Internet]. Government of Canada. 2015 [cited 2017 10 14]. Available from: <http://www.statcan.gc.ca/pub/82-625-x/2017001/article/14763-eng.htm>
2. Braga M, Casanova A, Teoh H, Dawson KC. Treatment gaps in the management of cardiovascular risk factors in patients with type 2 diabetes in Canada. *Can J Cardiol*. 2010 Jun 1;26:297-302.
3. Funnell MM, Anderson RM. The Problem with Compliance in Diabetes. *JAMA*. 2000 Oct 4;284:1709.
4. McCrate F, Godwin M, Murphy L. Attainment of Canadian Diabetes Association recommended targets in patients with type 2 diabetes: a study of primary care practices in St John's. *Can Fam Physician*. 2010 Jan;56:e13-9.
5. Hood M, Wilson R, Corsica J, Bradley L, Chirinos D, Vivo A. What do we know about mobile applications for diabetes self-management? A review of reviews. *J Behav Med*. 2016 Dec;39:981-94.
6. Ristau RA, Yang J, White JR. Evaluation and Evolution of Diabetes Mobile Applications: Key Factors for Health Care Professionals Seeking to Guide Patients. *Diabetes Spectr*. 2013 Sep;26:211-215.
7. Jahns, R-G. Research 2 Guidance [Internet]. The addressable market for diabetes apps in 2016 has increased to 135.5M potential app users (diagnosed diabetics), out of which 4.1M are active users. 2017 [cited 2017 Dec 12]. Available from: <https://research2guidance.com/the-addressable-market-for-diabetes-apps-in-2016-has-increased-to-135-5m-potential-app-users-diagnosed-diabetics-out-of-which-4-1m-are-active-users/>

¹MD Program, Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada

Correspondence
Sewon Bann (sewonb@gmail.com)

8. Harris SB, Petrella RJ, Leadbetter W. Lifestyle interventions for type 2 diabetes. Relevance for clinical practice. *Can Fam Physician*. 2003;49:1618.
9. Brown, JB, Nichols, GA, & Perry, A. The burden of treatment failure in type 2 diabetes. *Diabetes Care*. 2004 Jul;27(7):1535-40.
10. Fowler MJ. Microvascular and macrovascular complications of diabetes. *Clin Diabetes*. 2008 Apr;26(2):77-82.
11. Faulkner MS. Quality of life for adolescents with type 1 diabetes: parental and youth perspectives. *Pediatr Nurs*. 2003 Sept-Oct;29:362-8.
12. Russell LB, Suh D, Safford MA. Time requirements for diabetes self-management: too much for many? *J Fam Practice*. 2005 Jan;54:52-6.
13. Debono M, Cachia E. The impact of diabetes on psychological well-being and quality of life. The role of patient education. *Psychol Health Med*. 2007 Oct;12(5):545-55.
14. Cafazzo JA, Casselman M, Hamming N, Katzman DK. Design of an mHealth app for the self-management of adolescent type 1 diabetes: a pilot study. *J Med Internet Res* 2012 May 8;14(3):e70.
15. Goyal S, Cafazzo JA. Mobile phone health apps for diabetes management: current evidence and future developments. *QJM* 2013 Dec;106(12):1067-9.
16. Healthline. Healthline Media. The Best Diabetes Apps of 2017 [Internet]. 2017 [cited 2017 Dec 13]. Available from: <https://www.healthline.com/health/diabetes/top-iphone-android-apps>
17. Quinn CC, Shardell MD, Terrin ML, Barr EA, Ballew SH, Gruber-Baldini AL. Cluster-randomized trial of a mobile phone personalized behavioral intervention for blood glucose control. *Diabetes Care*. 2011 Sep;34(9):1934-42.
18. Miller AS, Cafazzo JA, Seto E. A game plan: Gamification design principles in mHealth applications for chronic disease management. *Health Informatics J*. 2016 Jun;22(2):184-93.
19. Rose, K. J., M. Koenig, and F. Wiesbauer. Evaluating success for behavioral change in diabetes via mHealth and gamification: MySugr's keys to retention and patient engagement. *Diabetes Technol Ther*. 2013 Feb 1;15(2):a114.
20. Bonoto B, de Araujo V, Godoi I, de Lemos LL, Godman B, Bennie M, et al. Efficacy of Mobile Apps to Support the Care of Patients With Diabetes Mellitus: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *JMIR Mhealth and Uhealth*. 2017 Mar 1;5(3):e4.
21. Huckvale K, Adomaviciute S, Prieto JT, Leow MK, Car J. Smartphone apps for calculating insulin dose: a systematic assessment. *BMC Med*. 2015 May 6;13:106.
22. Jo I, Yoo S, Lee DY, Park C, Kim EM. Diabetes Management via a Mobile Application: a Case Report. *Clin Nutr Res*. 2017 Jan;6(1):61-7.

A future beyond insulin injections? Regenerative medicine for type 1 diabetes

Sepehr Kamal¹

Citation: UBCMj. 2018; 9.2 (48-49)

For people with type 1 diabetes, frequent blood glucose measurements and insulin injections are a part of daily life. While immensely beneficial, this is unfortunately an imperfect, time-consuming treatment with its own inherent risks. Over the last two decades, researchers have made significant strides in the development of alternative cell-based therapies that have the potential to circumvent the need for insulin injections. In particular, stem cells may be able to provide an infinite supply of insulin-producing cells for use in transplant therapies. Fierce pursuit of this technology is underway by research groups at academic institutions and biotechnology companies. These groups hope to apply regenerative medicine to type 1 diabetes, with the first clinical trials now in progress in Canada and the United States.

Background

In Canada, approximately 300,000 people are living with type 1 diabetes.¹ The most common age of onset is ten years old; however, onset can be at any age.² The condition is characterized by autoimmune destruction of insulin-producing pancreatic beta cells, leading to dysregulation of glucose homeostasis.³ Beta cells are present in the pancreas in clusters of endocrine cells known as pancreatic islets. In humans, remarkably only approximately 1.3 grams of beta cells are responsible for regulating blood glucose for the whole body.⁴ The small number of essential beta cells presents type 1 diabetes as an attractive target for cell replacement therapies.

Insulin-based therapies

Type 1 diabetes was not always managed by insulin injections. Canadian scientists Frederick Banting and Charles Best's discovery of insulin in 1922 led to the emergence of this treatment. Before their discovery, children who developed type 1 diabetes typically only lived for one to two years after diagnosis.⁵ It is not an overstatement to say insulin injections have saved millions of lives.

However, insulin injections fall short of a cure. Among other challenges, quality of life is impaired, and over-administration of insulin can lead to life-threatening hypoglycemia. Newer products such as insulin-pumps and long-acting insulins are addressing some of the limitations of insulin injections, though even with these products a meticulous patient cannot achieve the ultimate goal of diabetes therapy: perfect regulation of blood glucose levels.⁶ Therefore, the risk of long-term complications such as cardiovascular disease, neuropathy, and nephropathy cannot be fully eliminated by current insulin replacement therapies. Nevertheless, in 2016 the Food and Drug Administration (FDA) approved the first ever "artificial pancreas", a hybrid closed-loop insulin delivery system, for patients aged 14 and up.⁷ This system monitors blood glucose and automatically administers insulin; however, it still requires users to input details about upcoming meals. Another therapeutic avenue under research is gene-based therapy. Gene-based therapies primarily involve *in vivo* viral delivery of genetic material to coax

non-beta cells into producing insulin.⁸ However, this approach is limited by the inability to perform controlled, multistep cell reprogramming as could be performed *in vitro*.

Regenerative medicine therapies

The idea to directly replace lost pancreatic beta cells, instead of lost insulin, drove research at the University of Alberta in 1990s. This led to the development of the Edmonton Protocol. The Edmonton Protocol is a method to isolate pancreatic islets from a cadaveric organ donor and transplant them into a type 1 diabetes patient. This method has proven successful, with approximately 50% of patients remaining insulin-independent at five years post transplant.^{9,10} While this method is limited by the scarcity of donors and challenges such as the need for immunosuppressive drugs, it has established a precedent for cell-based diabetes therapies.

Building on this precedent, stem cells have the potential to serve as an alternative source of pancreatic beta cells for cell-based therapies.¹¹ The generation of beta cells from human stem cells is challenging, however, with the *in vitro* development of true beta cells remaining elusive.^{12,13} The most recent major breakthroughs came in 2014, when two research groups in Canada and the United States independently published for the first time evidence of glucose-responsive insulin production in cells derived from stem cells.^{14,15} These derived cells notably lacked several characteristics of human beta cells, such as the ability to rapidly turn off insulin production once glucose levels dropped. Nevertheless these "beta like" cells rapidly reversed diabetes when implanted into diabetic mice.

It remains unclear whether true beta cells are required for reversal of diabetes in humans, or whether insulin-producing "beta like" cells are sufficient.⁸ ViaCyte, a clinical stage biotechnology company based in California, is using the latter strategy to differentiate allogeneic human embryonic stem cells into pancreatic progenitor cells, which are developmental precursors to beta cells. These pancreatic progenitor cells are loaded into a device for subcutaneous implant into a patient, anticipating final maturation of the cells to occur *in vivo*.^{11,16} In 2014 this group launched a combined phase 1 and 2 clinical trial to evaluate the safety and efficacy of this therapy.¹⁷ The trial is run from several locations, including the University of California San Diego and the University of Alberta, with the goal to treat over 50 patients. For now, this trial is limited to adults who have been living with a diagnosis of type 1 diabetes for several years. However, as their implantation device circumvents the need for immunosuppressive drugs, a similar therapy could eventually be suitable for youth as well.¹⁸ More recently, ViaCyte has launched a second clinical trial to test an alternative non-immunoprotective device for cell delivery, tailored for patients at high risk for severe hypoglycemic episodes.¹⁹ The University of British Columbia (UBC) is participating in this second trial, led by UBC endocrinologist Dr. David Thompson and based on research pioneered by UBC professor Dr. Timothy Kieffer.

While the results of these trials are awaited, researchers are also working to address other challenges associated with cell transplantation. In California, ViaCyte is employing cell encapsulation, a technique to

¹Genome Science and Technology MSc Program, University of British Columbia, Vancouver, BC, Canada

Correspondence
Sepehr Kamal (sepehr.kamal@gmail.com)

immobilize cells in a semipermeable polymer, to isolate the cells from the immune system and to provide convenient cell retrieval. However, cell encapsulation also reduces blood supply, thus starving the transplanted cells of oxygen. Researchers are exploring methods to mitigate this issue by promoting vascularization within the encapsulation device. For example, Pepper et al. temporarily placed a vascular access catheter into a subcutaneous site to stimulate vascularization of the site prior to cell transplantation.²⁰ As well, researchers are exploring a strategy to mitigate the foreign body immune response by encapsulating cells with alginate, a polysaccharide derived from algae.²¹⁻²³ There is also ongoing investigation to identify the most optimal site for transplant.

The cost of a stem cell-based diabetes therapy could also prove to be a significant barrier to its usage. Islet cell transplantation by the Edmonton Protocol is estimated to cost \$100,000 CAD per transplant, and it is likely a stem cell-based therapy would cost significantly more due to expenses related to the long and complex cell preparation procedure.²⁴ In 2017, the FDA approved the first ever chimeric antigen receptor-T cell (CAR-T) cell therapy to treat cancer, with a high price of \$475,000 USD per patient.²⁵ Interestingly, this CAR-T therapy will employ a new “outcomes-based” pricing model, with the company only receiving reimbursement for patients who respond to the therapy. It is possible a similar policy could be applied to future stem cell-based diabetes therapies. Treatment prices may also decrease in the long-term with further manufacturing innovations. Regardless of the initial price of treatment, the lack of need for insulin injections following transplant, and a reduction in diabetes-associated complications could lead to significant long-term savings.

It is possible further basic science advances will be needed prior to progression to larger-scale clinical trials. There remains room for improvement in the stem cell differentiation protocol, with the goal to develop true beta cells *in vitro* still unrealized. Advancements in scale-up and manufacturing of cell-based therapies are also needed if the treatment is to be accessible to the millions of people living with type 1 diabetes worldwide. With the Edmonton protocol, clinicians observed a decrease in function of the transplanted cells after several years. Long-term clinical studies are therefore needed to assess if there are similar decreases in the function of stem cell-derived therapies. Also, if the need for lifelong immunosuppressive therapy were avoided, this would more readily allow the treatment of pediatric patients who are more susceptible to the side effects of such therapy. This could be achieved by immunoisolation of the transplanted cells, or by using autologous stem cells obtained from the patient instead of an allogeneic stem cell line.

For almost 100 years, insulin injections have been the mainstay of therapy for type 1 diabetes. While numerous challenges remain, it appears regenerative medicine may eventually replace insulin injections. It is exciting to see the large contributions of Canadian researchers to the field. Canadians played a key role in the discovery of insulin in 1922, the discovery of stem cells in 1961, and the development of islet transplantation in the 1990s. It is fitting that Canadians are now leading the development of stem cell-derived therapies for diabetes. Close collaboration by clinicians and expert scientists in the fields of stem cell biology, diabetes, biomaterials, and cell manufacturing will be essential moving forward to create an optimized final product that provides the greatest overall benefit to patients.

References

1. Canadian Diabetes Association. The prevalence and costs of diabetes. 2009 Dec.
2. Dabelea D, Mayer-Davis EJ, Sayday S, Imperatore G, Linder B, Divers J, et al. Prevalence of Type 1 and Type 2 Diabetes among children and adolescents from 2001 to 2009. *JAMA*. 2014 May 7;311(17):1778-1786.
3. Leslie RD, Palmer J, Schloot NC, Lernmark A. Diabetes at the crossroads: relevance of disease classification to pathophysiology and treatment. *Diabetologia*. 2015 Jan;59(1):13-20.
4. Ionescu-Tirgoviste C, Gagnieu PA, Gubceac E, Mardare I, Popescu I, Simona D, Militaru M. A 3D map of the islet routes throughout the healthy human pancreas. *Sci. Rep.* 2015 Sep 29;5:14634.
5. Brostoff JM, Keen H, Brostoff J. A diabetic life before and after the insulin era. *Diabetologia*. 2007 Jun;50:1351-1353.
6. Grunberger G. The need for better insulin therapy. *Diabetes Obes. Metab.* 2013 Mar;15:1-5.
7. Smalley E. Medtronic automated insulin delivery device gets FDA nod. *Nat Biotech.* 2016 Dec 7;34:1220.
8. Ellis C, Ramzy A, Kieffer TJ. Regenerative medicine and cell-based approaches to restore pancreatic function. *Nat. Rev. Gastroenterol. Hepatol.* 2017 Oct;14:612-628.
9. Thompson DM, Meloche M, Ao Z, Paty B, Keown P, Shapiro RJ, et al. Reduced progression of diabetic microvascular complications with islet cell transplantation compared with intensive medical therapy. *Transplantation*. 2011 Feb 15;91(3):373-378.
10. Ryan EA, Paty BW, Senior PA, Bigam D, Alfadhli E, Kneteman NM, et al. Five-year follow-up after clinical islet transplantation. *Diabetes*. 2005 Jul;54(7):2060-2069.
11. Schulz TC, Young HY, Aguinick AD, Babin MJ, Baetge EE, Bang AG, et al. A scalable system for production of functional pancreatic progenitors from human embryonic stem cells. *PLoS One*. 2012 May 12;7(5):e37004.12.
12. Johnson JD. The quest to make fully functional human pancreatic beta cells from embryonic stem cells: climbing a mountain in the clouds. *Diabetologia*. 2016 Oct;59(10):2047-57.
13. Kieffer TJ. Closing in on Mass Production of Mature Human Beta Cells. *Cell Stem Cell*. 2016 Jun 2;18(6):699-702.
14. Rezaei A, Bruin JE, Arora P, Rubin A, Batushansky I, Asadi A, et al. Reversal of diabetes with insulin-producing cells derived *in vitro* from human pluripotent stem cells. *Nat. Biotechnol.* 2014 Nov;32(11):1121-1133.
15. Pagliuca FW, Millman JR, Gurtler M, Segel M, Dervort AV, Ryu JH, et al. Generation of Functional Human Pancreatic b Cells *In Vitro*. *Cell*. 2014 Oct 9;159(2):428-39.
16. Aguinick AD, Ambbruzzi DM, Moorman MA, Bhounik A, Cesario RM, Payne JK, et al. Insulin-Producing Endocrine Cells Differentiated *In Vitro* From Human Embryonic Stem Cells Function in Macroencapsulation Devices *In Vivo*. *Stem Cells Transl. Med.* 2015 Oct;4(10):1214-1222.
17. US National Library of Medicine. ClinicalTrials.gov. Available from: <https://clinicaltrials.gov/ct2/show/NCT02239354> (2017)
18. Hathout E, Lakey J, Shapiro J. Islet transplant: an option for childhood diabetes? *Arch. Dis. Child.* 2003 Jul;88(7):591-594.
19. US National Library of Medicine. ClinicalTrials.gov. Available from: <https://clinicaltrials.gov/ct2/show/NCT03163511> (2017)
20. Pepper AR, Gala-Lopez B, Pawlick R, Merani S, Kin T, Shapiro JM. A prevascularized subcutaneous device-less site for islet and cellular transplantation. *Nat. Biotechnol.* 2015 May;33(5):518-523.
21. Veisheh O, Doloff JC, Ma M, Vegas AJ, Tam HH, Baader AR, et al. Size- and shape-dependent foreign body immune response to materials implanted in rodents and non-human primates. *Nat. Mater.* 2015 Jun;14(6):643-651.
22. Vegas AJ, Veisheh O, Doloff JC, Ma M, Tam HH, Bratlie K, et al. Combinatorial hydrogel library enables identification of materials that mitigate the foreign body response in primates. *Nat. Biotechnol.* 2016 Jan 25;34(3): 345-352.
23. Vegas AJ, Veisheh O, Gurtler M, Millman JR, Pagliuca FW, Bader AP, et al. Long-term glycemic control using polymer-encapsulated human stem cell-derived beta cells in immune-competent mice. *Nat. Med.* 2016 Mar;22(3):306-310.
24. Wallner K, Shapiro JAM, Senior PA, McCabe C. Cost effectiveness and value of information analyses of islet cell transplantation in the management of ‘unstable’ type 1 diabetes mellitus. *BMC Endocrine Disorders*. 2016 Apr 9;16(17).
25. Mullard A. FDA approves first CAR T therapy. *Nat Review Drug Discovery*. 2017 Sep 29;16:669.

2017-2018 UBCMJ Staff

EXECUTIVE

Editors in Chief

Heidi Britton, BSc (Hons) (Sr.)
Alvin Qiu, BSc (Hons) (Sr.)
Calvin Liang, MSc (Jr.)
Annette Ye, PhD (Jr.)

Managing Editors

Ellia Zhong (Sr.)
Tae Hoon Lee, PhD (Sr.)
Jennifer Ling, MSc (Jr.)
Janice Mok, BHSc (Hons) (Jr.)

Publications Managers

Nelson Lu, BSc (Pharm) (Sr.)
Cody Lo, BSc (Jr.)

Communications

Michelle Ng, BSc (Pharm) ACPR (Sr.),
Ellen He, BHSc (Hons) (Jr.)

SECTION EDITORS

Academics

Mark Trinder, MSc (Sr.)
Daniel Kwon, MSc (Jr.)

Case and Elective Reports

Pauline Luczynski, MSc (Sr.)
Wissam Nassrallah, MSc (Jr.)

Reviews

Kristin Dawson, PhD (Sr.)
Peter Baumeister, MSc (Jr.)

Commentaries

Kaity Lalonde, MSc (Sr.)
Curtis May, BKin (Sr.)
Kevin Fan, BSc (Jr.)

News and Letters

Jacqueline Regan (Sr.)
Gabriel Blank, BSc (Hons) (Jr.)

EXTERNAL

Finances, Advertising & Sponsorship

Ivan Chiu, BA, BSc (Sr.)
Chris Shamatutu, BSc (Sr.)
Jason Kim, BSc (Pharm) (Jr.)
Eric Esslinger, BSc (Jr.)

IT Managers

Nelson Lu, BSc (Pharm) (Sr.)
Tami Lin, BSc, BMus (Jr.)

STAFF WRITERS

James Cairns, MSc
Sepehr Kamal, BSc
Clark Fruhstorfer, BSc (Hons)
Valerie Ward, MSc
Braedon Paul
Sympascho Young, BSc (Hons)
Sewon Bann, BSc

COPYEDITING

Chief Copyeditors

Derek van Pel, PhD (Sr.)
Elisabeth McClymont, BA (Jr.)

Copyeditors

Sarah Fraser, BSc (Sr.)
Jessie Wang, BMLSc (Sr.)
Jeffery Ye, BHSc (Jr.)
Cassia Tremblay, BSc (Jr.)
Nicole Ng (Jr.)
Rebecca Xu, BSc (Hons) (Jr.)

PUBLICATIONS

Layout & Graphics Editors

Jeremy Dick, BSc (Sr.)
Nancy Duan, BSc (Jr.)

The University of British Columbia Medical Journal (UBCMJ) is a student-driven academic journal with the goal of engaging students in medical dialogue. Our scope ranges from original research and review articles in medicine to medical trends, clinical reports, elective reports, and commentaries on the principles and practice of medicine. We strive to maintain a high level of integrity and accuracy in our work, to encourage collaborative production and cross-disciplinary communication, and to stimulate critical and independent thinking.

Submission Guidelines

Articles are submitted online via our online submissions system, OJS (<http://ojs.library.ubc.ca/index.php/ubcmj>). For detailed submission instructions, please refer to the complete online version of the UBCMJ Guide to Authors, which can be found at www.ubcmj.com.

Author Eligibility

Authors must acknowledge and declare any sources of funding or potential conflicting interest, such as receiving funds or fees from, or holding stocks and benefiting from, an organization that may profit or lose through publication of the submitted paper. Declaring a competing interest will not necessarily preclude publication but will be conducive to the UBCMJ's goal of transparency. Such information will be held in confidence while the paper is under review and will not influence the editorial decision. If the article is accepted for publication, the editors will discuss with the authors the manner in which such information is to be communicated to the reader. UBCMJ expects that authors of accepted articles do not have any undisclosed financial ties to or interest in the makers of products discussed in the article.

In the interest of full transparency, no current members of the UBCMJ staff will be permitted to publish in the journal, except for those officially invited in a staff writer capacity to author a news piece or editorial. This policy is intended to limit the potential for conflicts of interest. All former members of the UBCMJ staff are exempted from this policy, as they will not have involvement in the workings of the journal at the time of their submission.

Author Originality

Authors must declare that all works submitted to the UBCMJ contain original, unpublished content and have been referenced according to the appropriate academic style. Written content that displays excessive similarity to previously published works, including works written by the submitting authors, will not be published by the UBCMJ. This policy is consistent with the UBC policy on plagiarism. The UBCMJ editorial staff reserves the right to request revisions, to deny publication, or to require retraction of submitted or published work that contains clear violations of this policy.

Specific Submission Criteria

Academic Research

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 in the context of current literature in their respective disciplines. UBCMJ currently accepts both full length articles and research letters.

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 (a) where the manuscript or article contains any material(s) (including text, images or other media) or other contribution(s) which belong to others, the author(s) are solely responsible for obtaining permission in writing from the owner(s) for its publication in the article.

Reviews

Reviews provide an overview of a body of scientific work or a medical trend. Reviews may outline a current medical issue or give insight into the principles of practice of a clinical field. Authors may choose to review the etiology, diagnosis, treatment, or epidemiology of a specific disease. Articles may also provide a survey of literature dealing with philosophy and social science as it pertains to medicine.

Case and Elective Reports

Case Reports describe patient encounters in a clinical or public health setting. The case should provide a relevant teaching point for medical students, either by describing a unique condition OR by presenting new insights into the diagnosis, presentation, or management of a more common condition. A template form to be used by the authors to obtain documented consent is provided on our website. The patient's consent form should be retained by the authors for a period of five (5) years. Please do not provide the patient's name or signature directly to the UBCMJ.

Elective Reports provide a specific description of the scope of practice of a medical specialty and/or training program, and recall the student's impressions and reflections during and upon completion of the elective.

News and Letters

This section includes articles that touch on current events in the field of medicine, significant medical advances, or brief summaries of research in an area. Note that submissions to this section do not require extensive elaboration on the methods or results of the review process.

Commentaries

Commentaries are intended to provide a platform for intellectual dialogue on topics relevant to the study and practice of medicine. Submissions should correspond to one of the following categories:

- Subjective pieces relevant to medical studies, life as a future physician, or the current social context of medicine.
- Clinical perspectives on an interesting research study or area of focus.

Correspondence

For any questions related to your submission, please contact the appropriate Section Editors.

Academic Research	(academic@ubcmj.com)
Case and Elective Reports	(reports@ubcmj.com)
Reviews	(reviews@ubcmj.com)
News and Letters	(news@ubcmj.com)
Commentaries	(commentaries@ubcmj.com)
Editorial Inquiries	(managing.editor@ubcmj.com)
Other Inquires	(external.editor@ubcmj.com)
Sponsorship	(sponsorship@ubcmj.com)

The UBC Medical Journal is now accepting submissions for...



UBCMJ Volume 10 Issue 1 Fall 2018

Public Health

The UBC Medical Journal is now accepting submissions for the Fall 2018 issue on Public Health. The focus of public health is to promote health through prevention and management of disease and injury on a population scale. In British Columbia, the creation of smoke-free spaces by public health authorities have been in place since the early 1980s. Immunization programs, food security, and safe drinking water are other examples of public health activities. Our upcoming UBCMJ issue aims to highlight the challenges and opportunities that lie at the intersection of public health policy, health education, and community engagement.

To encourage and recognize high quality writing, the **UBCMJ Distinguished Writing Award**, including a **\$250** honorarium, will be presented to the authors of the strongest article submitted in the Fall 2018 and Spring 2019 issues.

What to submit:

- Academic Research
- Reviews
- Case and Elective Reports
- News & Letters
- Commentaries

We also accept submissions that do not fall into next issue's theme.

Submission Deadline: **March 10, 2018**
Submit at: **ubcmj.med.ubc.ca/submissions/**

ACKNOWLEDGMENTS



University of British Columbia Medical Journal

This issue of the UBCMJ could not have been possible without the support and guidance of the following individuals:

Linda Herbert
Dr. Janette McMillan
Brian Kladko
Dr. Michelle Wong
Jennifer Fong

The University of British Columbia Medical Journal uses an open access publishing policy in line with our mandate to publish in a socially responsible way. We endorse open access publishing as the preferred model for scholarly communication and encourage the adoption of open access principles by universities and research agencies.



I wish I had just called Katie on Day 1 of med school and let the experts take me through the process. Being properly insured takes one thing off my list of worries and knowing that the team I've got specializes in the work I do every day makes it that much better.

- Dr. Heather O'Donnell

At Haslett Financial, we recognize that your needs are unique. Our goal is to provide you with the best solutions to address those needs. We will always customize the financial plan to you... and not the other way around.

Our customized, comprehensive financial solutions for Students and Medical Professionals include:

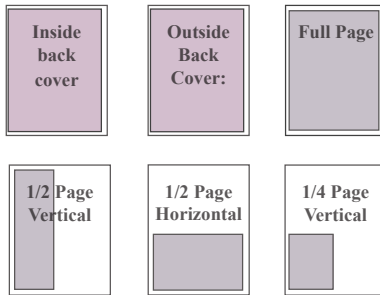
- > Life, Disability and Critical Illness Insurance
- > Financial and Investment Planning
- > Debt Consultation

We would love to hear from you! Contact us today for a consultation.

604-261-2037 | www.hassolutions.com



The UBCMJ provides many options for your advertising needs:



Please enquire about our Product Advertisement Rate Card at www.ubcmj.com or advertising@ubcmj.com

“Take two of these



and be back in Vancouver the same morning.”

Painless travel between metro Vancouver, Vancouver Island, the Gulf Islands & the Sunshine Coast. It's just what the doctor ordered.

- Fast, frequent flights
- Easy, flexible charters
- Preferred pricing programs
- Great loyalty rewards

HARBOUR AIR SEAPLANES
harbourair.com | 1.800.665.0212



Banking can be this comfortable.



Banking Plan for Doctors

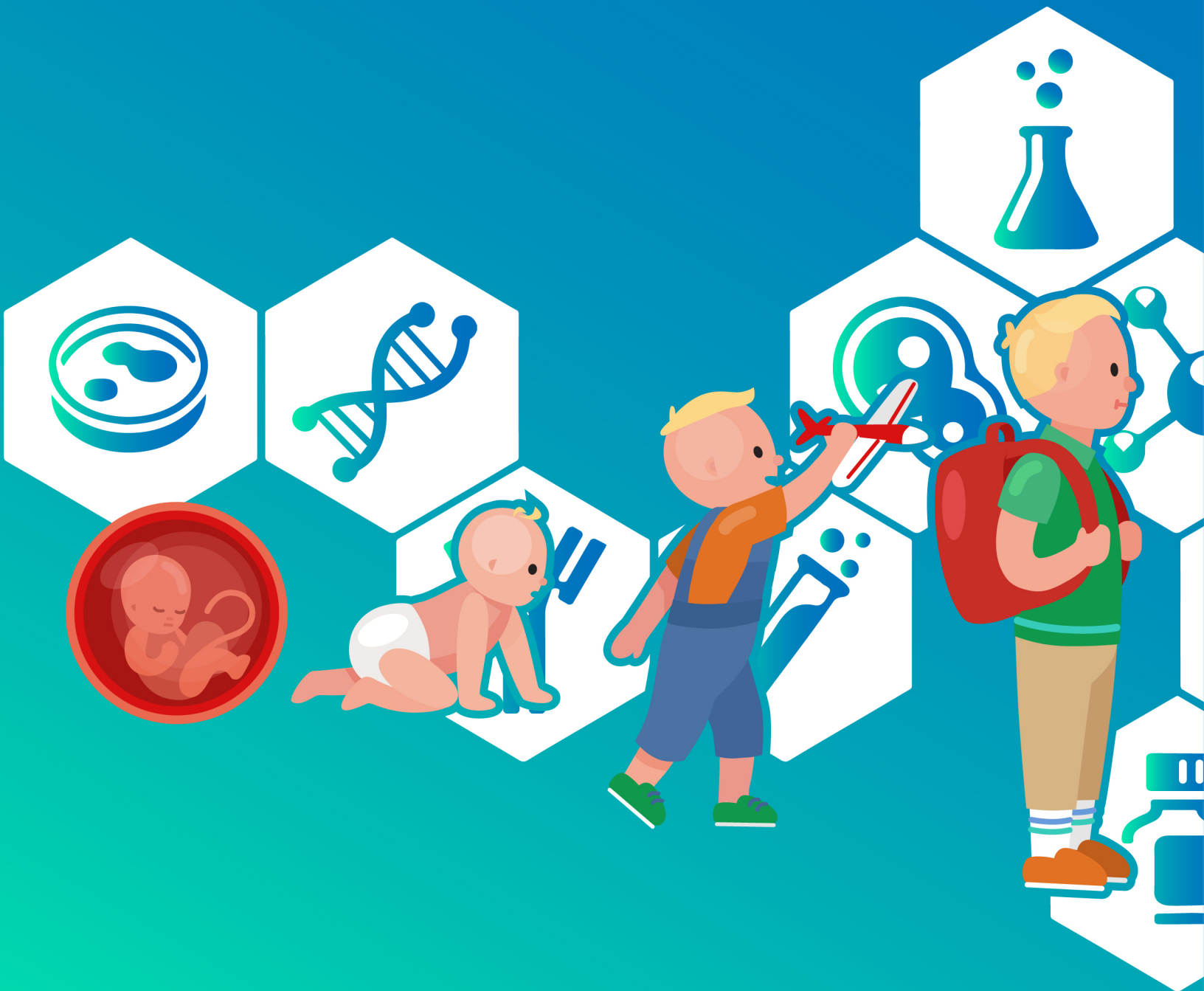
We provide a single point of contact, who understands your medical practice and your plans for growth. Our Account Managers are dedicated to simplifying your business banking and helping you meet your business goals.

Fast and efficient service, longer branch hours and flexible financial solutions to help your practice grow.

- Business Line of Credit up to \$250,000 with rates as low as TD prime¹
- Up to 100% Business Loan financing of the cost of setting up or expanding your practice¹
- Up to 100% financing of the cost of purchasing the building where you hold your practice¹

¹ Subject to complying with TD Canada Trust lending policies and criteria, including confirmation of good personal credit history. Certain business documentation is required. Other conditions may apply.

Contact Matthew O'Brien
Regional Manager Professional
TD Business Banking, Pacific Region
Tel: 604-376-1205
Fax: 604-737-1332
Toll-free: 1-844-292-9327
Email: matthew.o'brien@td.com



THE UNIVERSITY OF BRITISH COLUMBIA
Faculty of Medicine

www.ubcmj.com
ISSN: 1920-7425

