A special thank you to all Public Health Ontario students that submitted their abstracts for this year’s edition of Student Voice!

This year’s Student Voice newsletter was prepared by:

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Yael Goldshmid - senior communications specialist, Communications  
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Work placements are essential to students pursuing a career in public health. They provide hands on learning experiences and vital networking opportunities for future public health professionals. But the benefits of the placements exist not only to students, but to the organizations offering the placements themselves.

Former Public Health Ontario (PHO) placement student and newly appointed medical officer of health (MOH) for Lambton County, Dr. Sudit Ranade, speaks to the value to students of a placement at an organization like PHO. Dr. Ranade says that placements allow students to navigate their future career paths: “You learn how to work with other people, you learn how to design research and you learn how to think about problems.” Secondly, he says, placements allow students to network with people they would not normally meet. Placements allow students to be exposed to a variety of work environments and settings allowing students to work with professionals in their chosen field. Finally, he says, placements allow students to work in guided settings; they get to learn from their mistakes. “It’s kind of like practice at making decisions and thinking about things in a supervised setting,” says Dr. Ranade.

“Students bring to us new ideas, new opportunities for collaboration. For an organization that values innovation and creativity, having students in our midst really helps us.” - Dr. Vivek Goel

Dr. Ranade says students should go into their placements considering both their educational learning goals as well as their personal learning goals. He says that having established goals prior to starting a placement allows students to network properly with the professionals who will ensure those goals are met. He adds that students shouldn’t limit themselves by limiting their placement options; many organizations and companies are multi-faceted and rely on people with a broad range of skills to fill their placement opportunities. PHO President and CEO, Dr. Vivek Goel, agrees that placement opportunities have many benefits for students. PHO hosts a variety of students in different fields of work including communications, human resources, public health, pathology and biology.

But the value of placements isn’t just to the student; it’s also to the benefit of the organization offering the placement. “They [students] bring to us new ideas, new opportunities for collaboration. For an organization that values innovation and creativity, having students in our midst really helps us,” says Dr. Goel.

Dr. Goel encourages all students, not just public health students, to take advantage of all the opportunities offered at PHO. “Wherever students wind up working, they could have an impact on big public health issues. I think having the presence of college and university students in many disciplines at PHO, collaborating with each other and our staff is good for PHO and society at large.”

ABOUT DR. RANADE
Dr. Sudit Ranade is the newly appointed MOH of Lambton County (starting September 2012.) He has done student placements at a variety of organizations including PHO and the World Health Organization. Dr. Ranade became interested in public health after an eye-opening trip to India while in medical school. There he witnessed the power of low cost public health interventions. He is looking forward to being in the position of MOH for quite a few years and is thinking of a career in teaching afterwards.
Q: What should the public health priorities be in Ontario?

Dr. Vivek Goel: I think first of all it’s important to maintain the gains we’ve made, so things like fluoridation, food safety and the pasteurization of raw milk for example, are the very important gains that public health has made in the past century and a half. The second is to look at the new issues that are emerging: mental health, social determinants of health, many environmental issues, the impact of climate change and thinking ahead to what our public health challenges are going to be. I think one of the important things in public health is being ready for what’s coming next.

Q: What do you still need to work on in public health in Ontario?

Dr. Vivek Goel: Tobacco control; that remains one of our biggest health challenges. Another way of looking at public health issues is with the lifespan approach — looking at both children’s health and senior’s health — which might help put another lens on it.

Q: What was the true value of CPHA’s list?

Dr. Vivek Goel: I think in public health we don’t take time to take stock of our achievements and communicate them so that the public understands what public health has been doing. I think that highlighting those 12 achievements and the videos actually helps us have a better understanding of what needs to be done. I think it’s a good exercise and it’s based on the earlier list from the Centers for Disease Control (US). The CPHA modifications actually add a lot of breadth to the list and bring in some of the uniquely Canadian contributions, like the social determinants of health.

CPHA’S 12 GREAT ACHIEVEMENTS

- safer and healthier foods
- control of infectious diseases
- healthier environments
- vaccination
- recognition of tobacco use as a health hazard
- motor vehicle safety
- healthier mothers and babies
- acting on the social determinants of health
- universal policies
- safer workplaces
- family planning
- decline in deaths from coronary heart disease and stroke

For more information on the 12 Achievements visit: http://cpha100.ca/12-great-achievements/
The Sparking Life Niagara (SLN) program is being piloted at two high schools in the Niagara region this school year. The program aims to improve learning and academic achievement of identified at-risk youth through daily aerobic physical activity.

The program is being evaluated in order to draw conclusions about program outcomes and effects and to identify recommendations for future uptake of the program. Working with Niagara Public Health, the evaluation has multiple components including conducting stakeholder interviews or performing analysis to check for significant differences pre- and post-intervention. Physical measurements include height, weight, BMI and blood pressure while academic measurements include reading comprehension and mathematics through standardized testing.

Following the evaluation, I will do a tool revision analysis and make suggestions and recommendations to improve the current resources that are being used. Finally, the results of the evaluation will be used to apply for a planning grant that will bring together experts to discuss and explore a much more rigorous evaluation design for the program.

Varicella, commonly known as chickenpox, is a primary illness caused by the varicella-zoster virus (VZV). Before varicella vaccines became available, varicella was considered a universal childhood infection estimated to develop in 90 per cent of children by the age of 12 years. In Canada, the varicella vaccine was licensed in 1998 and since then, publicly-funded universal varicella immunization programs have been implemented in all Canadian provinces and territories, including Ontario in September 2004.

The primary objective of the project is to conduct a literature review on the impact of universal, publicly-funded varicella vaccination programs on the burden of disease from VZV in Canada and other countries which have implemented varicella vaccination programs. In addition, varicella data from Ontario’s integrated Public Health Information System (iPHIS) will be analyzed to describe the epidemiology of varicella in Ontario between 1993 and 2011, and to determine whether there has been any impact from the vaccination program.
DAEGAN SIT - HPV GENOTYPE DISTRIBUTION IN ONTARIO  
MCGILL UNIVERSITY - LIFE SCIENCES  
SUPERVISOR: DR. ANU REBBAPRAGADA

Human Papilloma Virus (HPV) is the most common sexually transmitted disease worldwide. Some types of HPV can cause cervical cancer. In 2007, the Gardasil HPV vaccine was approved for administration to Grade 8 girls in Ontario. Since this vaccine protects against high-risk HPV types 16/18, it is possible that other wart or tumor causing HPV types can become dominant and cause cervical cancer. This project will capture the prevalence of ALL high-risk HPV types in Pap samples (n=5600) obtained from a geographically representative set of 18-30 year-old women across Ontario. A homegrown Luminex assay that can detect 46 different HPV genotypes in a single sample is being used. This study will provide the baseline HPV genotype distribution to examine changes over time (e.g. whether HPV types 16/18 has decreased and/or, other high-risk types have increased) and measure vaccine effectiveness for the 2007 Gardasil cohort (when they are within the 18-30 year-old bracket).

IRENE TANG - CHARACTERIZING RESISTANCE DETERMINANTS OF BETA-LACTAMASE POSITIVE PATHOGENS  
MCMASTER UNIVERSITY - BIOCHEMISTRY AND BIOMEDICAL SCIENCES  
SUPERVISOR: DR. ROBERTO MELANO

The prevalence of antibiotic resistance has increased in clinical settings as a consequence of overuse of antibiotics for the treatment of bacterial infections and use as prophylaxis. Of concern is the emerging resistance against beta-lactam antibiotics. Pathogenic bacteria are able to take up genetic elements that cause resistance to beta-lactams by encoding a beta-lactamase, an enzyme that is able to breakdown beta-lactam molecules rendering them ineffective as bacteriocides. Dr. Roberto Melano’s research group characterizes the resistance determinants present in beta-lactam resistant pathogens isolated from hospital patients. I focus specifically on isolates that express a New Delhi Metallo (NDM) beta-lactamase gene. By transferring the genetic element of the NDM beta-lactamase from the clinical isolate to a laboratory strain of bacteria that bears no resistance, all of the resistance determinants of the clinical isolate are available for characterization by molecular biochemistry.

TRAVIS POOTOOLAL - LEGIONELLA PNEUMOPHILA – TORONTO STRAIN SEQUENCING  
UNIVERSITY OF GUELPH - BIOLOGICAL SCIENCES  
SUPERVISOR: DR. CYRIL GUYARD

In 2005 there was an outbreak of the bacteria Legionella Pneumophila in Toronto. My job in this lab is to find the sequence of the DNA for that strain. The purpose of this is to create a genetic fingerprint to identify this strain as well as to find out what is unique about this strain. Once this has been accomplished we can have a greater understanding of the properties of the strain and how similar it is to other strains.
Many health equity planning tools have been developed to provide systematic steps for health program/policy planners and researchers to see their program, policy or research through the lens of health equity. The purpose of this research is to develop a report summarizing the existing evidence on the application and evaluation of health equity planning and assessment tools. The research will use literature review and key informant interviews to:

- Summarize existing evidence on the application and evaluation of health equity planning tools in different jurisdictions including but not limited to Canada, Australia, New Zealand, European Union countries, UK and USA
- Outline factors that facilitate and/or hinder the application of health equity assessment tools
- Outline factors necessary to be considered for initiating an evaluation of health equity assessment tools.

This study, 165 strains isolated from patients in Brampton Hospital (2004-2009) were tested for antimicrobial susceptibility. This is the first large scale study of antimicrobial resistant Salmonella enterica serovar Typhi and Paratyphi A done in Canada. By monitoring antimicrobial resistance over several years, we are hoping to obtain information on the magnitude of, trends in resistance, and to monitor the effect of current treatments and interventions.

This project involves conducting a scan (with special interest in Ontario) of existing data sources and indicators of childhood obesity. Specifically, the scan focuses on indicators such as measures of overweight and obesity, physical activity, sedentary behaviour and eating behaviour. The resultant data sources are then assessed for quality and utility. Ultimately, findings from the scan will provide baseline information on the province’s current environmental landscape and be used to generate a profile of childhood obesity data sources in Ontario. This project parallels an existing scan of data sources for youth obesity.
**MARIA BENNELL - BEACH WATER QUALITY ASSESSMENT IN EASTERN ONTARIO**
*QUEEN’S UNIVERSITY - MASTER OF PUBLIC HEALTH*
*SUPERVISOR: DR. ANNA MAJURY*

We are carrying out an evaluation of Ontario beach water quality over time and by beach location, using a microbiological, GIS and statistical tool kit, for the assessment of overall beach water quality in eastern Ontario and the geospatial distribution of beach water quality. We are also comparing two methods to detect water contaminating indicator organisms: the traditional cell culture method and the newer quantitative PCR method. Implementation of the quantitative PCR method will provide more rapid results and permit beach closures to occur more quickly in the case of contaminated beach waters. In turn, this will reduce the risk of human exposure to potentially harmful pathogens in water and reduce the incidence of gastrointestinal illnesses for recreational beach users.

**LYDIA CHENG - DETECTION OF SHIGA TOXIN-PRODUCING ESCHERICHIA COLI IN WELL WATER USING REAL-TIME QUANTITATIVE PCR**
*QUEEN’S UNIVERSITY - ENVIRONMENTAL LIFE SCIENCES*
*SUPERVISOR: DR. ANNA MAJURY*

Shiga toxin-producing Escherichia coli (STEC) are emerging food-borne and water-borne pathogens that can cause significant disease in humans. STEC strains produce at least one type of Shiga-like toxin, coded by the genes stx1 and stx2. The Public Health Ontario Laboratories do not currently employ standard protocols to detect STEC in water, even though 30 per cent of Ontarians rely on private wells as their primary drinking water source. The purpose of this study was to optimize a real-time quantitative PCR (qPCR) assay to detect and quantify stx1 and stx2 from well waters. The optimized assay was very sensitive and demonstrated high PCR efficiency. The assay was applied to 100 well waters; two samples were positive for both genes, and one was positive for stx2 only. This qPCR assay can be employed to detect the two Shiga-like toxin genes from well water, enabling outbreak investigations and facilitating the diagnosis and treatment of infected patients.

**DEBEKA NAVARANJAN - ETHNIC DISPARITIES IN ACQUIRING 2009 PANDEMIC H1N1 INFLUENZA**
*UNIVERSITY OF TORONTO - MASTER OF PUBLIC HEALTH - EPIDEMIOLOGY*
*SUPERVISOR: DR. LAURA ROSELLA*

The increase in ethnic diversity in Canada has led many to investigate ethnic health disparities. Past studies have concluded that ethnic disparities existed in hospitalization due to the 2009 pandemic H1N1 (pH1N1) influenza, and in obtaining the pH1N1 vaccine and other seasonal influenza vaccines. The purpose of this study was to study the association between ethnicity and risk of acquiring pH1N1. Our findings suggest that there is an association between ethnicity and risk of acquiring pH1N1, both in children and adults. In this analysis, among adults and children, ethnic minorities were more likely to test positive for pH1N1 compared to test negative controls. These disparities will have to be addressed by targeting programs and resources to these high risk subpopulations in order to reduce their burden of illness.
Groundwater serves as a primary source of drinking water for approximately 30 per cent of Ontario residents. The use of groundwater as a drinking source may pose a health risk if fecal contamination is present. The objective of this study was to reveal Escherichia coli (E. coli) contaminated areas and identify the major source(s) of fecal contamination present in well waters within multiple health unit regions in southeastern Ontario. Private well data for 2011 was geocoded and spatial scan statistics were used to delineate contamination clusters. E. coli positive samples were analyzed to determine the source of fecal contamination using a Bacteroidales 16S rRNA real time PCR assay. Significant E. coli and total coliform contamination clusters were revealed and geographically represented. The majority of drinking water contamination, for those wells studied, can be attributed to non-human and non-bovine sources. Future work will focus on correlating the cluster data to possible contributing causes.

Shiga toxin-producing Escherichia coli (STEC) are important food-borne pathogens and the causative agent of diarrhea and a life threatening post-diarrheal sequelae called haemolytic uremic syndrome (HUS). E. coli O157:H7 is the most common serotype and are easily detectable using routine testing, whereas non-O157 STEC are not screened for by frontline laboratories. The main goal of this study is to establish the prevalence of non-O157 STEC in stool in Ontario.

We optimized a method combining culture and quantitative real time polymerase chain reaction (qRT-PCR) targeting the Shiga toxin genes, stx1 and stx2. Conventional end-point PCR is used on positive samples to determine the Shiga toxin subtype as well as for the presence of two virulence genes. Finally end-point PCR targeting the gnd gene followed by sequencing is used to determine the serotype. The goal is to screen 4000 stool samples by the end of summer 2012. We have tested 2300 samples resulting in 12 stx1 and seven stx2 positives.
Over four million Canadians rely on private well water sources. These well water supplies are especially vulnerable to contamination since the condition and maintenance of drinking water is the responsibility of the well owner. Furthermore, studies show that Canadians who rely on private wells as a source of drinking water only test their water intermittently or not at all, and that treatment of well water is often not carried out. Using all private well waters submitted to Public Health Ontario Laboratory — Kingston for testing in the year 2011, an analysis of submitter behaviour will be carried out, which will examine how often individuals submit samples, which individuals are more likely to submit multiple samples, and if socio-economic status plays a role in how often individuals submit samples. Results will then be used to suggest appropriate interventions such as policy changes, guidelines and programs.

My project will focus on conducting a literature review to contribute to the evidence and rationale for conducting an implementation and impact level evaluation of the daily physical activity policy initiative mandated by Ontario’s Ministry of Education in 2005. This policy initiative requires students in grades 1 to 8 to participate in a minimum of twenty minutes of sustained moderate-to-vigorous physical activity each school day during instructional time. The purpose of the planned research study is to assess whether students are performing the recommended levels of daily physical activity at school in order to reap the health and other benefits of an active lifestyle. The results from this project will help inform provincial government policy decisions regarding healthy schools and, specifically, the role of the Daily Physical Activity initiative in contributing to the Canadian guideline for children of sixty minutes of moderate-to-vigorous physical activity each day.

The word from HR

Human Resources professionals deal with many of the most important issues organizations face today, including recruitment, benefits and compensation, labour relations, health and safety, HR information management systems, organizational learning, development and training and organizational effectiveness.

Our Human Resources students have the opportunity to get involved and connect with HR professionals, be part of our team and apply what they have learned while gaining valuable work experience. HR and PHO benefit from having additional resources to deliver some key projects, having our students share their points-of-view with us, and offer new perspectives on our policies and practices. Students are our leaders of tomorrow and we all benefit from having them work with us.

As Public Health Ontario continues to build the HR Foundations, we are delighted to have Rubab Aquil and Muhammad Babar students working with us this summer.

Thank you to all areas who have hired students this summer for your ongoing support and inclusion of university and college students at PHO.

Cathie Rogers
My practicum includes three proposed deliverables. 1) To conduct a comprehensive environmental scan or scoping review of performance measurement systems and tools used in different disciplines related to the knowledge organization including research performance, knowledge translation and exchange, and health services delivery. 2) To support planning and materials development for a two-day workshop, including development of an agenda, a panel session with the opportunity to deliver a presentation on the findings from the scoping review at the workshop 3) And to conduct information meetings with co-applicants and representatives from Public Health Ontario, the BC Centre for Disease Control, the Institut Nationale de Santé Publique de Québec, the Canadian Institute for Health Information and the Public Health Agency of Canada to compile and analyze the current status of impact measurement within these organizations.

The objective of the following study is to perform a multi-locus sequence typing (MLST) analysis on clinical isolates of the opportunistic pathogen non-tuberculosis Mycobacterium xenopi (M. xenopi) to determine strain variation in M. xenopi isolates. Immunocompromised patients with illnesses such as chronic obstructive lung disease (COPD), asthma and emphysema are most susceptible to M. xenopi infection. The principles of MLST analysis rely on sequencing housekeeping genes that are essential to cell survival during M. xenopi culture growth, and developing strain profiles accordingly. DNA isolates are amplified at multiple gene targets through employing strain-specific designed primers in a PCR reaction, followed by a crucial Sanger sequencing reaction. The result of this procedure yields 400-500 nucleotide base pair target sequences that can then be compared between different strains. Collectively, this analysis can answer epidemiological questions as to how different M. xenopi strains can be categorized and identified on a sequence-based comparison. In conclusion, the goal of this study is to identify the genes associated with the virulence and transmission of M. xenopi, and any related mutations discovered through MLST analysis.

It is very important that we have students working with us. This provides the student with an opportunity to see the type(s) of jobs/fields of work (e.g. scientist, medical microbiologist, medical technologist, bioinformatician, etc.) that they could enter into upon graduation, what other skill sets they need to acquire, and to be involved in real clinical laboratory problem solving. It also provides us with an able pair of hands to assist in some of the laboratory investigations and research, and potential publication of the findings which is a benefit to all parties.
Listeria monocytogenes is a bacterium that can cause severe illness in humans and almost all cases of listeriosis are caused by the consumption of contaminated food products. Although the occurrence of human listeriosis is quite low compared to other foodborne infections, it has a high mortality rate (about 20 to 30 per cent) making L. monocytogenes a serious public health concern.

L. monocytogenes can be classified into 13 different serotypes, however, only three serovars are responsible for 96 to 98 per cent of human listeriosis showing strains differences in virulence.

Recently in our laboratory we have typed 254 L. monocytogenes strains from clinical and food samples from Ontario using the multi-locus sequence typing method and identified strains present in food that are not represented in the clinical database.

My project consists of analyzing the more relevant virulence factors from these strains. We aim to characterize the mutations and polymorphisms that represent these different populations in order to design more accurate diagnostic test.

The purpose of this project is to look for mutations in target genes that are associated with drug resistance in Mycobacterium xenopi (M. xenopi). Knowing which strains confer drug resistance is important not only for improving patient treatment but also for monitoring potentially uncontrollable virulent strains. Non-tuberculosis M. xenopi is an opportunistic pathogen causing pulmonary in patients with decreased lung function credited to COPD, asthma, emphysema etc. Working with a variety of clinical strains, five selected target genes from each strain are sequenced and analyzed to look for mutations that are genetic markers of resistance to drugs. Five target genes from the DNA are amplified separately using PCR techniques and specific primers. Later, sanger sequencing reactions are used to prepare the DNA to be analyzed by the capillary electrophoresis DNA sequencer. The target gene DNA sequences of from each strain are then compared to one another and checked for mutations. Understanding M. xenopi drug resistance can support preventative measures for the development of such resistance as well as provide new insights into drug development.
Purpose: To identify biomarkers for identifying outbreak versus non-outbreak strains of Clostridium difficile (CD), isolated during outbreaks in Ontario hospitals using DNA sequencing, MMLVA (Modified Multi-locus variable Number Tandem Repeat Analysis) and other methods (growth curves, sporulation rate, germination speed, etc.). Methods: We will use 50 strains from 10 outbreaks of the past three years. For each outbreak, 3 NAP1 strains (one outbreak and two sporadic strains) and two Non-NAP1 strains will be analyzed using molecular and microbiology methods.

Results: Variation in outbreak and sporadic strains, if observed, will allow identifying biomarkers associated with clinical outbreaks and will assist with investigating hospital outbreaks.

Key Message: Well-defined criteria for differentiation of outbreak strain of CD from sporadic ones are essential for interpretation of typing data of strains isolated from patients during outbreaks. It will guide infection control measures to contain and prevent outbreaks of CD.
On June 14, placement students from 480 University got the chance to see what projects their student peers in the labs were working on.

The tour began with an introductory presentation from Dr. Samir Patel, a clinical microbiologist at PHL. Students were led through clinical testing laboratories where work is done in virus detection, enteric diseases and molecular and environmental testing. Students also had the opportunity to see research laboratories where research work is done in HPV, DNA Core and Antibiotic Resistance. Laboratory managers briefly demonstrated the work done in the lab, explained laboratory equipment used and discussed the significance of their work to student groups.

As part of PHO’s commitment to supporting students in their learning, the lab tour was an important experience to help students understand the organization’s structure as a whole. “We want to introduce everyone to everything,” says Tiffany Bartlett, education specialist. “The learning experience at PHO should be comprehensive. We want to show them the breadth of the organization rather than pigeonhole them into one project.”

The 480 University students came from backgrounds in public health, public relations, human resources and epidemiology. This was an opportunity for them to learn about what goes on at the laboratory and how that work sets the foundation for public health research at the corporate office.

The LMP students come from a variety of disciplines including biochemistry, microbiology and other medical sciences. For the LMP students, this tour helped to expose them to research and clinical testing being done in other labs. This was also an opportunity to see how research at PHL is applied not only within the laboratories, but how it is translated to other initiatives in the organization. “It was really interesting to see the scope of the other research and the testing that happens in the labs” says Tetyana Vodoviz, a medical science student at PHL. “We were able to see the real-world connections between the labs and its significance in the broader public health world.”
Students are required to write lay summaries to convey research findings. But writing in a non-technical way is easier said than done. How do you go about writing an effective lay summary to best showcase your work? How can you ensure your writing is consistent with lay language so that the general public understands your message clearly? Here are some fool-proof tips to help you craft the perfect lay summary.

**Have a good title**
A title draws people into your work. Your title is the reader’s first impression of your lay summary. Titles should be short, sweet and to the point, while still attracting attention.

**The first sentence is crucial**
The first sentence introduces your lay summary and should sum up the summary in one sentence. When writing your first sentence ask yourself, can you explain your research in 25 words?

**Focus on relevant content points, practical application and the benefits of your research**
Address the “so what?” factor. What relevant and important data is going to make the reader interested in the work that you do? Why is your work important?

**Use short, simple sentences**
After editing for grammar and spelling, read your summary out loud. Are there any sentences that feel long-winded? Do any thoughts run on?

**Get to the point and avoid ambiguity**
A lay summary is normally very short so make sure your sentences are clear and concise. Be direct and to the point, avoiding generalizations and introducing secondary ideas. Remember, you are writing for people who have little to no prior knowledge about the subject.

**Provide context**
Provide concrete and real life examples so that the general public and your peers can better relate to your ideas.

**Avoid technical and scientific terms**
Use lay language and avoid overly scientific terms that the public may not understand. Avoid using uncommon English words and avoid using Latin-based or Latin words when possible. Avoid the use of acronyms and spell words out as acronyms might not be well known to the public. For example, instead of vector use carrier, instead of escherichia coli use E.coli. A good guideline to use is, asking yourself, would the average person, with no scientific background, understand this?

**Get someone outside of your field to read over your summary**
Sometimes the best way to make sure your summary is relevant and easily understood is asking someone outside your field to read through it. Whether that’s asking your mom, a friend or the stranger you locked eyes with across the coffee shop, having another set of eyes can help.