

WEDNESDAY, MAY 31

CONCURRENT SESSION A: 11:00AM - 12:30PM

A1: ENVIRONMENTAL & OCCUPATIONAL

Some challenges in measuring ultra-fine particles and developing a land use regression model in Greater Montreal Area

Presented by: **Shilpa LN Karumanchi**, Student, University of Montreal

- Develop a land use regression model to produce an exposure surface for ultrafine particles in the Greater Montreal Area. As ultrafine particles are highly unstable with high spatial variability, a campaign was designed to measure the levels of ultrafine particles with a dense monitoring network of 250 sampling sites in the Greater Montreal Area. In order to derive average annual levels, three visits (20minutes each) were performed in winter and three in summer. Land use regression models have proved to be an efficient tool for generating exposure surfaces for traffic-related air pollutants in urban areas. A land use regression model is currently under development to derive an exposure surface for ultrafine particles in Greater Montreal. On average, the concentrations of ultrafine particles in winter are twice the concentrations in summer. A number of land use parameters and proximity variables were identified as potential predictors of ultrafine particles. So far, a multivariable model for mean ultrafine concentrations includes estimated average NOx emissions (a surrogate for traffic, 150 m buffer), bus stops (300 m buffer), building footprint ratio (150 m buffer), commercial buildings (300 m buffer), length of bus lines (500 m buffer), distance to PE Trudeau International Airport, distance to rail line and temperature. Once land use regression model for ultrafine particles has been developed, it can be used as an exposure surface to estimate ultrafine concentrations at any point in Greater Montreal Area. This will be used to evaluate risk within a Montreal-based case-control study of lung cancer.

Co-Author(s): Shilpa LN Karumanchi, Marcela Rivera, Lesley Richardson, Benoit Thierry, Mark Goldberg, Jack Siemiatycki, Marianne Hatzopoulou

A community-based pilot study assessing the work-related musculoskeletal risk perception among government- and private-sponsored Syrian refugees in Canada

Presented by: **Sonja Senthana**r, PhD Candidate, University of Waterloo

The purpose of this study is to examine refugee risk perception of hazards in the workplace leading to musculoskeletal disorders (MSDs). The research objectives include: 1. Understand what workplace hazards newly integrated refugees perceive as risky versus less risky; 2. Determine if risk perception differs by a) demographic variables (gender, age, level of education), b) employer safety climate (previous safety training, supervisory/coworker support), and c) pre- and post-migration factors (previous/current occupation, years of working experience). Syrian refugees will be recruited through our community partnerships in the Kitchener-Waterloo region (Reception House Waterloo, The Working Centre, ShamRose). Participants will be asked to watch and rate 44, ten-second lifting/lowering videos and complete a perceived exertion survey. The videos consist of different height combinations (ex. Floor-to-floor, calf-to-waist, knee-to-waist) and use props that are either light, medium, or heavy, where demonstrators are near or far from the prop and in the squat or stoop position. Each video will be rated using an 11-point Likert scale ranging from 0-10, with lower spectrum values suggesting that the participant does not believe repeating the task throughout the day leads to low back pain while the higher spectrum suggests the opposite. To address risk perception of other body regions, a modified version of the Perceived Exertion Survey will be used. This survey estimates workers' perceptions of a job's physical difficulty and will include 15 specific low to high intensity activities (ex. Pushing/pulling). Participants will rate tasks by degree of effort on an 11-point scale, ranging from 0 = "no effort required" to 10 = "extremely strong effort". We will run various factorial ANOVAs followed by Tukey post-hoc tests to measure which activities participants perceived as riskier than others. Risk perceptions will then be stratified by demographic, safety climate and pre/post migration factors to assess whether differences exist.

Co-Author(s): Sonja Senthanar, Philip Bigelow, Amin Yazdani

Population Attributable Fraction and Impact Fractions for Lung Cancer and Residential Radon – A Canadian Perspective

Presented by: **Tasha Narain**, Research Associate, Queen's University

To determine the current Canadian population attributable fraction (PAF) and population impact fractions (PIF) for lung cancer after exposure to residential radon using updated relative risk and exposure prevalence estimates. The relationship between residential radon exposure and lung cancer risk was assumed to follow a log-linear dose-response pattern for a continuous exposure representing the average exposure during a 25-year window. The relative risk (RR) per average radon exposure of 100 Bq/m³ was obtained from a meta-analysis of 23 studies from 1990 to 2015. The distribution of average radon exposure was estimated from the Cross Canada Survey of Radon Concentration in Homes (2012) and information on the distribution of housing characteristics. PIFs were calculated based on counterfactual scenarios reflecting Canadian policy and theoretical radon reduction initiatives. A meta-analysis of lung cancer risk associated with residential radon resulted in a RR=1.08 (95%CI: 1.03-1.14) per 100 Bq/m³ increase. A higher risk was obtained when restricted to studies published post-1999. The distribution of residential radon exposures across Canada was right skewed with an arithmetic mean of 76.8 Bq/m³ and a geometric mean of 33.1 Bq/m³. In 2004, an estimated 25.0% of Canadian homes were above 100 Bq/m³ and 8.6% were above the national guideline of 200 Bq/m³. The current PAR was 6.1%. Following 90% remediation of 75% of homes with radon above 200 Bq/m³, 1.8% of lung cancer cases in 2016 could have been prevented. Alternatively, if homes above 100 Bq/m³ were targeted, 3.0% of all lung cancers could have been prevented in 2016. Our next step is to project the future burden of residential radon-associated lung cancer in Canada for the year 2045 based on current trends and assess the impact of reducing the Canadian guideline for radon exposure from 200 Bq/m³ to 100 Bq/m³.

Co-Author(s): Tasha Narain, Will D. King, Paul Villeneuve, Paul A Demers, Perry Hystad

An investigation of occupational exposure to monocyclic aromatic hydrocarbons and lung cancer risk in the metropolitan Montréal area

Presented by: **Hunter Warden**, Graduate student, Queen's University

To assess the association between occupational exposure to monocyclic aromatics hydrocarbons (MAHs: benzene, toluene, xylene) and lung cancer risk among men in the metropolitan Montréal area. A case-control study recruited 733 histologically confirmed cases of lung cancer and 894 population-based controls frequency matched by age. Exposure assessment consisted of a questionnaire and in-person interview, which collected participants' occupational histories. A team of chemists and industrial hygienists translated each job held into potential exposures to 294 agents (MAHs included) with estimates of probability and level of exposure. Separate multivariable unconditional logistic regression was used to estimate odds ratios (ORs) and 95% confidence intervals (95% CIs) for the association between each MAH and lung cancer risk. MAH exposure was conceptualized into ever, non-substantially, and substantially exposed categories. Multivariable models were adjusted for smoking history, respondent status, age, ethnicity, socioeconomic status, and ever exposure to several occupational lung carcinogens. Analyses compared ever, non-substantial, and substantial MAH exposure to those unexposed. Ever exposure to xylene was associated with an OR of 1.33 (0.96 – 1.84). Further associations were revealed in stratified analyses based on smoking history. Heavy smokers were associated with a 40% (OR=1.40, 95% CI: 1.01 – 1.94) and 69% (OR=1.69, 95% CI: 0.80 – 3.55) increased risk of lung cancer, respectively, for those ever exposed and substantially exposed to benzene. Further analyses were restricted to histological subtypes of lung cancer. Substantial exposure to benzene was associated with an OR of 2.46 (1.02 – 5.95) for squamous cell carcinoma among heavy smokers. Results demonstrate increased lung cancer risk associated with occupational MAH exposure among heavy smokers. Further analyses will explore the era of MAH exposure and lung cancer risk, as many industries underwent regulatory changes in the 1960s that may have affected exposure profiles.

Co-Author(s): Hunter Warden, Harriet Richardson, Lesley Richardson, Jack Siemiatycki, Vikki Ho

Perceived neighbourhood safety and systolic blood pressure in children: findings from the QUALITY cohort

Presented by: **Tracie Barnett**, Professor, INRS Institut Armand Frappier

Perception of neighbourhoods as unsafe may increase risk of hypertension in adults, possibly through stress. We tested associations between perceived neighbourhood safety, systolic blood pressure (SBP), and stress in children. Baseline data were collected in 2005-2008 when children were aged 8-10 years (n=630); follow up data were collected two years later when children were aged 8-10 years (89% response). SBP was measured at both time points and an average of 3 in-clinic readings were obtained using oscillometry; age-, sex-, and height-specific percentiles of SBP were computed. A stress biomarker was generated, based on 5 salivary cortisol samples from which maximum slope was estimated. Perception of neighbourhood safety was reported at baseline by parents using a 5-point Likert scale (dichotomized as safe/unsafe). Analyses were restricted to 430 children with complete data. General linear modelling was used to test the relation of neighbourhood safety with (Model 1) predicted SBP and (Model 2) change in SBP. Both models adjusted for age, sex, BMI, puberty, parent education, area-level education, social and material deprivation, and disorder. We tested models with and without the stress biomarker. In model 1, neighbourhood safety was associated with a 5.8 percentile increase in SBP (B=5.79, 95% C.I.:1.44-10.14) two years later. In model 2, i.e. including baseline SBP, the relation was attenuated but results suggested that neighbourhood safety was associated with change in SBP (B=3.51, 95% C.I.: -0.67-7.69). The stress biomarker was not associated with neighbourhood safety or with SBP. Perceiving neighbourhoods to be unsafe may adversely impact children's blood pressure. Elevated blood pressure in childhood is detrimental to health; while interventions improving neighbourhood safety may be beneficial to cardiometabolic risk factor profiles, underlying mechanisms remain to be elucidated.

Co-Author(s): Tracie Barnett, Gisèle Contreras, Gilles Paradis, Jennifer McGrath, Melanie Henderson

A2: PUBLIC HEALTH / POPULATION HEALTH

Area-level deprivation and Emergency Department Use in Alberta: An analysis of rates and trends from 2010 to 2016

Presented by: **Jordan Ross**, Analyst, Alberta Health Services

To explore the relationship between area-level deprivation and rates of emergency department and urgent care centre (ED/UCC) use in Alberta between 2010 and 2016. All ED/UCC visits within Alberta from 2010-2016 were identified using data from Alberta Real-Time Syndromic Surveillance Net. Deprivation quintiles from the 2011 Pampalon Deprivation Index (PDI) for Alberta were linked via patient postal code. The PDI includes material, social, and combined deprivation quintiles (Q1-Q5; least-most deprived). Populations for each year were calculated from Census data. Crude and age-adjusted rates and rate ratios (Q5 vs. Q1) were calculated by year and zone. Linear regression was used to assess the statistical significance of the change in rate ratios from 2010-2016. ANOVA was used for comparing ED/UCC visit rates. Age-adjusted rates per 1000 population for ED/UCC use increased in Edmonton and Calgary from 2010 to 2016, but decreased in the Central and North Zones. There was no overall trend in the South Zone. The greatest increase was among Edmonton's least deprived quintile (Material Q1: 2010 = 304.6; 2016 = 351.7). Rates of ED/UCC use are greatest in Central and North Zones, but decreased among all quintiles from 2010 to 2016. The age adjusted rate ratio for material quintiles (Q5 vs. Q1) decreased year over year for Edmonton (2010 = 1.65; 2016 = 1.23) and Calgary (2010=1.27, 2016=1.19), but increased in the Central (2010 = 1.00; 2016 = 1.19) and North (2010 = 1.72; 2016 = 1.84) Zones. ED/UCC use increased in Edmonton and Calgary, but decreased in the North and Central Zones from 2010-2016. Rate ratios exhibited the opposite trend, decreasing in Edmonton and Calgary and increasing in the North and Central Zones. Future steps include examining factors contributing to these trends.

Co-Author(s): Jordan Ross, Daniel Han, Julie Zhang, Roland Ngom, Christopher Sikora, Hussain Usman, Sarah Edwards

Title: Febrile seizure risk following childhood vaccination in Alberta; a study aimed at immunization quality improvement in children 6 to 23 months.

Presented by: **Muddassir Siddiqui**, Analyst, Alberta Health Services

Co-administration of vaccines in children may increase the risk of febrile seizures. Our study aims to investigate the concomitant effects of common vaccines administered to children under age two. The data on febrile seizure (FS) was extracted from the National Ambulatory Care Reporting System and Discharge Abstract Database and merged with provincial immunization data. Six types of commonly administered vaccination combinations (>70% of all the immunization events) were studied. Self-controlled risk interval analysis was used to compare the FS risk subsequent to vaccine administration during risk and control intervals, while controlling time-invariant confounders. Conditional Poisson regression models were used to assess the risk ratio in 2 risk intervals (0-2 days and 7-10 days post-vaccination) compared with control interval (7 to 14 days pre-vaccination), adjusted for age group and influenza season. There was an increased risk of febrile seizures associated with events of concurrent administration of Measles, mumps, rubella, and varicella (MMRV), Meningococcal conjugate (Men-C) and Pneumococcal conjugate (PCV13) vaccines (Incidence rate ratio (IRR), 10.09; 95% confidence interval (CI), 6.63 to 15.35). Diphtheria, Tetanus, acellular Pertussis, Polio and Haemophilus influenzae type b (DTaP-IPV-Hib) vaccine also increased the risk (IRR 1.90; 95% CI, 1.21 to 3.01) when administered independently. No independent FS risk was found when influenza (IRR, 1.64; 95% CI, 0.84 to 3.22) vaccines were administered separately. Co-administration of influenza vaccine did not increase the FS risk when administered concurrently with other vaccines. There was increased risk of FS associated with concurrent administration of MMRV, Men-C and PCV13 vaccines, and when DtaP-IPV-Hib vaccine was administered to children under age 2. The concurrent administration of influenza vaccine with other vaccines did not further increase the risk of FS.

Co-Author(s): Li Huang, Jing Zhang, Muddassir Siddiqui, Christopher Bell, Graham Vance, Mayank Singal

Alcohol consumption prevalence and adherence to cancer prevention recommendations for alcohol consumption among adults: cross-sectional results from Alberta's Tomorrow Project

Presented by: **Tiffany Haig**, MSc Candidate, Alberta Health Services

To determine prevalence of alcohol consumption and describe adherence to World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) cancer prevention recommendations for alcohol in Alberta's Tomorrow Project (ATP) participants. ATP is a large longitudinal prospective cohort study of Albertans aged 35-69 at enrollment. The present analysis reports on participants who completed the baseline self-administered health and lifestyle questionnaire (HLQ; n=26,842). HLQ included data concerning past-year alcohol consumption behaviour. We classified participants as adherent (?2 drinks/day for men; ?1 drink/day for women) or non-adherent (>2 drinks/day for men; >1 drink/day for women) to WCRF/AICR cancer prevention recommendations on maximum alcohol consumption limits. We also examined the combined prevalence of alcohol consumption, tobacco use, overweight/obesity, and the presence of co-morbidities to profile multiplicative cancer risk among men and women. Among participants who reported consuming alcohol (n=22,627; 84.0% of all participants), 87% were classified as adherent to cancer prevention recommendations. Approximately 14% of men and 12% of women exceeded WCRF/AICR recommended maximum alcohol consumption limits (non-adherent). Compared to adherent, non-adherent were more likely to be young, active daily smokers, overweight/obese, having one or more co-morbidities, urban residents with higher household incomes and greater weekly consumption of red meat servings. Volume of daily alcohol consumed was positively associated with current tobacco use in both men and women. Overall, men (56.0%) were more likely than women (46.8%) to fall in the moderate-to-high risk behavioural profiles and show higher overall pattern of daily alcohol consumption. A sizeable proportion of ATP participants consumed alcohol daily in excess of cancer prevention recommendations. This represents a potential target to promote current recommendations to reduce alcohol consumption for cancer prevention in Alberta. Future analyses will examine whether improved adherence to recommendations reduces cancer incidence.

Co-Author(s): Tiffany Haig, Abbey Poirier, Alianu Akawung, Paula Robson, Christine Friedenreich, Darren Brenner

Associations between cancer prevention knowledge, attitudes and behaviours in the Alberta Prevents survey

Presented by: **Anne Grundy**, Research Associate, Department of Social and Preventive Medicine, Université de Montréal and Centre de recherche du CHUM (CRCHUM)

This study aimed to describe knowledge of modifiable cancer risk factors in Alberta, predictors of high risk factor knowledge, and associations of this knowledge with cancer prevention attitudes and behaviours. A cross-sectional population-based telephone survey (Alberta Prevents) in a weighted sample of 1,500 adults in Alberta assessed knowledge and attitudes concerning cancer prevention, health improvement behaviours, barriers to living a healthy lifestyle, and sources of prevention information. Respondents' cancer prevention knowledge was evaluated based on their awareness of eight modifiable cancer risk factors and subsequently classified as high, moderate or low. Multivariate logistic regression models were used to estimate odds ratios (ORs) and 95% confidence intervals (95%CI) to characterize associations of attitudes towards cancer prevention, behaviour changes, and sources of prevention information with overall knowledge of cancer risk factors. Fifty-four percent of participants had high cancer prevention knowledge, 37% had moderate knowledge and 8% had low knowledge. The characteristics most strongly associated with high knowledge were being female and having discussed cancer prevention with a health professional. Cancer risk factor knowledge was associated with attitudes towards prevention, where compared to individuals with high knowledge, those with low (OR=0.15, 95%CI=0.08-0.31) or moderate (OR=0.44, 95%CI=0.25-0.78) knowledge were less likely to believe that their risk of cancer could be reduced. Further, compared to those with high knowledge, those with low (OR=0.49, 95%CI=0.31-0.77) or moderate (OR=0.75, 95%CI=0.57-0.99) knowledge were less likely to have made changes to improve their health in the previous six months. Cancer prevention knowledge was less clearly related to internet use to obtain prevention information. Among survey respondents, knowledge of modifiable cancer risk factors was associated with both cancer prevention attitudes and behaviours. The population level data gathered in this survey provide key insights concerning information seeking, knowledge gaps and attitudes towards cancer prevention in Alberta.

Co-Author(s): Anne Grundy, Melissa Schock, Kathryn Arnold, Rebecca Morton, Simran Tiwana

Estimated reductions in provider-initiated preterm births and corresponding maternal and newborn hospital length of stay under a universal aspirin prophylaxis strategy in Canada

Presented by: **Alison Park**, Senior Epidemiologist, Institute for Clinical Evaluative Sciences (ICES)

We estimated how a national aspirin (ASA) prophylaxis strategy might reduce provider-initiated preterm birth (PI-PTB) associated with preeclampsia (PE) and intrauterine growth restriction (IUGR) in Canada. We completed a retrospective population-based cohort study of all singleton hospital births in Canada in 2013, excluding the province of Quebec. We estimated the proportion of term and PI-PTB affected by PE and/or IUGR, and the corresponding mean maternal and newborn hospital length of stay (LOS). We then estimated the potential annual reduction in these PI-PTB cases, and reductions in maternal and newborn LOS as a consequence of an ASA prophylaxis program that reduced PE and IUGR by either 10% or 53%, the lowest and highest reductions suggested by randomized clinical trials. Among 269,303 births, 4,495 (1.7%) were PI-PTB. Of these, 1,512 (33.6%) had a diagnosis of PE and/or IUGR. The mean maternal LOS was 2.0 days (95% CI 2.0-2.0) among term births unaffected by PE or IUGR, rising to 7.3 days (95% CI 6.1-8.6) among PI-PTB with both PE and IUGR. The mean newborn LOS was 1.9 days (95% CI: 1.8-1.9) among term births, rising to 21.8 days (95% CI 17.4-26.2) among PI-PTB with both PE and IUGR. If ASA conferred a 53% relative risk reduction (RRR) against PE and/or IUGR, then there would be a net annual national reduction of 3,365 mom-days and 11,591 baby-days in hospital. If ASA conferred a 10% RRR, then 635 mom-days and 2,187 baby-days in hospital would be reduced annually. A universal national ASA prophylaxis program could substantially reduce the burden of prolonged maternal and newborn hospital LOS attributed to PI-PTB.

Co-Author(s): Susie Dzakpasu, Joel Ray, Emily Bartsch, Alison Park, Prakesh Shah

A3: EPIDEMIOLOGIC METHODS

A qualitative pilot study to inform participant engagement strategies in a large prospective cohort study

Presented by: **Jenna Gagne**, Research Assistant, Alberta's Tomorrow Project, CancerControl Alberta, Alberta Health Services

The long-term viability of population cohort studies depends on sustained participant engagement. Here, aspects of participant motivations, expectations, and preferences were explored in a large prospective cohort study in Alberta. In this qualitative study, a purposive sample of 33 actively engaged cohort participants were interviewed by telephone over a 4-month period. Interview questions were revised iteratively across the interviews using the constant comparative method. Topics discussed included individual motivations, expectations and preferences, with the aim of informing study operations and developing more effective communication strategies. Each interview was recorded, anonymized, and transcribed by a third party who then coded the data for emerging themes using an open coding technique and qualitative data analysis software (NVivo 10). Participants' motivations for joining the cohort were largely driven by a personal connection to cancer (the original focus of the cohort) and/or general altruism. Participants voiced expectations that research results are communicated and project objectives be accomplished in a rigorous, transparent and efficient manner. Participants exhibited considerable trust in the cohort leadership and staff concerning operational decision making and research direction, however, many saw a value in participant consultation. With the increasing use of online technology for data collection, most participants expressed willingness to correspond and complete questionnaires online, however, many still wished to receive paper-based communications. The willingness to use online technology was not necessarily associated with age but was rather highly individual-specific. Actively seeking participant insight provides valuable information not otherwise available through traditional data collection methods. In large cohort studies, participant engagement may be enhanced by the cohort demonstrating sustained commitment to project goals and using multiple modalities to communicate progress and emergent research findings.

Co-Author(s): Jenna Gagne, Bud Skiffington, Declan Barry, Stephanie Garbowski, Geraldine Lo Siou, Elizabeth MacNeil-Cameron, Joel Minion, Madeleine Murtagh, Seol Paek, Michael Ridley, Jane Schlosser, Kelsey Thomson, Lindsay Wodinski, Paula Robson, Jennifer Vena

Measuring Equity in Health Care through Data Linkage

Presented by: **Christina Catley**, Senior Analyst, Canadian Institute for Health Information

Measuring inequalities in health care access, quality and outcomes across social groups (also known as equity stratifiers) is the first step to informing action to reduce inequity. Current approaches to measure inequalities vary across the country. Therefore, this work uses linked health and socio-demographic data to: 1) inform the development of equity stratifier definitions for pan-Canadian data collection and reporting; and 2) demonstrate the impact of examining health indicators by multiple equity stratifiers. The Canadian Institute for Health Information is leading the development of common definitions for equity stratifiers, starting with age, sex, education, income, and geography. This is a collaborative project with a pan-Canadian expert working group, Statistics Canada, the Public Health Agency of Canada, and the Manitoba Centre for Health Policy. Definitions for other important equity stratifiers are also in development, including Indigenous identity, race/ethnicity, gender identity and language. Using Statistics Canada linkage files (e.g., Discharge Abstract Database (DAD)-census linkage, DAD-tax file linkage), this study estimates inequalities in three commonly used health indicators (chronic obstructive pulmonary disease hospitalization, asthma hospitalization, and hospitalized heart attack) across multiple stratifiers. We will test the sensitivity of alternate definitions of these stratifiers (e.g., measuring educational attainment at the household or individual level, and with 4 or 5 levels of education). We will present national and provincial results for the three health indicators across multiple stratifiers, as well as results for interactions between stratifiers (e.g., education-related inequalities by urban versus rural and remote). By informing the development of common stratifier definitions, this study will promote a consistent approach for measuring and reporting inequity in health care in Canada.

Co-Author(s): Sara Allin, Christina Catley, Philippe Finès, Harshani Gangodawilage, Jean Harvey, Stephanie Ko, Erin Pichora, Claudia Sanmartin

Can health administrative data be used to accurately identify cases of travel-related disease in Ontario?

Presented by: **Rachel Savage**, PhD Student, University of Toronto

Data availability and quality are current barriers to measuring travel-related infectious disease burden. Consequently, we explored whether health administrative data could be used to accurately identify cases in Ontario. We constructed a cohort of medically-attended patients with presumed travel-related illness in Peel, Ontario through deterministic linkage of the Canadian Institutes for Health Information's hospital discharge abstract (DAD) and same-day surgeries databases, National Ambulatory Care Reporting System, and Ontario Health Insurance Plan (OHIP) physician claims. We included patients with diagnostic codes for hepatitis A (ICD-10 B15, OHIP 070), malaria (B50-54, 062) and typhoid/paratyphoid fever (A01, 002) between November 2011 and February 2015. The sensitivity and positive predictive value (PPV) of the codes was assessed through probabilistic linkage of iPHIS, Ontario's reportable disease database, as the reference standard with the cohort. Probabilistic linkage was successful in 90.0% (289/321) cases. Codes for hepatitis A had a sensitivity of 83.7% (95% CI 73.3-94.0) and PPV of 0.3% (95% CI 0.2-0.3); for malaria, 69.0% (95% CI 60.5-77.6) and 41.3% (95% CI 34.3-48.3); and for typhoid/paratyphoid fever, 85.8% (95% CI 79.8-91.9) and 6.2% (95% CI 5.1-7.3). Surprisingly, only three-quarters of malaria true positives were in the DAD, and those in OHIP were more frequently coded with a less specific code (136), which explains poor sensitivity. PPV improved markedly when OHIP billing codes were excluded. Almost one third (29.5%, 18/61) of false negatives did not have a health encounter during the study period; of these, 55.6% were not eligible for OHIP at the time of their illness. Linking population-based data sets to study travel-related illness is possible and is a novel approach that is resource-efficient and overcomes current data limitations. Further work is needed to determine which diagnostic codes and data sources can optimize sensitivity and PPV.

Co-Author(s): Rachel Savage, Laura Rosella, Monali Varia, Maureen Horn, Kamran Khan, Natasha Crowcroft

Cancer in Ontario Workers from 1983-2016: results from the Occupational Disease Surveillance System (ODSS)

Presented by: **Saul Feinstein**, Research Associate, Cancer Care Ontario

Work-related risk factors are important determinants of health, but existing surveillance systems fail to capture occupational information. ODSS addresses this issue via linkage of existing administrative databases. The ODSS cohort linked Workplace Safety and Insurance Board (WSIB) time-loss compensation claimants to records in the Ontario Cancer Registry (OCR) and other health administrative data sources. Follow-up occurred from a worker's first claim date until cancer diagnosis, death, loss to follow-up or end of study period, whichever occurred first. Cancer risks were stratified by sex and were calculated for industries and occupations using age-adjusted Cox Proportional Hazard models. Job-exposure matrices (JEM) from CAREX Canada were used in targeted analyses to explore risks associated with work-related exposures to particular known and suspected carcinogens. The ODSS Workers cohort consists of 2.2 million workers. Mean age at claim was 37 and 70% of claims were from males. For industry groups, the cohort included 22,000 miners, 200,000 construction workers and over 1 million workers in manufacturing and trade. Among occupations, there were 280,000, 275,000 and 216,000 workers for construction trade, medicine and health, and transport equipment operating, respectively. In the pilot project, which was limited to a 20% sample of WSIB claims, significantly increased lung cancer risk was observed for construction (HR 1.08) and primary metal industries (HR 1.19), and for mining (HR 1.48) and equipment operating (HR 1.16) occupations. Teaching occupations had an increased risk of breast cancer (HR 1.57), and mesothelioma risk was two-fold in construction occupations (HR 2.12). The ODSS team is working with occupational health and safety advocates and stakeholders to develop evidence-based estimates and reduce exposure to workplace hazards for Ontario workers. After obtaining cancer estimates, other chronic diseases including asthma, noise-induced hearing loss and contact dermatitis will be assessed.

Co-Author(s): Saul Feinstein, Jill MacLeod, Luis Palma Lazgare, Paul A Demers, Chris McLeod, Alice Peter

Ethnic Variation in Prediabetes Incidence among Recent Immigrants and long-term residents to Canada: A Competing Risk Analysis

Presented by: **Ghazal Fazli**, PhD Candidate, University of Toronto

In this study, we aimed to examine whether the development of prediabetes among recent immigrants would vary across different ethnic groups compared to long-term residents. We conducted a retrospective cohort study to investigate the risk of prediabetes development among recent immigrants (RIs) and long-term residents (LTRs) among adults aged ≥ 20 living in Ontario between 2002- 2013. Individuals were identified using anonymous federal immigration data, linked to a single commercial laboratory database and other provincial, administrative health databases. A validated algorithm was used to classify recent immigrants into distinct ethnic groups using country of birth, mother tongue and their surname (for Chinese and South Asian ethnicity). We used Fine and Gray's competing risk and Cox survival modeling methods to compare prediabetes development across immigration status, ethnicity Cumulative incidence of prediabetes was 58% and 50% among RIs, (N= 334,783; mean age 40) and LTRs (N=1,437,502; mean age 46), respectively. Age-sex-income adjusted prediabetes incidence was higher for RIs (HR: 1.36, 95% CI 1.34 to 1.37, $p < 0.001$) than LTRs. After adjusting for additional covariates (time since arrival, immigration class, and education) for RIs only, South Asian (HR: 3.6, 95% CI 3.0 to 4.3 $p < 0.001$) and Sub-Saharan African and Caribbean (HR: 2.8, 95% CI 2.3 to 3.4 $p < 0.001$) females aged 20-34 had an elevated risk of developing prediabetes compared to White-Western Europeans (HR: 0.75, CI 95% 0.59 to 0.93 $p < 0.001$). This pattern was consistent across all age groups (35-49 and 50-64), except for those 65+. Results from the competing risk and Cox models were relatively similar. The incidence of prediabetes over time was significantly higher among recent immigrants compared to white-western European populations, suggesting the need for future prevention strategies to reduce the rise of type 2 diabetes among high-risk populations.

Co-Author(s): Ghazal Fazli, Gillian Booth, Reza Rezai, Arlene Bierman, Rahim Moineddin

A4: KNOWLEDGE TRANSFER / EXCHANGE

Predicting Important Patient Domains for Glaucoma Management

Presented by: **Lavanya Uruthiramoorthy**, Graduate Student, Western University

To develop an algorithm that predicts vision-related quality of life (VRQoL), social support, depressive symptoms and preference based health-related quality of life (HRQoL) for glaucoma management using clinical/demographic variables. A cross-sectional study was conducted among patients in London, Ontario (n=250). Variables were collected through medical chart reviews and face-to-face interviews. VRQoL, social support, depressive symptoms and preference-based HRQoL were measured using: Visual Function Questionnaire-25, Community Integration Questionnaire, Patient Health Questionnaire-9 and Time-Trade off technique, respectively. Regression analyses (linear, logistic and stepwise) and Classification and Regression Trees (CART) were applied to build predictive models using thirteen demographic and clinical variables. Through leave-one-out cross-validation (LOOCV), the predictive performance of the four models were assessed with mean absolute error (MAE), standard error (SE) and standard deviation (SD). Linear (MAE=6.27,SE=0.52,SD=8.15) and stepwise (MAE=7.02,SE=0.51,SD=8.11) regression models presented four strong predictors of VRQoL: income, living arrangements, mobility aid, and best corrected visual acuity(BCVA). Whereas, CART (MAE=6.77,SE=0.56,SD=9.17) only presented BCVA as a strong predictor. Six important predictors of social support were depicted by linear (MAE=3.38,SE=0.16,SD=2.48) and stepwise (MAE=3.27,SE=0.16,SD=2.48) regression models: age, sex, income, living arrangement, mobility aid and BCVA. Only three predictors were identified by CART (MAE=4.03,SE=0.19,SD=2.98): age, sex and mobility aid. Logistic (MAE=0.30,SE=0.02,SD=0.25) and stepwise (MAE=0.31,SE=0.02,SD=0.26) regression models for depressive symptoms identified two strong predictors: mobility aid and first line of treatment. For preference based HRQoL, logistic (MAE=0.41,SE=0.01,SD=0.24) and stepwise (MAE=0.40,SE=0.01,SD=0.22) regression models identified two strong predictors: BCVA and number of ocular conditions. CART analysis didn't reveal predictors for depressive symptoms and preference based HRQoL. The identified predictors hold the most promise for developing an algorithm to predict VRQoL, social support, depressive symptoms and preference based HRQoL. Further validation of the algorithm is required to provide ophthalmologists with a more efficient way to assess these patient attributes when managing glaucoma.

Co-Author(s): Lavanya Uruthiramoorthy, Daniel J. Lizotte, Monali Malvankar, Cindy Hutnik

A systematic review of the role of coping strategies in the association between caregiving complexity and quality of life among parents of children with chronic illness or disability

Presented by: **Alana Fairfax**, Master's student, University of Ottawa

To synthesize studies of coping and quality of life (QoL) among parents of children with chronic illness. We hypothesize that coping modifies the association between caregiving complexity and QoL. With the help of an information scientist, we developed an electronic search strategy to identify relevant citations in Medline, EMBASE, PsycINFO and CINAHL. Two reviewers independently assessed titles/abstracts using pre-specified inclusion criteria. Articles eligible for full-text review were screened by two independent reviews with discrepancies resolved by third party consensus. One reviewer is abstracting data on study characteristics, methods to address confounding, measurement tools, risk of bias, and results with respect to associations of interest. Extracted data will be validated by a second reviewer. 2,245 citations were screened and 163 full-text articles were reviewed. Nine articles have met the inclusion criteria and data abstraction is ongoing. Preliminary results show that studies of parents of children with cerebral palsy were most common (3/9), followed by epilepsy (2/9). A majority (7/9) of the studies report the mother as the caregiver completing measures of coping and quality of life. Findings regarding the relationship between coping and QoL are inconsistent across studies. There is considerable heterogeneity in study methods, including instruments used to measure key constructs. We thus plan to synthesize results narratively. We will conduct a search of grey literature, complete data abstraction and critically appraise included studies. Understanding how coping strategies are associated with QoL among parents of children with chronic illness will inform the development of interventions to support families.

Co-Author(s): Alana Fairfax, Jamie Brehaut, Ian Colman, Lindsey Sikora, Beth Potter

Comparative human exposure to antimicrobial resistant Escherichia coli from food animals using integrative assessment modelling: A farm to fork approach.

Presented by: **Colleen Murphy**, Veterinary Epidemiologist, NSERC Fellow placed at the Centre for Food-borne, Environmental and Zoonotic Infections

To build an integrated assessment model (IAM) using existing data to assess human exposure to extended spectrum cephalosporin resistant E. coli (ESC-E. coli) through consumption of chicken, beef or pork. Stochastic models were built using existing data obtained from the Canadian Integrated Program for Antimicrobial Resistance Surveillance and peer-reviewed literature (studies investigating factors associated with antimicrobial use (AMU) or antimicrobial resistance (AMR) from any geographical population, and/or AMU and AMR frequency data from a Canadian population). Individual farm-to-fork ESC-E. coli models for broiler chickens, beef cattle and pigs were built. Each of these models adjusted the findings with rates of human food consumption. Models were indexed by food animal species to assess the relative contribution of each commodity on human exposure to ESC-E. coli acquired via consumption of these products. All commodity-specific models included nodes for non-conventional management systems (organic, antibiotic free, natural) and antimicrobial use (AMU). The broiler chicken model also included nodes for other management factors (e.g., type of litter) and vacuum packaging at retail. Initial results suggest that the comparative human exposure to ESC-E. coli is highest from broiler chickens and lowest from beef cattle when considering conventional management systems with AMU. In non-conventional management systems without AMU, the comparative human exposure remained highest from broiler chickens, followed by beef cattle and was lowest through pigs. Overall, human exposure to ESC-E. coli was lower from animals raised in non-conventional management systems, in which animals were raised without antimicrobials compared to animals raised in conventional systems with AMU. Initial results suggest that human exposure to ESC-E. coli was highest from chicken, and exposure from other commodities depended on factor selection (e.g. AMU). These findings are partially explained by higher chicken consumption rates. However, the effects of cooking and related practices were not investigated.

Co-Author(s): Colleen Murphy

A knowledge translation strategy for the Canadian Population Attributable Risk (ComPARE) project

Presented by: **Leah Smith**, Epidemiologist, Canadian Cancer Society

To develop a knowledge translation (KT) strategy that will maximize the impact of the Canadian Population Attributable Risk (ComPARE) project results on cancer prevention research, programs, and policies in Canada. ComPARE will quantify the number and proportion of new cancer cases in Canada, now and projected to 2040, that could be prevented through changes in modifiable lifestyle and environmental risk factors. These findings have the potential to have a major impact on cancer control and prevention activities in Canada. To ensure findings are disseminated to the broadest and most relevant audiences, the project includes an integrated KT component. To facilitate this, KT leads were identified among ComPARE investigators to develop and implement a KT strategy. The strategy is divided into four phases: planning, stakeholder consultation, product development and dissemination. In the planning phase, a logic model was developed to gain clarity and consensus on the inputs, activities and outputs required for the desired outcomes; a detailed work plan outlining timelines was also developed. To facilitate stakeholder consultation, a KT Advisory Committee was formed comprising nine experts in cancer prevention (representing government, policy, advocacy, research and practice) from across Canada. Teleconferences and two in-person workshops will keep committee members apprised of study findings and provide a forum through which to discuss best practices for KT and determine dissemination methods and channels. Anticipated KT products include research publications, conference presentations, targeted webinars, media engagement, infographics and interactive online resources. The committee will consult on product development and support dissemination of products and results through their networks. ComPARE will provide comprehensive estimates of the burden of cancer attributable to modifiable risk factors in Canada. The integrated KT strategy supports ongoing uptake of study results and will help maximize the impact of these important findings on cancer prevention planning and decision-making in Canada.

Co-Author(s): Leah Smith, Zeinab El-Masri, prithwish de, Robert Nuttall

Corneal Biomechanical Properties after SMILE Versus FLEX, LASIK, LASEK, or PRK: A Systematic Review and Meta-analysis

Presented by: **Hui Guo**, graduate student, Department of Epidemiology and Biostatistics, Schulich School of Medicine and Dentistry, The University of Western Ontario, London, Canada

The aim of this study was to compare the postoperative corneal biomechanical properties between small incision lenticule extraction (SMILE) and other corneal refractive surgeries. Articles from January 1, 2005, to October 25, 2016, were identified searching PubMed, EMBASE, Web of Science, and International Clinical Trials Registry Platform. Inclusion criteria: participants (P): adult myopia patients who underwent corneal refractive surgeries; intervention (I): SMILE; comparison (C): corneal refractive surgeries except for SMILE; outcome (O): corneal biomechanical properties; study design (S): clinical trial, prospective or retrospective cohort study, cross-sectional study, and case series. Two authors were responsible for the literature selection. Multiple effect sizes within each study were combined. Final postoperative value and change score were pooled in separate subgroups which were synthesized. Random-effects model was conducted. Seventeen articles (1733 eyes) were included: 3 randomized controlled trials (RCTs), 6 prospective and 6 retrospective cohort studies, and 2 cross-sectional studies. Using the combined effects of corneal hysteresis (CH) and corneal resistance factor (CRF), the pooled Hedges' g of SMILE versus laser-assisted in situ keratomileusis (LASIK) was 0.30 (95% CI, 0.11 to 0.48; $I^2 = 51\%$), versus femtosecond lenticule extraction (FLEX) was -0.04 (95% CI, -0.46 to 0.38; $I^2 = 20\%$), and versus the group of photorefractive keratectomy (PRK) and laser-assisted sub-epithelial keratectomy (LASEK) was -0.26 (95%CI, -0.60 to 0.09; $I^2 = 60\%$). The summary score of Corvis ST (CST) parameters after SMILE was comparable to LASIK with the pooled Hedges' $g = -0.05$ (95% CI, -0.22 to 0.12; $I^2 = 55\%$). In terms of preserving corneal biomechanical strength after surgeries, SMILE was superior to LASIK, while comparable to FLEX or PRK/LASEK group based on the results from ocular response analyzer (ORA). More studies are needed to apply CST on evaluating corneal biomechanics after refractive surgeries.

Co-Author(s): Hui Guo, Seyed Hosseini-Moghaddam, William Hodge

CONCURRENT SESSION B: 1:45PM to 3:15PM

B1: POPULATION HEALTH

Canadian Longitudinal Study on Aging: A Platform for Interdisciplinary Research

Presented by: **Lauren Griffith**, associate professor, Department of Health Research Methods, Evidence, and Impact, McMaster University; **Istvan Molnar-Szakacs**, data access officer, Canadian Longitudinal Study on Aging; **Mark Oremus**, associate professor, School of Public Health and Health Systems

The Canadian Longitudinal Study on Aging (CLSA) is a large, national research platform on health and aging allowing researchers to answer critical questions on the biological, medical, psychological, social, lifestyle and economic aspects of aging, disability and disease. The CLSA follows more than 51,000 men and women who were between the ages of 45 and 85 at recruitment, for 20 years. Through its large sample, detailed data collection and longitudinal design, the CLSA enables research on the complex interplay among health determinants. This session will present 3 aspects of the CLSA platform – the platform itself, data access, and research using the CLSA data. The description of the CLSA as a research platform will offer an introduction to the methodology as well as the data included in the Baseline dataset - health status, diseases, cognition, psychological well-being and mental health, social well-being, economic aspects of aging, physical assessments and blood-based biological markers. The data access portion will describe how to access the currently available Baseline dataset, including, questionnaire data on all 51,338 participants and comprehensive physical assessment data and blood-based biomarkers on approximately 30,000 participants. The session will conclude with experiences of data users who have ongoing projects using the CLSA dataset. There will be opportunities for questions during and after the session.

B2: DIABETES, CARDIOVASCULAR DISEASE & STROKE

The impact of self-efficacy on hospitalization rates and in managing chronic disease in a Canadian type-2 diabetes cohort

Presented by: **Haoyu Zhao**, Graduate student, School of Public Health, University of Alberta

The aim of the study is to evaluate the association between self-efficacy in managing chronic disease and the risk of hospitalization among patients with type 2 diabetes. We used self-reported surveys to measure socio-demographics, clinical characteristics and self-efficacy among a cohort of adults with type-2 diabetes from December 2011 to December 2013. Chronic disease self-efficacy was assessed using a previously validated 6-item questionnaire, categorized into low, medium, or high (reference group). Our primary outcome was all-cause hospitalization within 1 year following the survey, which was obtained through individual-level, de-identified linkage of the survey data to the administrative databases of Alberta Health. The association between self-efficacy and all-cause hospitalization was assessed using multivariate logistic regression after adjustment for socio-demographics, Elixhauser co-morbidities, health status and diabetes specific behaviors. Among the cohort (n=1915), the average age was 64.5 (SD 10.7), 45.3% were female. Overall, 199 (10.4%), 459 (24.0%) and 1257 (65.6%) patients reported low, medium and high self-efficacy, respectively. Patients with low self-efficacy were younger, had more comorbidities, and followed less healthy behaviors. In unadjusted analyses, low self-efficacy was associated with increased risk of hospitalization (23.6% vs 9.6%; odds ratio (OR) 2.90: 95% confidence interval (95%CI 1.99, 4.23) compared to those with high self-efficacy, while no association was observed for medium self-efficacy level (ORs 1.28: 95%CI 0.91, 1.79). After adjustment, however, there was no difference in hospitalization risk for patients with low or medium self-efficacy compared to those with high self-efficacy patients: ORs 0.99 (95%CI 0.58, 1.68) and 0.67 (0.44, 1.01), respectively. Although self-efficacy is thought to be an important aspect of diabetes care, our results suggest that self-efficacy is not independently associated with reductions in all-cause hospitalization. Focus on additional health aspects are likely required to improve overall health outcomes in patients with type 2 diabetes.

Co-Author(s): Haoyu Zhao, Jeff Johnson, Fatima Sayah, Allison Soprovich, Dean Eurich

Changes in Body Mass Index and Incidence of Diabetes: A Longitudinal Study of Alberta's Tomorrow Project Cohort

Presented by: **Ming Ye**, Postdoctoral Fellow, Alliance for Canadian Health Outcomes Research in Diabetes, University of Alberta

The objective of this study was to characterize the association between body mass index (BMI) changes over time and incidence of diabetes in a cohort of adults in Alberta. From 2000-2015, Alberta's Tomorrow Project (ATP) enrolled Albertans aged 35-69 to a prospective cohort study. BMI was calculated from self-reported height and weight with sex-specific corrections for self-reporting biases, and change in BMI (dBMI) calculated as the difference between baseline and follow-up. Incident cases of diabetes were identified using the Canadian National Diabetes Surveillance System algorithm applied to linked administrative data with International Classification of Disease 9 (ICD-9) or -10 coding of diabetes. Multivariable Cox regression was used to examine the association between dBMI and incidence of diabetes after adjusting for covariates obtained from baseline health questionnaires. In a subset of the ATP cohort (n=19,164), 1,168 incident diabetes cases were identified during 198,853 person-years (10.4±2.7 years) of follow-up. A one unit (kg/m²) increase in BMI was associated with 10% (95% CI: 7%-13%) increase in the overall incident rate of diabetes, after adjusting for age, sex, ethnicity, household income, baseline BMI, smoking status, physical activity, diet quality (assessed by the Healthy Eating Index), parental history of diabetes, baseline comorbidity and the length of time for dBMI. Compared to participants with minimal BMI change (±5%), participants with moderate (5%-10%) reduction in BMI had 28% (95% CI: 9%-44%) lower risk of diabetes, while moderate (5%-10%) and large (>10%) increases in BMI were associated with substantially increased risk [22% (2-46%) and 83% (49-126%), respectively]. Our results showed that BMI increase over time was associated with development of diabetes in the ATP cohort, and moderate reduction in BMI may significantly reduce this risk. Public health programs promoting moderate weight loss could help reduce incidence of diabetes in Alberta.

Co-Author(s): Ming Ye, Paula Robson, Jennifer Vena, Jian-Yi Xu, Dean Eurich, Jeff Johnson

Comorbid depression and anxiety symptoms and the risk of incident diabetes: prospective results from the Lifelines Cohort Study

Presented by: **Sonya Deschênes**, Postdoctoral fellow, McGill University

The goal of this study was to examine the associations between depression and anxiety comorbidity and the risk of incident diabetes in a large prospective cohort of Dutch adults. Data were from the Lifelines Cohort Study, a longitudinal study of people living in the Netherlands. At baseline, depression and anxiety symptoms were assessed using the Mini-International Neuropsychiatric Interview; diabetes was assessed with either a self-reported diagnosis of diabetes made by a physician or by blood assessments of hemoglobin A1c (HbA1c) levels > 6.5%. Incident diabetes was assessed by self-report at two time-points over approximately 28.5 months. Four groups (no depression or anxiety, anxiety only, depression only, comorbid depression-anxiety) were compared on the risk of diabetes using logistic regression analyses. Odds ratios (OR) with 95% confidence intervals (CI) are reported. 103,396 adults between 30 and 75 years of age were included in the study (mean age = 48 (SD = 10) years, 59% female). In all, 95.4% did not have depression or anxiety, 2.8% had anxiety only, 0.9% had depression only, and 1.0% had comorbid depression-anxiety. 650 (0.6%) participants developed diabetes during follow-up. Compared to those with no depression or anxiety, odds of incident diabetes were OR = 1.04 (CI = 0.62,1.75) for those with anxiety only, OR = 1.25 (CI = 0.59,2.66) for those with depression only, and OR = 2.13 (CI = 1.24,3.66) for those with comorbid depression-anxiety. Analyses were adjusted for age, sex, education, ethnicity, marital status, diabetes family history, smoking, and body mass index. Similar results emerged in unadjusted models. Results suggest that when comorbidity between depression and anxiety is considered, the combination of depression and anxiety is most strongly associated with incident diabetes. The next steps of the project will include analyzing new data from a third Lifelines follow-up wave with HbA1c assessments available.

Co-Author(s): Sonya Deschênes, Rachel Burns, Norbert Schmitz

Economic vulnerability and chronic disease risk: A population-based study investigating the association between food insecurity and incident type 2 diabetes in Canadian adults

Presented by: **Christopher Tait**, PhD Candidate, Dalla Lana School of Public Health, University of Toronto

Little is known about the relationship between food insecurity and incident type 2 diabetes. The objective of this study is to investigate this association in a representative sample of Canadians. We used data from Ontario adult respondents to CCHS 2.2 linked to health administrative data (n = 4,867). Food insecurity was assessed with the Household Food Security Survey Module that focuses on self-reported uncertain, insufficient or inadequate food access, availability, and utilization due to financial constraints resulting in subsequently compromised eating patterns. Incident type 2 diabetes cases were identified by the Ontario Diabetes Database, and tracked up to 11.6 years from baseline. Cox proportional hazards models were used to estimate hazard ratios (HRs) and 95% confidence intervals (CIs) for type 2 diabetes as a function of food insecurity status. This is the first study to investigate the relationship between food insecurity and type 2 diabetes risk in a longitudinal population-based cohort of Canadian adults. Canadians in food insecure households had more than 2 times the risk of type 2 diabetes compared to those in food secure households [HR = 2.29, 95% CI = 1.24-4.23]. Significantly increased diabetes risk was higher in males [HR = 2.71, 95% CI = 1.15-6.36] than in females [HR = 2.28, 95% CI = 1.08-4.83]. Additional adjustment for BMI attenuated the association between food insecurity and type 2 diabetes [HR = 2.18, 95% CI = 1.09, 4.37]. However in sex-stratified results, this attenuation was only observed in females. Our findings indicate that food insecurity is independently associated with increased diabetes risk. Understanding diabetes risk from a broader perspective, including a comprehensive understanding of socioeconomic and biological pathways is paramount for informing policies aimed at mitigating the burden of type 2 diabetes in Canada.

Co-Author(s): Christopher Tait, Mary L'Abbe, Peter Smith, Laura Rosella

The progression from prediabetes to type 2 diabetes among recent immigrants and long-term residents to Canada: A population-based cohort study

Presented by: **Ghazal Fazli**, PhD Candidate, University of Toronto

We aimed to investigate the progression from prediabetes to diabetes among recent immigrants (RIs) and long-term residents (LTRs), and whether the progression will differ among immigrant populations of different ethnicities. We used a single commercial laboratory to identify adults aged ≥ 20 who met the case definition of prediabetes (any fasting 6.1-6.9 mmol/L or OGTT 7.8-11.0 mmol/L) between 2002-2011. These records were linked to anonymous federal immigration data for information on world region of birth and other immigration factors, and the Ontario Diabetes Database to ascertain new diabetes cases up to Dec 31st 2013. The ODD is a validated algorithm using hospital records and physicians' fee-for-service claims. We used Fine and Gray's competing risks modeling to examine the progression from prediabetes to diabetes among RIs and LTRs. Overall, RIs (N=23,478) were younger at baseline (mean age 50 vs. 57 years) compared to LTRs (N=111,085). Cumulative incidence among RIs was higher compared to LTRs, 62.3% and 55.8%, respectively. Diabetes incidence was 9.72 per 100 person-years (py) for RIs and 8.52 per 100-py for LTRs, after 4.4 years median follow up time. After adjusting for covariates including age, sex, income, immigration class, marital status, education, and time since landing (RIs only), diabetes incidence was highest among South Asian (HR: 1.67, 95% CI 1.52 to 1.83) and South-East Asian groups (HR: 1.61, 95% CI 1.45 to 1.78) than white western Europeans. The annual rate of progression to diabetes was 5-5.5% across all non-Western Europeans groups, indicating a significantly higher risk, compared to Western European populations. We found that progression from prediabetes to diabetes among immigrants to Canada was elevated among RIs across different ethnic populations, which has important implications for informing future research and policy interventions for diabetes prevention targeting high risk groups.

Co-Author(s): Ghazal Fazli, Gillian Booth, Reza Rezaei, Rahim Moineddin, Arlene Bierman

B3: HEALTH SERVICES RESEARCH & ECONOMICS

Reducing scoring uncertainty in the EQ-5D health utilities: A Bayesian approach using spatial Gaussian correlation structure

Presented by: **Shahriar Shams**, PhD Student, University of Toronto

Scoring algorithm for EQ-5D-3L is constructed subject to a large degree of uncertainty. The purpose of this work was to quantify and minimize this uncertainty which is currently ignored. The scoring algorithm was developed through valuation studies where only a subset of the total number of health states was directly valued. Predicted values from a regression model were used to assign utilities to the unvalued health states. We used the US valuation study data from 3773 respondents, which valued 43 of the EQ-5D-3L's 243 health states. A Bayesian approach was used to calculate predicted utilities and prediction intervals. A spatial Gaussian correlation structure was used on the model misspecification errors which allows them to contribute to the predicted utility of nearby health states. Using the posterior mean of misspecification errors reduced the parameter uncertainty of the valued health states (SD 0.0109) which is a substantial reduction from the parameter uncertainty in the current practice (SD 0.038). Use of spatial Gaussian correlation structure resulted in a further 21% reduction in mean squared error. Using the posterior mean in conjunction with spatial correlation structure resulted in more precise estimation of the US EQ-5D-3L value set. Given the considerable uncertainty in the value sets, we suggest considering this approach in constructing scoring algorithms for both the EQ-5D-3L and other instruments.

Co-Author(s): Shahriar Shams, Eleanor Pullenayegum

Using primary care electronic medical record data and machine learning to predict acute care use

Presented by: **Colin Weaver**, MSc Student, University of Calgary

While many who receive acute care services have conditions that require intensive treatment, some have complex health and social needs which could be addressed more effectively upstream in outpatient settings. This work will develop prediction models using primary care electronic medical record (EMR) data to identify individuals at high risk of subsequent acute care use. Those identified may benefit from interventions to improve health, prevent acute care use, and reduce overall health care costs. We will obtain routinely collected primary care EMR data from Alberta adults available from the Canadian Primary Care Sentinel Surveillance Network. These data include information on patients' demographics, diagnoses, lab results, prescriptions, and number of primary care encounters. We will link these data to acute care administrative health data held by Alberta Health Services. We will have primary care data from an estimated 200,000 Albertans, who will have had approximately 500,000 acute care visits between 2011 and 2016. Prediction models will include conventional regression (logistic, regularized logistic) as well as machine learning methods (regression trees, neural networks, ensemble methods). We will predict three outcomes over a 12 month horizon in separate models: 1) at least 1 hospital admissions, 2) at least 3 emergency department visits, and 3) top 5% in acute care costs. We will repeat these analyses restricting to acute care use for ambulatory care sensitive conditions. The best performing method will be selected based on bootstrapped cross-validated estimates of test data prediction error. The final prediction algorithm will enable primary care practices to identify patients at high risk of acute care use, an important first step in improving the care for these individuals. This work will also determine the feasibility and predictive performance of using machine learning and primary care EMR data to predict acute care use.

Co-Author(s): Colin Weaver, Kerry McBrien, Tolulope Sajobi, Paul Ronksley, Brendan Lethebe, Tyler Williamson

Homelessness status and the frequency of accessing primary care in the context of a large Canadian city: a modeling study

Presented by: **Laura Rivera**, Research Associate, W21C, O'Brien Institute for Public Health, University of Calgary

Little is known about the experiences of the homeless once connected to a family physician. We sought to elucidate the impact of homelessness on frequency of visits to primary care. This work takes place at a community primary care clinic closely situated to a number of shelters in Calgary, Alberta, which manages many homeless individuals. We undertook a retrospective chart review using study data from the clinic's electronic medical record, extracting data from July 1, 2015 to June 30, 2016. We investigated the relationship between current homelessness and the rate of visits to primary care, defined as the count of visits associated with a patient accounting for length of patient's attachment to their primary care physician. We used negative binomial regression adjusting for patient age, sex, and comorbidity score. The study analyzed 336 patients, of which 49 were homeless (14.6%). The mean number of visits for homeless patients was 11.4 for the study period, compared to 3.8 visits for non-homeless patients ($p < 0.0001$). Overall, the multivariate adjusted model indicated that the rate of homeless individuals accessing primary care physicians was 2.65 times greater than the rate for non-homeless individuals (rate ratio [RR] 2.65, 95% confidence interval [95% CI] 2.11-3.33; $p < 0.0001$) when adjusted for age, sex, and comorbidity score. When stratified by sex, the magnitude of the risk ratio was stronger for males (females, RR 2.01, 95% CI 1.33-3.05, $p < 0.0001$; males, RR 2.85, 95% CI 2.16-3.77, $p < 0.0001$). In this setting, homelessness status is associated with an increased rate of visits to primary care. These results bear implications for physicians managing homeless individuals, as well for decision-makers involved in developing physician remuneration schemes that may work to incentivize physicians to roster complex patients.

Co-Author(s): Laura Rivera, Edwin Khoo, Matthew Henschke, Michael Forseth

A population-based study of patient and system factors associated with advanced cutaneous melanoma in Ontario

Presented by: **Meaghan Mavor**, Master's student, Queen's University

We undertook a population-based study of melanoma in Ontario investigating the relationship between advanced melanoma and patient and health system factors that may be unrelated to melanoma biology. A 65% random sample of all invasive cutaneous melanoma in Ontario from 2007 to 2012 was identified in the Ontario Cancer Registry (OCR), and pathology reports on these cases were obtained. Reports were abstracted according to a standardized algorithm and linked to OCR. The data from each patient's first melanoma diagnosis was utilized. Associations between advanced melanoma (thickness >2.0mm) and patient-, health system-, and tumor- factors were described. The Rurality Index of Ontario categorized rurality, and the Ontario Marginalization Index, socioeconomic status (SES). Multivariable modified Poisson regression was utilized. 9085 people were identified, of which 8128 had thickness information. 46.72% of patients were female and the median age at diagnosis was 62. 25.70% of patients had advanced melanoma (>2.0mm). In unadjusted analyses, males were 1.384 times more likely than females to be diagnosed with advanced melanoma (95%CI:1.28-1.49); patients living in a rural setting were not more likely to be diagnosed with advanced melanoma (RR:0.96; 95%CI:0.88-1.04); those of the lowest SES quintile were at the greatest risk of advanced melanoma (RR:1.54; 95%CI:1.36-1.74); and, advanced melanoma risk varied by health region (RR range:0.73-1.10, p=0.0011). In multivariate regression, advanced age (RR:1.011 per year, 95%CI:1.008-1.0127), male sex (RR:1.12, 95%CI:1.05-1.19), lowest SES quintile (RR:1.26, 95%CI:1.13-1.40), and health region (RR range:0.93-1.35, p=0.0045) were significantly associated with advanced melanoma. Disparate rates of advanced melanoma between the sexes, age, SES and health region suggests there may be inequitable access to timely diagnosis of melanoma in Ontario. This highlights a potential opportunity for system improvement to ensure timely and equitable access to care for melanoma.

Co-Author(s): Meaghan Mavor, Harriet Richardson, Grace Miao, Timothy Hanna

Using mortality rate forecasting in health economic evaluation

Presented by: **Mohammad Kaviul Khan**, Clinical Research Project Coordinator, Child Health Evaluative Sciences, The Hospital for Sick Children

Decision models in health typically consider age-specific, all-cause mortality as deterministic and time-constant. This study investigates the impact of using mortality rate projections on the outcomes of decision models. A previously published decision model from a cost-effectiveness study comparing two hip replacement strategies in the United Kingdom was used for illustration purposes. All-cause age/gender-specific mortality rates in the model were informed either directly from the 1999 life-table (period method) or through forecasts, based on historical life-tables (cohort method). Forecasts were obtained using the Hyndman-Ullah forecasting model combined with a random walk with drift time-series. Life-tables were sourced from Human Mortality Database. The impact of the two mortality methods on the cost-effectiveness outcomes (incremental costs, quality-adjusted life-years (QALYs) gained, incremental cost-effectiveness ratio (ICER)) and their uncertainty was estimated. When age/gender-specific mortality rates from the 1999 life-tables were used, the ICER comparing new prosthesis to standard care were £387.39/QALY gained (incremental cost = £27 and QALY gained = 0.07) and £2179.31/QALY (incremental-cost = £97 and QALY gained = 0.04) respectively. When projected mortality-rates obtained from 1974-1999 life-tables applying Hyndman-Ullah was used, the ICERs were £164.86/QALY gained (incremental-cost = £13.5 and QALY gained was 0.08) and £1817.54/QALY gained (incremental-cost = £91 and QALY gained = 0.05). From probability sensitivity analysis it was observed that the mortality probabilities explained 5.8% of the total variation in the male for both QALY gained and incremental-cost, when, uncertainties around mortality-rates were incorporated. For females the explained variation was 6.1% and 5.2% respectively for QALY gained and incremental-cost. Using mortality forecasts reduces bias and improves characterization of uncertainty in cost-effectiveness studies. This has important policy implications, since decision makers rely on cost-effectiveness outcomes for long-term healthcare planning. Future work should consider the implications of these forecasting methods on policy implementation and healthcare budgeting.

Co-Author(s): Mohammad Kaviul Khan, Petros Pechlivanoglou

Preventing alcohol-related cancer: what if everyone drank within the guidelines?

Presented by: **Elisa Candido**, Acting Group Manager, Cancer Care Ontario

1) Estimate the proportion and number of cancers attributable to alcohol consumption in Ontario in 2012; 2) Compare with estimates assuming consumption had not exceeded two sets of drinking guidelines. We calculated population attributable fractions (PAFs) for six cancer types using drinking prevalence from the 2000/01 Canadian Community Health Survey and relative risks obtained from meta-analyses. We multiplied each PAF by the number of incident cancers in 2012, allowing for a 12-year latency period, to calculate the number of alcohol-attributable cases. We also estimated the numbers of alcohol-attributable cases assuming consumption had not exceeded the levels recommended by 1) Canada's Low-Risk Alcohol Drinking Guidelines (LRADG) or 2) the cancer-specific guidelines from the World Cancer Research Fund and American Institute for Cancer Research (WCRF/AICR). 1,207 new cases of cancer diagnosed in Ontario during 2012 were attributable to alcohol consumption, representing approximately 1.6% of all new cancer cases and 5.1% of alcohol-related cancer cases (i.e., cancers of the oral cavity and pharynx, esophagus, colorectum, liver, larynx, and female breast) diagnosed that year among Ontario adults aged 31 years and older. If no Ontario adults had exceeded the LRADG, an estimated 286 fewer cancer cases would have been diagnosed in 2012. An estimated 434 fewer cancer cases would have been diagnosed if no Ontario adults had exceeded the WCRF/AICR guidelines, which have lower recommended limits for daily consumption than the LRADG. Strategies to reduce alcohol consumption in the population, even to the levels recommended by drinking guidelines, may reduce the associated cancer burden in Ontario.

Co-Author(s): Stephanie Young, Elisa Candido, Norman Giesbrecht, Julie Klein-Geltink

Effects of sleep duration on all cancer incidence rates in the Alberta Tomorrow Project cohort

Presented by: **Jessica McNeil**, Postdoctoral Fellow, Alberta Health Services

To investigate the etiologic association between sleep duration and cancer incidence in Alberta's Tomorrow Project (ATP) cohort. Previous research has demonstrated U-shaped associations between sleep duration and deleterious health outcomes. This analysis included 38,754 Albertans aged 35-65 years at baseline from the ATP cohort who were recruited from 2008-2015. Cancer incidence was determined through record linkage with the Alberta Cancer Registry. Data on sleep duration and potential confounders were obtained through self-administered questionnaires. Cox proportional hazard regression was conducted to evaluate the effects of sleep duration on incidence of all cancers. Models were adjusted for age, sex, highest level of education, English as a first language, smoking status and alcohol intake. Data on sleep duration were available for 38,380 participants. By 2016, there were 1,264 incident cases of cancer. Reporting ≤ 6 hours of sleep/day (short sleep duration) was significantly associated with increased incidence of all cancers (unadjusted hazard ratio (HR) = 1.22, 95% confidence interval (CI): 1.06-1.41; $P = 0.01$) versus the reference group of 7-9 hours of sleep/day (optimal sleep duration). This association remained after adjusting for confounders (adjusted HR = 1.19, 95% CI: 1.03-1.37; $P = 0.02$). There was no statistically significant difference in all cancer incidence rates between participants reporting > 9 hours of sleep/day (long sleep duration) compared to 7-9 hours of sleep/day (adjusted HR = 1.01, 95% CI: 0.74-1.36; $P = 0.97$). Short sleep duration was associated with an increased risk for all cancers, compared to optimal sleep duration. These results corroborate previous findings on the associations between short sleep duration and deleterious health outcomes. Additional analyses will investigate associations between sleep duration and site-specific cancer incidence.

Co-Author(s): Jessica McNeil, Amanda Barberio, Christine Friedenreich, Darren Brenner

The Long-Term Risk of Cardiovascular Disease Incidence in Lymphoma Survivors: A Systematic Review and Meta-Analysis

Presented by: **Alexis Mickle**, Graduate Student, Alberta Health Services

We assessed the long-term risk of cardiovascular disease (CVD) and CVD sub-types among long-term survivors of Hodgkin's lymphoma (HL) and Non-Hodgkin's lymphoma (NHL) relative to the general population. A systematic review and meta-analysis was conducted on late CVD incidence in lymphoma survivors. Embase, Medline, and CINAHL databases were searched for all relevant articles published before November 22, 2016. Observational studies that estimated CVD risk in lymphoma survivors with a minimum of 5-year survival or 10-year follow-up from diagnosis were included. Using DerSimonian and Laird random-effects model, relative risks were assessed independently in HL and HNL survivors. In addition, subgroup meta-analysis was performed for CVD subtypes in HL survivors. Study quality assessment was based on the Newcastle-Ottawa scale, while several variables were assessed as potential sources of heterogeneity. The literature search resulted in 6016 papers of which 19 distinct articles were included in the meta-analysis. Reviewer agreement was strong ($\kappa = 0.73$). The relative risk of a cardiovascular event was 1.93 (95% CI: 1.37 to 2.71; $p < 0.01$; $I^2 = 94.2$) in HL survivors and 1.72 (95% CI: 1.30 to 2.27, $p < 0.01$; $I^2 = 97.7$) among NHL survivors compared to the general population. In addition, secondary analysis by CVD subtype revealed notable excess risk among HL survivors for valvular heart disease, pericardial disease and myocardial disease and appeared to be greater among those treated in childhood. The proportion of females and the median age of diagnosis were statistically significant sources of heterogeneity ($p < 0.01$), while the median duration of follow-up was borderline significant ($p = 0.10$). Current literature suggests that lymphoma survivors are at an elevated risk of CVD, likely related to the cardiotoxic effects of chemotherapy and radiation therapy. These findings support the implementation of awareness and screening programs focused on improving the cardiovascular health of lymphoma survivors.

Co-Author(s): Alexis Mickle, Devon Boyne

The Long-Term Risk of Cardiovascular Disease Mortality in Lymphoma Survivors Compared to the General Population: A Systematic Review and Meta-Analysis of Observational Studies

Presented by: **Devon Boyne**, PhD Student, Alberta Health Services

Cardiotoxicity has been identified as one of the late complications of cancer therapy. Our objective was to quantify the association between prior lymphoma treatment and cardiovascular disease risk. A systematic review and meta-analysis was conducted using a pre-specified protocol (PROSPERO Registration Number: CRD42016052342). Articles indexed in Embase, Medline, and CINAHL prior to November 22nd, 2016 were systematically searched. Eligibility was assessed independently and in duplicate. Disagreements were resolved by consensus. A pooled estimate of the relative risk of death from any cardiovascular event was obtained using a DerSimonian and Laird random-effects model. Heterogeneity was quantified using the I-squared statistic. A set of criteria based on the Newcastle-Ottawa Scale were used to appraise study quality. Potential publication bias was identified using Egger's test and funnel plots. Of the 6016 articles identified, 20 were deemed eligible for inclusion. There was strong agreement with respect to the assessment of eligibility ($\kappa = 0.73$). The risk of a fatal cardiovascular event was estimated to be 8.52 times greater (95% CI: 6.09 to 11.91) and 5.83 times greater (95% CI: 2.68 to 12.67) among Hodgkin's and Non-Hodgkin's lymphoma survivors respectively. Among Hodgkin's lymphoma survivors, the pooled effect estimate was greater among studies with a median age of diagnosis less than 19 years (RR = 19.33; 95% CI: 10.06 to 37.12). There is considerable heterogeneity in this body of literature (I-squared range: 92.5% to 94.4%). Publication bias is suspected and there is a high risk of bias in this literature due to residual confounding. The literature suggests that prior lymphoma treatment confers a long-term elevation in the risk of fatal cardiovascular disease, particularly among childhood lymphoma survivors. We plan to conduct further meta-analyses stratified by various demographic and treatment characteristics.

Co-Author(s): Devon Boyne, Alexis Mickle, Darren Brenner, Christine Friedenreich, Doreen Rabi

Bacillus Calmette-Guerin (BCG) vaccination and lymphoma: preliminary results from a systematic review and meta-analysis

Presented by: **Marie-Claude Rousseau**, Full Professor, Institut National de la Recherche Scientifique (INRS) - Institut Armand-Frappier

1) Systematically review epidemiological studies evaluating the association between bacillus Calmette-Guérin (BCG) vaccination, a non-specific stimulator of the immune function, and Hodgkin's and non-Hodgkin's lymphoma, and 2) Conduct a meta-analysis. Eligible studies were identified by a PubMed search of scientific articles up to January 2017, and a search of each relevant article's references. A total of 8 studies were deemed eligible. Each study was summarized and information was gathered using a data extraction form. Summary odds ratios (ORs) and 95% confidence intervals (CI) were estimated using fixed or random effects models. The latter was used if moderate or substantial heterogeneity was suggested by either Cochran's Q test or the I² index of heterogeneity. BCG exposure was categorized as vaccinated or not. Analyses were performed separately for Hodgkin's and non-Hodgkin's lymphoma. A total of 1,641 articles were initially identified. Five were included and, based on their reference lists, 3 were further added. Of the 8 selected studies, 2 were clinical trials, 5 were case-control studies, and 1 was a case-cohort. Information on BCG vaccination was self-reported (5 studies) or extracted from records (3 studies). Five studies included Hodgkin's lymphoma, whereas all 8 studies addressed non-Hodgkin's lymphoma. The random effects summary OR for the association between BCG vaccination and Hodgkin's lymphoma was 1.21 (95% CI: 0.67 - 2.18). Moderate to substantial heterogeneity was detected (Q=8.0, degrees of freedom (df)=4, p=0.09; I²=50.1). For non-Hodgkin's lymphoma, the fixed effects summary OR was 1.39 (95% CI 1.15 - 1.67), and little heterogeneity was detected across studies (Q=7.8, df=7, p=0.35; I²=10.0). The evidence remains inconclusive for Hodgkin's lymphoma, whereas a positive association was observed for non-Hodgkin's lymphoma. Further analyses taking into account methodological quality are needed as the studies present limitations related to sample size, losses to follow-up, and misclassification of BCG vaccination status.

Co-Author(s): Marie-Claude Rousseau, Florence Conus, Marie-Elise Parent

THURSDAY, JUNE 1

CONCURRENT SESSION C: 8:30AM – 10:00AM

C1: HEALTH SERVICES RESEARCH & ECONOMICS

Characteristics and early healthcare use of refugees in Ontario, Canada

Presented by: **Amanda Alberga**, Epidemiologist , Institute for Clinical Evaluative Sciences (ICES)

To describe characteristics and estimate healthcare use in the first year after being granted refugee status in a 10-year cohort of refugees compared with non-refugee immigrants and long-term residents. Population-based, cohort study conducted in Ontario, Canada from 2003-2013 using linked data from the Immigration, Refugees and Citizenship Canada permanent resident database and health administrative databases. Main exposure was immigration classification. We compared government-assisted refugees, privately-sponsored refugees, refugees landed in Canada to non-refugee immigrants, and long-term residents. Healthcare utilization within the first year of arrival was captured for emergency department visits, inpatient hospitalizations, and outpatient visits. Of the 174,078 refugees, 13% were government sponsored, 10% privately sponsored, 52% landed in Canada, and 25% were refugees with humanitarian considerations. The majority of refugees were between 18-45 years (58%), single (50%), had 0-12 years of schooling (66%), and resided in the lowest neighbourhood income quintile (50%). Refugees were primarily from Africa (17%), and South Asia (20%), and 99% settled in urban communities. In year one, 22% of government sponsored refugees exhibited moderate to high comorbidity, as reflected in their incidence rates of 5.7 inpatient hospitalizations and 28.2 emergency department (ED) visits per 1000 person-months (PM) compared with privately-sponsored refugees (4.1 hospitalizations and 19.8 ED visits per 1000 PM) and refugees landed in Canada (4.1 hospitalizations and 21.4 ED visits per 1000 PM) respectively. Baseline differences revealed variation amongst immigrant subgroups during early settlement. Differential patterns in comorbidity and healthcare utilization suggest government sponsored refugees have higher healthcare needs as a reflection of health status. These results can be used to understand health needs and inform settlement planning.

Co-Author(s): Amanda Alberga, Natasha Saunders, Wanrudee Isaranuwachai, , Paul Kurdyak, Astrid Guttmann

Effects of behavioural risk factors on high cost users of healthcare: a population-based study

Presented by: **Amanda Alberga**, Epidemiologist , Institute for Clinical Evaluative Sciences (ICES)

To investigate the association between health behaviour risks and downstream high cost healthcare utilization of Ontario residents. A cohort of participants from the Canadian Community Health Survey (CCHS) cycles 2005-2009 were prospectively linked to population-based health administrative data in Ontario, Canada. Using a person-centered costing methodology, CCHS respondents were ranked according to healthcare utilization costs and categorized as ever having high cost user (HCU) status (i.e. top 5%) in any of the 4 years following interview. Among non-HCUs at baseline, logistic regression models were used to estimate the association between health behaviours such as smoking, alcohol consumption, physical activity, diet, cumulative number of health behaviours and becoming an HCU. Models estimated that smoking and physical inactivity were most strongly associated with the age-adjusted odds of becoming an HCU. Relative to non-smokers, current smokers had 61% greater odds of becoming an HCU (AOR: 1.61; 95% CI: 1.35-1.92; $p < .0001$). Compared to participants that reported being physically active, inactive respondents had 27% greater odds of becoming an HCU (AOR: 1.27; 95% CI: 1.12-1.45; $p = .0003$). After adjusting for income the association between diet and becoming an HCU was attenuated (AOR: 1.16; 95% CI: 0.98-1.37; $p = 0.2645$). The number of health behaviour risks was positively associated with the odds of becoming a HCU in subsequent years. Having 3 behavioural risk factors demonstrated the strongest association (AOR: 1.64; 95% CI: 1.28-2.10; $p < .0001$). The analyses demonstrate that risky health behaviours are associated with future high cost utilization. Health behaviours are a meaningful target for health promotion programs. Findings can inform decision-makers on appropriate targets for those on an HCU trajectory to promote long-term sustainability of the healthcare system.

Co-Author(s): Amanda Alberga, Laura Holder , Kathy Kornas, Catherine Bornbaum, Laura Rosella

Leveraging a Provincial Network to Describe Population Trends in Palliative Care Service Use in Ontario

Presented by: **Lauren Della Mora**, Senior Analyst, Cancer Care Ontario

To present the Ontario Palliative Care Network's (OPCN) approach to describing the current state of palliative care service use from a provincial capacity planning perspective. Collaborated with OPCN's clinical, research and system experts in an iterative process to identify palliative care capacity planning goals based on provincial priorities, and develop health service utilization metrics related to those goals. Metrics were produced by extracting and linking administrative database records generated during patients' last year of life, summarized by region, and presented as rates/proportions in an Excel tool that allows for inter-region comparisons. Administered a survey among regional partners to collect information on unique system features, bed counts and data caveats. Survey data was analyzed with a mixed methods approach and summarized regionally, highlighting common themes. Together, the regional metrics and survey responses provide a baseline assessment of system capacity and performance. They emphasize notable regional variation in how health services are used and administered in patients' last year of life. Compiling this information initiated valuable conversations at both regional and provincial levels on factors contributing to observed variation and opportunities to better understand successes and challenges, scale-up innovations and enhance data reporting practices. Data gaps limiting our understanding of Ontario's palliative care system have been identified for further consideration. Pre- and post-survey meetings with regional partners fostered collaborative relationships, helped tailor analyses to local planning needs, and identified options for translating metrics into practice. The Excel tool delivers essential service utilization information to regional planners that was previously unknown. Continued collaboration with regional partners and access to sub-region level data will enhance OPCN's understanding of the current state and system challenges. Engaging clinical and data experts will be critical to address data gaps and identify priority goals for palliative care capacity planning in Ontario.

Co-Author(s): Lauren Della Mora, Deanna Wu, Daphne Sniekers, Deanna Bryant, Nathalie Sava, Rachel Boissonneault, Angelika Gollnow, Lisa Favell

Health care service utilisation and unmet health care needs of rural Indigenous peoples in Canada: A population-based study

Presented by: **Arlanna Pugh**, Graduate Student, Queen's University

This study explores when and how off-reserve rural Indigenous peoples use health care services, and why their health care needs are unmet compared to rural non-Indigenous peoples residing in Canada. Unmet health care needs are classified according to the five dimensions of access to health care: availability, affordability, accessibility, accommodation, and acceptability. Three cycles (2012-2014) of the cross-sectional Canadian Community Health Survey were used to analyse patterns of short-term utilisation (visiting a health professional within the last 12 months), long-term utilisation (having access to a regular medical doctor), and reasons for unmet health care needs. Cross-tabulations and logistic regression, adjusted for health and socio-demographic factors, determined the prevalence and odds of rural Indigenous peoples compared to rural non-Indigenous peoples in using health services and having unmet health care needs. The prevalence of Indigenous peoples who have a regular medical doctor (77.9% [75.7%, 80.1%]) was significantly less than non-Indigenous peoples (87.1% [86.5%, 87.6%]). Fewer Indigenous peoples visited a physician, dentist, optometrist, or medical specialist within the last 12 months compared to non-Indigenous peoples, whereas a higher proportion was shown for nurse visits. Unmet health care needs were significantly more prevalent among Indigenous peoples (10.0% [8.4%, 11.6%]) compared to non-Indigenous peoples (6.8% [6.4%, 7.2%]). Among those who had an unmet health care need, a greater proportion of Indigenous peoples identified cost (affordability), inadequate care (acceptability), and unavailability in the area (accessibility) as reasons for not receiving care, whereas a greater proportion of non-Indigenous peoples identified inconvenient hours (accommodation) and long waiting times (availability) as reasons. Limited short- and long-term health care service use and a greater prevalence of unmet health care needs among Indigenous peoples may encourage a targeted approach to delivering patient-centered, culturally sensitive care in rural Canadian communities. A weighted logistic regression further exploring this association is forthcoming.

Co-Author(s): Arlanna Pugh, Heather Castleden, Colleen Davison

Investigating the value of a tailored knowledge synthesis approach for rare diseases: Focus groups with various stakeholders

Presented by: **Kylie Tingley**, PhD candidate, University of Ottawa

The objective of this study is to engage with stakeholders (i.e., patients/families, physicians, and policy-advisors) to better understand their perspectives on evaluating and synthesizing treatment effectiveness evidence for rare diseases. We conducted focus group interviews by telephone to elicit opinions on evaluating evidence for rare diseases from various stakeholder groups. A purposive sampling approach was used to ensure sufficient diversity and contrasting opinions. Using a semi-structured interview guide, participants were asked to describe their general perspectives on the challenges in rare disease research, their processes for evaluating and synthesizing evidence, and their thoughts on outcomes used in rare disease research. Each interview was recorded and transcribed by a member of the study team. Transcripts were analyzed using interpretive description to identify key concepts and better understand stakeholder perspectives. To date (February 2017), we have conducted two focus group interviews, with metabolic physicians (n=6) and policy advisors (n=3). Participants described many limitations of clinical trial evidence for rare diseases, including insufficient length of follow-up, lack of clinically meaningful outcomes, lack of standardized health outcome measures for rare disease populations, and poor external validity (i.e., full clinical spectrum of disease not captured). Participants from both groups also expressed concerns about bias in industry-funded research. Participants in both groups suggested that if a treatment is transformative or there are no alternative treatments available, research studies do not need to be as methodologically rigorous; however, some participants noted that this is rarely the case, especially since supportive care can be used as a comparator. The next step for this project is to conduct focus groups with other stakeholders, including patients/families. Data collected as part of these interviews will be used to shape the development of an evidence framework for evaluating and synthesizing treatment effectiveness evidence for rare diseases.

Co-Author(s): Kylie Tingley, Beth Potter, Doug Coyle, Pranesh Chakraborty, Ian Graham, Kumanan Wilson

C2: CANCER

Projection of Cancer Incidence in Alberta's Tomorrow Project from 2017 to 2036

Presented by: **Jian-Yi Xu**, Biostatistician, Alberta's Tomorrow Project, CancerControl Alberta, Alberta Health Services, Alberta

Prediction of cancer case accrual in cohort studies can inform the planning of well-powered research study designs. We investigated statistical models for projecting cancer incidence in Alberta's Tomorrow Project (ATP). ATP is a prospective cohort study of adults (35-69 years) who had never been diagnosed with cancer at enrollment (n = 54,931; 36% men, 64% women). Incident cases of cancer were identified through the Alberta Cancer Registry. Age groups were defined in 5-year increments and age structure shift was calculated with the assumption of a closed projection system. The calculated sub-samples were adjusted for life expectancy (2010 Alberta Life Table). Using SAS and R, multiple types of regression were used to extrapolate the age-specific rates calculated in the past to the defined projection period (2017-2036), and stratified by sex and cancer type. Using a direct global method (extrapolating from past cancer incidence in ATP), 11,080 incident cancer cases (excluding non-melanoma skin cancer) were projected over the period from 2017 to 2036 in the cohort. When applying a hybrid model incorporating the age structure shift of ATP cohort and Alberta population-based rates, this projection increased to 13,734. The projection was then adjusted to 11,949 when the past observed ATP rates were applied to the sex- and age group- based provincial rates. Compared to the observed cancer incidence in ATP in 2014-2015, the hybrid model projected 15.9% more cases. However, this over-projection was reduced to 4.6% when the provincial rates included in the hybrid model were adjusted by factor specific to ATP as a prospective cohort. The adjusted hybrid model, integrating ATP cohort data and Alberta population data, generated a reasonable long-term projection of cancer incidence in ATP. Both a long-term (10 years) internal validation and an external validation (e.g. using another cohort) are needed for wider application.

Co-Author(s): Jian-Yi Xu, Zhenguo Qiu, Ilona Csizmadi, Jennifer Vena, Paula Robson, Lorraine Shack, Haocheng Li

Lifestyle and Cancer Prevention in Canada: Estimating the Current and Future Avoidable Cancer Burden

Presented by: **Darren Brenner**, Research Scientist/Adj. Assistant Professor, University of Calgary

As part of a national cancer burden estimation project (ComPARE), we are estimating the current attributable and future avoidable burden of cancer due to modifiable lifestyle factors in Canada. We synthesized the epidemiologic literature on modifiable lifestyle factors and cancer. For relevant exposure-disease associations, we identified risk estimates from collaborative panels and meta-analyses. Current exposure prevalence was obtained from national population-based surveys. Exposure prevalence was projected to 2032 using logistic, multinomial or spline models. Current age-sex-specific incidence data were from the Canadian cancer registry. Cancer incidence data were projected to 2042 using age-period-cohort models and historical registry data from 1969-2012. We used a population attributable risk framework to estimate current burden and a potential impact framework to examine the future avoidable burden under a range of counterfactual exposure scenarios. Our burden estimation framework included: tobacco (active and passive), alcohol, excess body weight, physical inactivity, fruit and vegetable insufficiency, calcium insufficiency, excess red and process meats, excess salt intake, oral contraceptive use and hormone replacement therapy. We estimate that the population attributable risks for cancer incidence are 31.0% (30.0-32.2%) for active tobacco smoking (14 cancer sites), 2.6% (1.8-3.3%) for passive smoking (4 cancer sites), 4.4% (4.2 - 4.7%) for alcohol (8 cancer sites), 10.8% (9.8-11.6%) for excess body weight (14 cancer sites), 10.3% (8.8-11.7%) for physical inactivity (15 cancer sites), 11.7% (8.5-14.4%) and 5.9% (4.9-7.0%) for insufficient fruit and vegetable intake (10 and 8 cancer sites), respectively. Future avoidable burden of cancer results will be available at the time of the meeting. Modifiable lifestyle factors account for a sizeable proportion of the current cancer burden in Canada – with dramatic variations by province/region. Presently available individual and population-level interventions are estimated to reduce tens of thousands of cases of cancer nationally by the year 2042.

Co-Author(s): Darren Brenner, Abbey Poirier, Yibing Ruan, Farah Khandwala, Xin Grevers, Stephen Walter, Will D. King, Paul A Demers, Paul Villeneuve, Eduardo Franco, Christine Friedenreich, on behalf of the ComPARE team

Shift work patterns, chronotype, and epithelial ovarian cancer risk

Presented by: **Lisa Leung**, Master's Student, Department of Public Health Sciences, Queen's University

To evaluate cumulative exposure to shift work from different work patterns in relation to epithelial ovarian cancer risk, taking into account interaction by chronotype and menopausal status. The PRevention of OVarian Cancer in Quebec (PROVAQ) study is a population-based case-control study in Montreal, Canada (2011-2016) with 496 cases and 906 controls. For each participant, lifetime work history was collected during an in-person interview, from which cumulative exposure to night shifts (NS) and/or evening shifts (ES) was calculated. Cumulative years of shift work among ever shift workers was categorized into tertiles and compared to never shift workers. Using multivariable logistic regression, odds ratios (ORs) and 95% confidence intervals (CIs) for ovarian cancer risk were estimated. Confounders were assessed using a combination of directed acyclic graphs and change-in-estimate procedures. The prevalence of ever shift work was 53.4% (15.7% NS; 37.7% ES only) among cases and 51.7% (16.4% NS; 35.3% ES only) among controls. The OR (95% CI) for the highest tertile of cumulative shift work compared to never shift workers was 1.20 (0.89-1.63). Compared to never shift workers, no association was observed for the highest tertile of exposure in ever ES and interpretation of risk is limited for the highest tertile of exposure in ever NS (OR=0.88, 95% CI: 0.58-1.36) due to a wide confidence interval. There was some suggestion of a U-shaped risk across cumulative shift work categories for ovarian cancer, which persisted when looking at risk according to tumour behaviour (invasive/borderline) and cancer types (Type I/Type II) using multivariable polytomous logistic regression. While an increased ovarian cancer risk was suggested among ever shift workers, further investigation isolating shift schedules (rotating, fixed with evenings/nights) is needed. Analyses investigating effect modification by chronotype and menopausal status, as well as considering shift work during life periods, will also be conducted.

Co-Author(s): Lisa Leung, Anne Grundy, Kristan Aronson, Anita Koushik

A cancer profile for First Nations in Ontario achieved through linked registry data and partnerships

Presented by: **Sehar Jamal**, Research Associate, Cancer Care Ontario

(1) Demonstrate the success of a partnership and data agreements in providing useful cancer information to First Nations; (2) Estimate cancer burden in First Nations in Ontario from 1991–2010. For over six years, researchers from Cancer Care Ontario and the Institute of Clinical Evaluative Sciences have partnered with the Chiefs of Ontario and First Nations to work towards building a strategy to track cancer patterns in First Nation communities. The partnership and underlying strategy involved linking the Indian Registry System (includes registered First Nations) to the Registered Persons Database (includes information on people with Ontario health insurance coverage) and the Ontario Cancer Registry using deterministic and probabilistic methods. Age-standardized estimates of cancer burden (incidence, mortality, survival and prevalence) were calculated for First Nations and other Ontarians. Compared to other Ontarians, First Nations had significantly lower incidence of prostate, female breast, uterine, thyroid and brain cancer, but significantly higher incidence of lung, colorectal, kidney, liver, cervical and gallbladder cancer. Incidence of cervical and male lung cancer declined significantly from 1991–2010. Five-year observed survival was poorer in First Nations compared to other Ontarians for cancers of the cervix and male lung. Over time, observed survival in First Nations improved for breast and prostate cancers. Our collaboration and adherence to certain principles produced information that was useful to First Nations in evaluating progress as well as planning programs and prioritizing needs for cancer control. Continued partnership work will enable development of research and cancer control priorities.

Co-Author(s): Sehar Jamal, Maegan Prummel, Alexander Yurkiewich, Carmen Jones, Diane Nishri, Jennifer Walker, David Henry, Alethea Kewayosh, Amanda Sheppard, Loraine Marrett

Colorectal cancer treatment for patients with a severe psychiatric illness: evidence for inequalities in a universal health care system

Presented by: **Alyson Mahar**, Postdoctoral Research Associate, Sunnybrook Research Institute

To identify potential inequalities in cancer treatment and cancer-specific survival for patients with schizophrenia, schizoaffective disorders, other psychotic disorders, bipolar disorders or major depressive disorders (severe psychiatric illness, SPI). A retrospective cohort study of colorectal cancer (CRC) patients in Ontario (2007-2012) was performed using provincial, routinely collected linked healthcare data. An SPI history was determined using hospitalization, emergency department, and psychiatrist visit data and categorized as 'no history', 'outpatient SPI history', and 'inpatient SPI history'. Cancer treatment was captured using physician billing, hospitalization, and regional cancer centre data. Vital status data was complete to 10/31/2015. Multiple log-binomial, logistic, and modified Poisson regression were used to investigate cancer treatment disparities. Multiple Cox-Proportional and the Fine & Gray sub-distribution hazards regression were used to investigate CRC-specific survival. We documented evidence of compromised cancer care for individuals with an SPI, including significantly fewer consultations with oncologists, and disparities in the provision of primary, adjuvant, and non-curative treatment. Stage II and III CRC patients with an inpatient SPI history were 2.15 times more likely (95%CI 1.07-4.33) to not receive a surgical resection, and 2.07 times more likely (95%CI 1.72-2.50) to not receive adjuvant treatment. The HR of death from any cause was 1.91 times higher for individuals with an inpatient SPI (95% CI: 1.63-2.25) and 1.40 times higher for individuals with an outpatient SPI history (95% CI: 1.22-1.59). The HRs of cancer-death were slightly lower than the overall estimates. CRC-specific death was 1.69 times higher for individuals with an inpatient SPI (95%CI 1.36-2.09). This is one of few studies worldwide documenting cancer treatment disparities and worse cancer prognosis for individuals with an SPI in a universal healthcare system. Failure to understand and address these cancer care disparities will result in unnecessary harm.

Co-Author(s): Alyson Mahar, Paul Kurdyak, Timothy Hanna, Natalie Coburn, Patricia Groome

Trends in Standardized Mortality among Individuals with Schizophrenia from 1993 to 2012: A Population-Based Study

Presented by: **Evgenia (Jenny) Gatov**, Epidemiologist, Institute for Clinical Evaluative Sciences (ICES)

We examined all-cause and cause-specific mortality time-trends and premature mortality in individuals with and without schizophrenia over a recent 20 year period. In this population-based, repeated cross-sectional study, we identified all individual deaths that occurred in Ontario between 1993 and 2012 in persons ages 15 and over (31,349 deaths in persons with schizophrenia and 1,589,902 deaths in those without). We plotted overall and cause-specific age-sex-standardized mortality rates (ASMR), stratified all-cause ASMR trends by sociodemographic characteristics, and analyzed premature mortality using years of potential life lost. Additionally, we calculated mortality rate ratios (MRR) using a negative binomial regression adjusted for age, sex, income, rurality, and year of death, and tested differences in time-trends and using an interaction term in the model. Individuals with schizophrenia experienced 3 times greater mortality rates, compared to those without (adjusted MRR, 3.12; 95% CI, 3.06-3.17). All-cause ASMRs in both groups declined in parallel (interaction between schizophrenia status and time $p > 0.75$) by about 35%, and were elevated in men, in those with low income, and in rural dwellers. The absolute ASMR difference declined throughout the study period (from 16.2 to 10.5 deaths per 1,000 persons). Cause-specific ASMRs were greater in those with schizophrenia, with circulatory conditions accounting for most deaths between 1993 and 2012, while neoplasms became the leading cause of death for those without schizophrenia after 2005. Individuals with schizophrenia also died, on average, 8 years younger than those without, and lost more potential years of life. While individuals with schizophrenia have experienced declining mortality rates over the past two decades, specialized approaches may be required to close the persistent three-fold gap.

Co-Author(s): Evgenia (Jenny) Gatov, Laura Rosella, Maria Chiu, Paul Kurdyak

Test-retest reliability of child and adolescent psychiatric disorder classifications assessed using standardized diagnostic interviews: a systematic review and meta-analysis

Presented by: **Laura Duncan**, Research Coordinator, Offord Centre for Child Studies, McMaster University

To conduct a systematic review and meta-analysis of test-retest reliability of standardized diagnostic interviews used to assess common child and adolescent psychiatric disorders in both clinic and non-clinic populations. Following a systematic review to identify eligible studies and data extraction by two independent reviewers, random effects meta-analysis and meta-regression of Cohen's kappa (a chance-corrected measure of agreement) were conducted. First, a multilevel random effects meta-analysis was conducted to produce a pooled estimate of Cohen's kappa. Second, a sub-group analysis was conducted using random effects meta-analyses to estimate pooled kappa estimates for parent and youth assessments of seven mental disorders. Third, a series of univariate multilevel meta-regressions were conducted to examine the extent to which between-study heterogeneity in reliability estimates can be explained by study and outcome characteristics. 5,917 articles identified through systematic review were screened for inclusion. Following full-text review of 46 articles, 21 articles published from 1987 to 2011 from 8 countries were selected for inclusion. Based on kappa, average reliability across studies was 0.58 (CI 95% 0.42-0.73) with substantial between-study heterogeneity. Reliability estimates ranged from 0.48 (social phobia) to 0.72 (ADHD) for parent assessments and from 0.38 (oppositional defiant disorder) to 0.68 (conduct disorder) for youth assessments. With the exception of conduct disorder, reliability of assessments was systematically lower and more heterogeneous for youth than parents. Meta-regression identified study recruitment setting, diagnostic criteria, retest interval, disorder, disorder prevalence and age group of the sample as moderators that partially explain some of the between-study heterogeneity in reliability estimates. Our results show that the reliability of standardized diagnostic interviews to assess child and adolescent psychiatric disorders is moderate, highly variable and influenced by a number of factors. These results have both clinical and research implications regarding the assessment and classification of psychiatric disorder.

Co-Author(s): Laura Duncan, Jinette Comeau, Irene Vitoroulis, Michael Boyle, Kathy Bennett

Associations Between Physical Illness and Suicidal Behaviours Among Adolescents and Young Adults

Presented by: **Mark Ferro**, Assistant Professor, University of Waterloo

This study aimed to examine the association between physical illness and suicidal thoughts, plans, and attempts in an epidemiological sample of adolescents and young adults (AYA). AYA aged 15–30 years (n=5,987) in the cross-sectional Canadian Community Health Survey-Mental Health were studied. Multinomial logistic regression was used to examine associations between physical illness and suicidal behaviours, as well as the potential moderating effect of having a comorbid mental illness. Twelve-month suicidal behaviour was measured using the WHO Composite International Diagnostic Interview 3.0 (CIDI). Physical illnesses were measured using self-report, whereas mental illness, classified as mood or substance use disorders according to the DSM-IV-TR, were measured using the CIDI. Prevalence of suicidal thoughts, plans, and attempts were higher in AYA with physical illness compared to healthy controls (8.8%, 3.2%, 2.0% vs. 2.6%, 0.5%, 0.2%, respectively). After adjusting for sociodemographic characteristics and the presence or absence of mental illness, AYA with physical illness had greater odds of reporting suicidal thoughts: OR=1.72 (1.24, 2.39), plans: OR=2.48 (1.33, 4.59), and attempts: OR=6.95 (2.75, 17.57). One interaction was found (OR=2.51(1.29, 5.12), showing that mental illness moderated the association between physical illness and suicidal thoughts. In the presence versus absence of mental illness, the odds for suicidal thoughts was higher among AYA with physical illness. Suicidal thoughts, plans, and attempts are common among AYA with physical illness and represent a considerable public health burden. Health professionals should be vigilant in asking about suicidal behaviour during assessments of AYA.

Co-Author(s): Mark Ferro, Anne Rhodes, Melissa Kimber, Laura Duncan, Michael Boyle, Kathy Georgiades, Andrea Gonzalez, Harriet MacMillan

Quality of life in mothers of children with epilepsy: 10 years after diagnosis

Presented by: **Klajdi Puka**, Graduate student, Western University; Children's Health Research Institute; Lawson Health Research Institute

To evaluate quality of life (QOL) for parents of children diagnosed with epilepsy 10-years previously, between the ages of 4–12, and identify child/epilepsy, parental and family factors for diminished QOL. Data were derived from the Health-Related Quality of Life in Children with Epilepsy Study (HERQULES), a Canada-wide prospective cohort study of children with newly diagnosed epilepsy. A two-stage clustered sampling design was utilized involving pediatric neurologists and their patients. Physicians reported on epilepsy-related characteristics. Parents reported on child/epilepsy, parental and family characteristics at the time of diagnosis and at the 10-year follow-up. Physical and mental health components of parental QOL were measured at follow-up using the SF-12-v2. Hierarchical multiple regressions were conducted to identify child/epilepsy, parent/family, and parental psychological functioning variables associated with physical and mental health components of QOL. Questionnaires were completed by 171 parents. At follow-up, 68% of patients had been seizure-free for the past five years and 87% had been seizure-free for the past year. Parents scored similarly to population norms on the mental health subscale and significantly better on the physical health subscale. However, 13% and 5% of parents scored at least one standard deviation below the population mean on the mental and physical health subscales, respectively. Hierarchical multiple regression identified family resources as the only significant predictor of physical health. For mental health, family functioning, and parental depressive symptoms and perception of stress were significant independent predictors, with the final model accounting for 72% of the variance. Other patient/epilepsy and family variables were not significant in the final model. Ten years after the diagnosis of epilepsy in children, QOL of parents was similar to the general population. This study identified factors contributing to diminished parental QOL and highlights the importance of family and psychosocial functioning over epilepsy-related variables.

Co-Author(s): Klajdi Puka, Kathy Speechley

A heavy burden on young minds: Novel insights into the global burden of substance use in adolescents from 73 low- and middle-income countries (LMICs)

Presented by: **Christopher Tait**, PhD Candidate, Dalla Lana School of Public Health, University of Toronto

The objective of this study was to estimate the prevalence and extent of co-occurring multiple substance use among adolescents in LMICs, and to quantify the degree of heterogeneity across regions. We used individual-level data from the most recent Global School-Based Student Health Surveys. The study sample included 211,165 adolescents aged 12-15 from 73 LMICs. Current alcohol, tobacco, marijuana, and illicit drug use were assessed through self-reported questionnaires. We estimated the prevalence of each substance use behaviour within each country, overall and stratified by gender. We further examined the co-occurrence of multiple substance use by estimating the proportion of students engaging in more than one substance use behaviour. DerSimonian-Laird random effects models were used to pool prevalence estimates according to world regions, and to assess the heterogeneity between countries within each region. The prevalence of alcohol use was 21.9% (95% CI: 17.3%-26.8%) and particularly high among countries in the Americas. The prevalence of tobacco use and marijuana use respectively were 11.9% (95% CI: 10.1%-13.7%) and 4.2% (95% CI: 2.6%-6.1%) with the highest estimates observed among Western Pacific countries. The prevalence of illicit drug use was 6.6% (95% CI: 4.9%-8.5%), lowest in the European region and highest in the Americas region. Overall, the level of substance use in adolescents in LMICs was high, though substantial heterogeneity was observed within and across world regions as well as between boys and girls. Nearly 25% of adolescents are using at least one substance, and of these, 11% reported using three substances concurrently, indicative of risky patterns of drug use. This study is the first to comprehensively investigate the prevalence and co-occurrence of substance use in adolescents in LMICs, using comparable nationally-representative datasets. This work addresses a critical knowledge gap and may provide evidence to guide culturally appropriate policy responses targeting adolescents in resource-poor settings.

Co-Author(s): Christopher Tait, Lauryn Conway

C4: CHROMIC DISEASE & INJURY

Early Mobilization Following Arthroscopic Rotator Cuff Repair; a Single-Blind, Randomized Control Trial

Presented by: **Anelise Silveira**, Research Associate, Alberta Health Services

Early mobilization may allow faster recovery without negatively affecting patient outcomes. This study compared early mobilization to a standard protocol during one year following arthroscopic rotator cuff repair (ARCR). 211 patients with full-thickness Rotator Cuff (RC) tear undergoing an ARCR were randomized to one of two groups following a preoperative assessment of shoulder pain, ROM, strength and health related quality of life (HRQL). During the first 6 postoperative weeks, subjects randomized to early mobilization (n=105) self-weaned from the shoulder immobilizer and performed painfree active ROM while the standard group (n=106) wore a sling for 6 weeks with no active ROM. Shoulder ROM, pain and HRQL were assessed at 6-weeks, 3-, 6- and 12-months postoperatively. At 6- and 12-months, strength was re-assessed and RC integrity was assessed at 12 months. The groups were similar preoperatively (p>0.12). The average age of all subjects was 55.9 (minimum 26, maximum 79) years and 134 (63.5%) were males. Based on reported compliance, both groups were equally compliant (p=0.11). Overall, there was no difference between groups in ROM (p>0.06), WORC (p=0.9), pain (p>0.2), SF-36 (P>0.2) and strength (p=0.5). 52 subjects (24-EM and 28-SR) had a full thickness tear via ultrasound testing (p>0.8). Early ROM did not show significant benefits for minimizing long-term stiffness and pain, but there was no compromise of their postoperative strength or HRQL. Consideration should be given to allow painfree active ROM within the first 6 weeks following an ARCR.

Co-Author(s): Anelise Silveira, Lauren Beaupre, Fiona Styles-Tripp, Martin Bouliane, Robert Balyk, Aleem Lalani, Robert Glasgow, Joseph Bergman, Charlene Luciak-Corea, David Sheps

Validation of a kidney failure risk equation in a population-based cohort of Alberta adults with chronic kidney disease

Presented by: **Rob Weaver**, Statistical Associate, Cumming School of Medicine, University of Calgary

To validate a 2-year kidney failure risk equation (KFRE) in a population-based cohort of Alberta adults with chronic kidney disease (CKD), with and without a referral to a nephrologist. We used administrative data for the Alberta population to identify all adults who met the criteria for CKD in 2012 who had visited/not visited a nephrologist, and to assess treated kidney failure to December 31, 2014. We used age, sex, estimated glomerular filtration rate, and urine albumin-to-creatinine ratio (ACR) to calculate a 2-year risk of kidney failure, imputing ACR where another albuminuria measurement was available, and using a published KFRE. We assessed discrimination and calibration, calculated sensitivity/specificity for 2 year kidney failure using a 10% risk threshold, and fit survival models for the referred/unreferred cohorts, comparing these to published results. We identified 8,816 and 61,816 adults with CKD in the referred/unreferred cohorts, respectively, who had data on all variables after imputation. In the referred cohort, the C-statistic was 0.93 and sensitivity/specificity at 10% risk of kidney failure were 77.0%/92.0%, respectively. In the unreferred cohort, the C-statistic was 0.91 and sensitivity/specificity were 34.0%/99.7%. Hazard ratios in the referred cohort were similar to the published KFRE, while hazard ratios in the unreferred cohort differed somewhat. In the referred cohort, there were 543 observed cases of 2-year kidney failure, compared to 392 predicted (88% and 84% in the highest risk quintile, respectively), while in the unreferred cohort, there were 153 observed cases vs. 192 predicted (83% and 85% in the highest risk quintile). The KFRE showed excellent discrimination and good agreement on hazard ratios, particularly in the referred cohort, although it underestimated risk in the referred cohort, and overestimated risk in the unreferred cohort. This information will be useful as we implement a KFRE-based referral system.

Co-Author(s): Rob Weaver, Michelle Smekal, Robert Quinn, Maoliosa Donald, Braden Manns, Marcello Tonelli, Navdeep Tangri, Brenda Hemmelgarn

Depressive Symptoms in Adolescents and Young Adults with Epilepsy 10 Years after Diagnosis: A Test of the Stress Process

Presented by: **Samanpreet Brar**, Graduate Student, Western University

To assess the association between severity of childhood epilepsy and depressive symptoms 10 years post-diagnosis and to examine the extent to which clinical and family factors mediate this relationship. Data were obtained from the Health-Related Quality of Life in Children with Epilepsy Study (HERQULES), a multi-centre prospective cohort study of children aged 4 to 12 years with new-onset epilepsy followed for 10 years (n=128). Depression was measured using the Center for Epidemiologic Studies Depression Scale (CES-D). Multiple linear regression analyses assessed the relationship between severity of epilepsy two years post-diagnosis and depressive symptoms ten years-post diagnosis. Generalized estimating equation models assessed the mediating effects of family factors (family resources, family functioning, parental depressive symptoms) and current epilepsy-related clinical factors [anti-epileptic drug (AED) use, five-year seizure remission]. Thirty-seven percent of participants had levels of depressive symptoms that were clinically relevant. Adjusting for the potential confounding effects of clinical, socio-demographic and familial factors, childhood severity of epilepsy was positively associated with depressive symptoms 10 years post-diagnosis ($b=-1.94$, 95% CI:-3.75,-0.14). Family resources ($ab=-0.39$, 95% CI:-0.89,0.11), family functioning ($ab=-0.28$, 95% CI:-0.66,0.11) and parental depressive symptoms ($ab=-0.02$, 95% CI:-0.30,0.26) were not found to mediate the relationship between childhood severity of epilepsy and subsequent depressive symptoms. Five-year seizure remission was found to mediate this relationship ($ab=-1.16$, 95% CI:-2.02,-0.30), decreasing the magnitude of the total effect of severity of epilepsy on depressive symptoms by 60%. Current AED use did not mediate this relationship ($ab=-0.22$, 95% CI:-1.15, 0.70). These findings provide insight on long-term effects of the early clinical presentation of epilepsy on the mental health of young people. Clinical efforts to achieve remission and psychosocial interventions/supports to improve family environment appear to be key targets to reduce depressive symptoms in this population.

Co-Author(s): Samanpreet Brar, Kelly Anderson, Mark Ferro, Kathy Speechley

Chronic disruptive pain in emerging adults with and without chronic health conditions: the moderating role of psychiatric disorders

Presented by: **Rana Qadeer**, Student, McMaster University

This study investigated the association between chronic health conditions (CHCs) and chronic disruptive pain (CDP) among emerging adults and the extent to which psychiatric disorders moderate this association. The data come from the 2012 Canadian Community Health Survey – Mental Health. Respondents were 15-30 years of age (n=5987). CDP was measured using a subset of the Health Utilities Index Mark 3 (HUI 3). Group comparisons between respondents with CHCs and healthy controls were made using chi-square tests. Odds ratios (OR) and 95% confidence intervals (CI) were computed from ordinal logistic regression models adjusting for sociodemographic covariates. Product-term interactions between CHCs and psychiatric disorders were included in the models to explore the moderating effects. All analyses were weighted to maintain representativeness of the study sample to the Canadian population. Compared to healthy controls, a greater proportion of participants with CHCs reported having chronic pain (20.3% vs. 4.5%, $p < 0.001$). Among those with chronic pain, respondents with CHCs reported a greater number of activities prevented because of CDP ($X^2=222.28$, $p < 0.001$). Compared to controls, participants with CHCs had greater odds of reporting CDP (OR=4.94, 95% CI=4.08-5.99). Alcohol ($B=-0.66$; $p=0.025$) and drug abuse/dependence disorders ($B=-1.24$; $p=0.012$) were found to moderate the association between CHCs and CDP. The moderating effects suggest that alcohol or drug disorders are especially harmful for young adults without CHCs and contribute to higher levels of CDP; however, among those with CHCs, alcohol and illicit drugs may be used as a numbing agent to blunt CDP. This study demonstrates the robust association between CHCs and CDP among emerging adults. Findings from this study have implications for the integration and coordination of services to design strategies aimed at managing CDP and preventing pain-related disabilities later in life.

Co-Author(s): Rana Qadeer, Lilly Shanahan, Mark Ferro

Time Trends of the Incidence, Prevalence, and Post-Diagnosis Mortality of Parkinsonism

Presented by: **Jessica Wong**, Doctoral student, Dalla Lana School of Public Health, University of Toronto

We assessed temporal trends in the incidence, prevalence, post-diagnosis mortality, and selected comorbidities of parkinsonism (including Parkinson's Disease) in Ontario, Canada over 18 years. We established a retrospective population-based cohort by linking health administrative databases from 1996 to 2013 in Ontario. The population comprised all residents aged 20-100 years with an incident diagnosis of parkinsonism ascertained using a validated algorithm. We calculated age- and sex-standardized incidence, prevalence, and mortality of parkinsonism, stratified by young-onset (aged 20-39 years) and mid/late-onset (aged ≥ 40 years). We assessed trends in incidence using Poisson regression, mortality using negative binomial regression, and prevalence of parkinsonism and selected comorbidities using the Cochran-Armitage trend test. From 1996 to 2013, we identified 73,129 incident cases of parkinsonism (from a source population of 10.5 million in 2013), of whom 56% were male, the mean age was 72.6 years, and 99% had mid/late-onset parkinsonism. The age- and sex-standardized incidence of mid/late-onset parkinsonism decreased 13.0% over 18 years, and was generally unchanged for young-onset parkinsonism, whereas prevalence increased 22.8% for all persons with parkinsonism. The age- and sex-standardized mortality decreased 75.5% for young-onset parkinsonism from 1996 to 2013, and decreased 4.0% from 2003 to 2013 for mid/late-onset parkinsonism. Among the comorbidities considered, the age- and sex-standardized prevalence of chronic obstructive pulmonary disease and stroke decreased by 53.0% and 51.2%, respectively. Young-onset and mid/late-onset parkinsonism exhibited differing trends in incidence and mortality over 18 years in Ontario. Further research is needed to examine the role of comorbidities on influencing the time trends of parkinsonism, especially the incidence.

Co-Author(s): Jessica Wong, Jeffrey Kwong, Karen Tu, Debra Butt, Richard Burnett, Ray Copes, Andrew Wilton, Brian Murray, Alexander Kopp, Hong Chen

CONCURRENT SESSION D: 10:30AM - 12:00PM

D1: PUBLIC HEALTH / POPULATION HEALTH

Knowledge translation and dissemination of new statistics on HPV-associated cancers in Canada

Presented by: **Leah Smith**, Epidemiologist, Canadian Cancer Society

To maximize the impact of new information on the burden of cancers caused by the human papillomavirus (HPV) in Canada on public awareness, public policy and HPV vaccination rates. Canadian Cancer Statistics 2016 included new statistics on the burden of HPV-associated cancers in Canada. To help results reach the broadest and most relevant audiences, a knowledge translation (KT) strategy was developed and executed through a coordinated effort between experts in cancer epidemiology and surveillance, communications, media relations, social media, public policy and advocacy. Activities included developing a press release and key messages, training spokespeople, pitching to the media and creating infographics. Dissemination channels included the media, social media, websites, emails and presentations/webinars. Indicators of the short-term effectiveness of the activities were monitored and assessed. Media engagement resulted in more than 230 news stories (12% French), including 152 articles, 71 radio interviews and 7 television pieces. All had a positive tone and approximately 88% included key messages developed to promote awareness and prevention. Facebook and Twitter posts resulted in almost 400,000 social media impressions and over 5,700 engaged users. Ten presentations and webinars were given to a range of audiences, including cancer control decision-makers and the general public. Emails were sent to more than 4,000 individuals, the majority of whom are cancer researchers. The four provinces without publicly funded HPV vaccination for boys leveraged the exposure to advocate for program expansion, contributing to the policy changes in all. Canadian Cancer Statistics 2016 provided new, important information on HPV-associated cancers in Canada. The KT strategy facilitated dissemination of findings to the public and other key stakeholders in a meaningful way, encouraging more informed HPV vaccine decision-making.

Co-Author(s): Leah Smith, Monika Dixon, Christine Harminc, Robert Nuttall

Cancer Risk Factors and Screening among Inuit in Ontario and other Canadian regions

Presented by: **Maegan Prummel**, Senior Research Associate, Cancer Care Ontario

To enhance understanding of cancer burden among Inuit in Ontario, Cancer Care Ontario and Tungasuvvingat Inuit collaborated to develop estimates of risk factors and screening presented alongside cultural/geographical contexts. Prevalence estimates of modifiable cancer risk factors were measured for Inuit living in Nunangat (traditional Inuit homeland in Arctic regions of Canada), outside Nunangat, and in Ontario specifically (where sufficient sample size permits), using the 2012 Aboriginal Peoples Survey. For comparison, prevalence of modifiable cancer risk factors were also measured for non-Aboriginal Ontarians using the 2012 Canadian Community Health Survey (CCHS). Screening estimates were measured using the CCHS (2005-2012). All estimates were age-standardized to the 2006 Inuit population outside Nunangat. A timeline detailing Inuit culture, conflict and change and an adapted Inuit medical travel map were developed. There are many social, historical and geographical factors that present unique challenges for Inuit living in and outside Inuit Nunangat in achieving and maintaining good health. The prevalence of smoking was highest, and household food security lowest, among Inuit in Nunangat compared to other groups. Compared with non-Aboriginal Ontarians, a higher proportion of Inuit outside Nunangat smoked and a lower proportion lived in food secure households. The trends for Inuit living outside Nunangat were similar for Inuit living in Ontario specifically. Papanicolaou (Pap) test uptake was similar for all groups, while a higher proportion of age-eligible Inuit in the north were overdue for colorectal cancer screening than non-Aboriginal Ontarians. The cancer risk profile of Inuit varies by region, but in general is higher than that observed for non-Aboriginal Ontarians. This consolidated information can be used as a tool to improve cancer control for Inuit populations in Ontario and beyond.

Co-Author(s): Maegan Prummel, Alexandra Hizaka, Caroline Cawley, Sehar Jamal, Michelle Rand, Paani Zizman, Christine Lund, Amanda Sheppard, Jason LeBlanc, Loraine Marrett

Colorectal cancer risk stratification identifies patterns and predictors of adherence to screening recommendations in Alberta's Tomorrow Project participants

Presented by: **Ala Al Rajabi**, Senior Research Associate, Alberta's Tomorrow Project, CancerControl Alberta, Alberta Health Services

To describe adherence to colorectal cancer (CRC) screening recommendations based on stratified risk, and to determine predictors for regular screening behaviour in participants in Alberta's Tomorrow Project (ATP). ATP is a prospective cohort study of Albertans aged 35-69 at enrollment. A subset of participants who completed enrollment and follow-up questionnaires (n=9,641) over 4.2±2.1 years were allocated into four mutually-exclusive risk strata based on the 2008 Alberta-specific "Toward Optimized Practice Clinical Guidelines" and the 2001 "Canadian Task Force on Preventive Health Care" guidelines for CRC screening. These guidelines were also used to assess screening status for CRC screening tests at enrollment and follow-up. Screening status at each time point was used to determine patterns of screening behaviour. Multinomial logistic regression modelling was applied to determine predictors of screening patterns. For the majority of participants (77.1%), age was the only indicator for screening initiation (stratum-1, considered average-risk); among individuals with additional risk factors, 12.5% had a family history of CRC (stratum-2), 8.2% had a bowel condition (stratum-3), and 2.2% had both a bowel condition and family history of CRC (stratum-4). Overall, screening status and patterns were similar between men and women across all strata. As CRC risk factors increased from stratum 1-4, the proportion of participants who were up-to-date on screening increased, as well as the proportion who maintained an up-to-date status from enrollment to follow-up (indicating a regular screening pattern). In the average-risk group, age, urban residence, higher household income and other cancer screening tests were associated with a greater likelihood of regular screening. Participants of average CRC risk were least adherent to screening recommendations. Promotion of recommendations to this group may increase screening effectiveness for CRC prevention. As ATP matures, it will be possible to investigate whether greater adherence to screening recommendations reduces CRC incidence in this cohort.

Co-Author(s): Ala Al Rajabi, Nathan Solbak, Jian-Yi Xu, Jennifer Vena, Sanaz Vaseghi, Heather Whelan, S. Elizabeth McGregor

Impact of the 2008 Alberta Tobacco Reduction Act on secondhand smoke exposure: Preliminary findings from a prospective cohort study

Presented by: **Alianu Akawung**, Biostatistician, Alberta Health Services

Reducing involuntary secondhand smoke (SHS) exposure is a major target for population tobacco policies. We evaluated SHS exposure prevalence before and after provincial tobacco legislative changes in a longitudinal cohort. Alberta's Tomorrow Project (ATP) is a prospective cohort study of ~55,000 adults (35-69 years and no personal history of cancer at enrollment). The present study represents data from a sub-sample of participants (n=12,222) who completed two questionnaires, including questions on SHS exposure, before (2000-2007) and after (2009-2015) the 2008 Alberta legislation which banned smoking in public places. Exposure rates before and after legislation were evaluated using descriptive statistics and unadjusted comparisons using McNemar's Test (presented here), and this work in progress will evolve to include longitudinal regression approaches such as Generalized Estimating Equations (GEE) and Generalized Method of Moments (GMM). SHS exposure was captured in three domains: home, work, and leisure/public places. Using McNemar's test, the proportion of participants reporting SHS exposure was significantly lower at follow-up - exposure at home decreased from 9.5% to 4.4% ($p < 0.0001$), exposure at work decreased from 15.2% to 7.4% ($p < 0.0001$), and exposure in leisure/public places decreased from 72.3% to 11.1% ($p < 0.0001$). A greater proportion of men than women reported SHS exposure in public places and at work at both baseline (74.9% and 25.6% for men, and 70.9% and 9.5% for women, respectively) and follow-up (14.5% and 12.3% for men, and 9.4% and 4.7% for women, respectively), whereas women reported slightly greater exposure rates at home before (10.4%) and after the legislation (4.5%) compared to men (8.1% and 4.4%). While preliminary, the descriptive analyses support that SHS exposure prevalence was lower after legislation in all domains, suggesting the 2008 Alberta Tobacco Reduction Act may have reduced SHS exposure in the province. Adjusted analyses will be performed to confirm and expand on these findings.

Co-Author(s): Alianu Akawung, Tiffany Haig, Ala Al Rajabi, Jennifer Vena, Heather Whelan, Paula Robson, Karen Kopciuk

Intentional tanning among Canadian adolescents: CRAYS 2015

Presented by: **Victoria Nadalin**, Senior Research Associate, Cancer Care Ontario

To measure intentional tanning beliefs and behaviours, prevalence and location of UV tanning device use and service refusal, noting differences between 7 provinces among Canadian high school students. Data for the Cancer Risk Assessment and Youth Survey (CRAYS) 2015 were collected January to December, 2015 among students at randomly selected high schools in 7 provinces. An in-class, paper and pencil questionnaire asked about a range of health risk behaviours, including ever participation in intentional tanning, location and refusal of UV tanning equipment use, and knowledge and beliefs about tanning. Rao-Scott chi squared tests and p-values examined weighted data for tanning by grade, ethnicity, sex, and urban/rural residence. Provincial variation in grades which comprise high school limited provincial comparisons and overall estimates to grades 10 and 11. Over twelve thousand students participated. On average, 82% of participants tanned intentionally, with significant provincial variation (from 90% in Quebec to 74% in British Columbia). Spray/self-tanner use was less common (15%) and significantly varied by province (from 24% in Atlantic Canada to 13% in Ontario). UV tanning equipment use was uncommon (4%) but significantly differed by province, from 6.2% in Atlantic Canada to 2.7% in Ontario. UV tanning equipment was used mostly at salons or studios (85%). Among those in grades 10 and 11 who used UV tanning equipment in the previous 12 months, 15% had been refused service at some point. Many attitudes and beliefs of adolescents who use UV tanning equipment differ significantly from those who do not use the equipment. Intentional tanning is common among Canadian adolescents, particularly outdoors. UV tanning equipment use by students is not frequent, and varies across provinces. CRAYS data collected in 2017 will revisit questions about tanning.

Co-Author(s): Victoria Nadalin, Loraine Marrett, Caroline Cawley, Leia Minaker, Stephen Manske

D2: BEHAVIORAL & SOCIAL EPIDEMIOLOGY

Social Support Availability and Depressive Symptoms Among Middle- and Older-aged Adults: A Preliminary Analysis of Baseline Data from the Canadian Longitudinal Study on Aging

Presented by: **Mark Oremus**, Associate Professor, University of Waterloo

We explored the association between social support availability (SSA) and depressive symptoms (DS) using baseline data from the Canadian Longitudinal Study on Aging (CLSA). Our study included interview data from 29,842 CLSA participants randomly recruited from 11 cities across Canada. SSA was measured using the 19-item Medical Outcomes Study Social Support Survey, which generated continuous scores from 1 (low SSA) to 5 (high SSA) on an overall SSA scale and four subscales: emotional/informational, tangible, positive social interaction, and affectionate. DS were measured using the 10-item Center for Epidemiologic Studies Depression Scale, which yielded scores between 0 (no DS) and 30 (maximum DS). We used generalized additive models and a gamma distribution to examine the association between SSA and DS, controlling for age and sex. Participants' median age was 62 years and 51% were female. Median overall SSA score was 4.42 (interquartile range [IQR] = 0.95). Median scores on the SSA subscales ranged from 4.21 to 4.44. Median DS score was 4.0 (IQR = 5.0). Regression coefficients were negative, indicating an inverse association between SSA and DS. Due to the quadratic nature of the SSA scores, a single regression coefficient could not represent the change in DS score associated with a one-unit change in SSA score. Changes in DS score ranged from -0.4402 to -0.1288, depending on the SSA subscale and the change in SSA score (e.g., from 1 to 2, from 4 to 5). All 95% confidence intervals excluded the null value. The inverse associations between SSA and DS were statistically significant in this sample of 45- to 86-year old adults. Future work will involve assessing larger sets of potential effect modifiers and confounders, and longitudinal analyses when follow-up CLSA data become available.

Co-Author(s): Mark Oremus, Colleen Maxwell, Suzanne Tyas, Candace Konnert, Jane Law, Holly Tuokko

Social Support Availability and Cognitive Function Among Middle- and Older-aged Adults: A Cross-sectional Analysis of the Canadian Longitudinal Study on Aging

Presented by: **Mark Oremus**, Associate Professor, University of Waterloo

To explore the association between social support availability (SSA) and cognitive function (CF) in persons aged 45–86 years using baseline data from the Canadian Longitudinal Study on Aging (CLSA). The CLSA interviewed 29,842 persons in 11 Canadian cities who completed the 19-item Medical Outcomes Study Social Support Survey (continuous score: 1 [low SSA]–5 [high SSA]) and performance-based cognitive tests in three domains: memory, executive function, and psychomotor speed. We converted raw cognitive test scores into z-scores separately for English and French speakers and summed the z-scores across multiple tests in the same domain. We analyzed the data using multiple linear regression, controlling for age, sex, and education. To improve model fit, we employed robust standard errors for memory and executive function, and the natural logarithmic transformation of psychomotor speed. Participants' median age was 62 years (interquartile range [IQR]=17 years), 51% were female, 81% completed high school, and 81% spoke English. Median overall SSA score was 4.42 (IQR=0.95). Prior to z-score transformation, median scores on seven of eight cognitive tests were less than half the maximum total score possible. Regression coefficients indicated a positive association between SSA and CF: memory=0.22 (95% confidence interval [CI]=0.18, 0.25); executive function=0.50 (95% CI = 0.43, 0.57); log of psychomotor speed=-0.06 (95% CI=-0.10, -0.03) (the negative sign means higher SSA scores are associated with faster reaction times). The coefficients represent changes in z-score or log z-score for every one-unit change in SSA score. Higher levels of SSA were associated with better CF in the CLSA sample. To more thoroughly investigate this finding, we will expand the analysis to include additional cognitive tests and covariates. We also plan to perform longitudinal analyses when the CLSA releases follow-up data.

Co-Author(s): Mark Oremus, Suzanne Tyas, Colleen Maxwell, Holly Tuokko, Jane Law, Candace Konnert

Bi-directional Association between Physical Activity and Sedentary Behavior during the Day and Nighttime Sleep Duration among 10-13 year olds

Presented by: **Yingyi Lin**, Graduate Research Assistant, Queen's University

To investigate whether physical activity and sedentary behavior during the day are temporally and bi-directionally associated with sleep duration at night among 10 to 13-year-old children. Participants consisted 440 children aged 10-13 years. A log was used to determine sleep duration for 8 consecutive nights and an Actical accelerometer was used to determine physical activity and sedentary behavior for the 7 days that fell between these 8 nights. Generalized estimating equation (GEE) models with first-order autoregressive matrix [AR(1)] were used to assess the relationships of interest. The GEE models accounted for the repeated measures nested within participants (e.g. there were 7 sleep duration – physical activity pairings per participant) and were adjusted for age, gender, season, and body mass index. A one standard deviation increase in sedentary behavior during the day was associated with a 0.09 standard deviation decrease in sleep duration the following night ($p < 0.001$). Conversely, a one standard deviation increase in vigorous physical activity during the day was associated with a 0.03 standard deviation increase in sleep duration the following night ($p=0.03$). A one standard deviation increase in sleep duration at night was associated with a 0.11 standard deviation decrease in sedentary behavior the following day ($p < 0.001$). Sleep duration did not predict moderate or vigorous intensity physical activity the following day ($p>0.1$). There is a bi-directional association between sedentary behavior and sleep duration among children. Moderate and vigorous intensity physical activity are not strong correlates of sleep duration.

Co-Author(s): Yingyi Lin

The intersectional discrimination index: Validity and reliability of a new measure for population health research

Presented by: **Ayden Scheim**, PhD candidate, Epidemiology & Biostatistics, Western University

We developed the Intersectional Discrimination Index (InDI) to measure enacted and anticipated discrimination without requiring attribution to particular grounds. This study evaluated its construct validity and test-retest reliability. The InDI measures anticipated, day-to-day, and major discrimination over the past-year and lifetime. In 2016, the InDI and socio-demographic, mental health, and substance use measures were administered to 2642 online panel members in Canada and the United States. Internal consistency and dimensionality of the anticipated discrimination scale were evaluated with exploratory and confirmatory factor analyses. Construct validation included known-groups comparisons, logistic regression of a composite outcome (psychological distress, hazardous drinking, smoking) on InDI components, and correlation/agreement with discrimination measures developed by Williams and colleagues. Test-retest reliability was examined in a subgroup (n=150) who completed the InDI at a second timepoint. We found support for unidimensionality and internal consistency of Anticipated Discrimination. As hypothesized, racial and sexual/gender minorities reported higher frequencies of all discrimination types (all $p < 0.001$). Each InDI components was significantly positively associated with negative mental or behavioural health outcomes after controlling for age, income, and childhood abuse. Frequency scores on the InDI and Williams components were strongly positively correlated (Spearman's r for day-to-day=0.83; for major= 0.76). When categorized into low, moderate, or high discrimination based on tertiles, agreement between the measures was moderate (weighted kappa=0.62; 0.56). The intra-class correlation coefficient (ICC) for test-retest reliability of anticipated, lifetime day-to-day, and lifetime major discrimination were 0.72 (95% CI: 0.63, 0.79), 0.78 (95% CI: 0.71, 0.83) and 0.72 (0.63, 0.79), respectively. We have found initial evidence for validity and reliability of Intersectional Discrimination Index. Future work will assess the instrument's utility for analyzing discrimination's health impacts across intersecting categories of social status and position, using granular socio-demographic data collected as part of the present study.

Co-Author(s): Ayden Scheim, Greta Bauer

Associations between Selected Aspects of Housing and Types of Social Support in Psychiatric Survivors

Presented by: **Melody Lam**, MSc Student, Western University

This study explores the relationship between housing and perceived social support among psychiatric survivors. Specifically, general support from others and intimate support from a confidant are compared. Data was collected through the Community-University Research Alliance 2: Poverty and Social Inclusion project, in which 380 community-dwelling individuals in London, Ontario above 18 years old with at least a one-year history of mental illness were interviewed annually from 2011 to 2014 inclusive. Perceived general and intimate social support were measured using scores derived from the Personal Resource Questionnaire. Multiple linear regression and Kruskal-Wallis tests were performed to investigate the relationship between type of housing and general and intimate support at baseline, and the relationship between housing stability, measured by housing changes over three years, and general and intimate support. Individuals living in their family's home had the highest level of perceived general support, followed by those in group homes/community care homes/single rooms, those in their own apartment or house, and finally, individuals who were homeless. Individuals who had a personal income above \$10,000 had a significantly higher score on average than those who earned below \$10,000 ($P=.005$). The same pattern based on type of residence was observed for perceived intimate support. Males and married individuals had significantly lower levels of perceived intimate support than females ($P=.009$) and unmarried individuals ($P=.001$), respectively. Comparing individuals who did and did not experience any changes in their type of housing over a three year period, no difference was found in the levels of perceived general or intimate support. The majority of psychiatric survivors prefer to live on their own; however, this study suggests that these individuals have relatively lower levels of perceived support. Exploring the interconnections among social determinants of health may be a key factor in providing better supports for psychiatric survivors.

Co-Author(s): Melody Lam, Mark Speechley, Cheryl Forchuk, Ross Norman

Population attributable risk and impact fractions for lung cancer and outdoor air pollution in Canada

Presented by: **Will D. King**, Associate Professor, Queen's University

To estimate the population attributable risk (PAR) and population impact fractions (PIF) for counterfactual exposure distributions in relation to air pollution indicators (PM_{2.5} and NO₂) in Canada. Outdoor air pollution has been classified as a carcinogen by IARC primary on the basis of a relationship between PM_{2.5} and NO₂ indicators and lung cancer risk. Relative risk estimates for these exposures were estimated from meta-analysis of Canadian and North American studies. The relationship between air pollution exposures and lung cancer risk was assumed to follow a (log) linear dose response pattern for a continuous exposure representing average exposure during a 25-year exposure window. PAR was calculated using an exposure distribution from recent analysis of a Canadian census cohort and PIF estimated using percent reductions in exposure. A meta-analysis of four Canadian studies of PM_{2.5} and lung cancer risk resulted in a pooled relative risk estimate of 1.14 (95% CI: 1.02–1.26) per 10 µg/m³. NO₂ was examined in a meta-analysis North American studies (n=7). There was evidence of publication bias and a trim and fill approach was used to obtain a relative risk 1.09 (95% CI: 1.02–1.17) per 10 ppb. Average PM_{2.5} and NO₂ levels of 9.8 µg/m³ and 11.6 ppb were estimated for an exposure window of 1990 to 2015. Both PM_{2.5} and NO₂ are used as indicators of relevant carcinogenic air pollution and similar PARs were obtained for each, 12.1% for PM_{2.5} and 9.5% NO₂. A 50% reduction in average PM_{2.5} is associated with a PIF of 6.2%. The comPARE project aims to quantify the proportion of incident cancer cases in Canada that could be prevented through changes in modifiable lifestyle and environmental exposures. Next steps in this research include investigation of trends in air pollution and predictions of future PAR and PIF.

Co-Author(s): Will D. King, Tasha Narain, Paul Villeneuve, Paul A Demers, Perry Hystad, on behalf of the ComPARE Team

Intervention strategies to improve cognitive functioning in hematologic cancer survivors after hematopoietic cell transplantation

Presented by: **Noha Sharafeldin**, Postdoctoral Scholar, University of Alabama at Birmingham

Impaired cognition – an increasingly recognized concern after hematopoietic cell transplantation (HCT) – has significant potential to impact societal reintegration. The overarching goal is to improve cognitive function in HCT survivors and facilitate integration of gene-based personalized interventions into standard-of-care. For the current study, we aim to demonstrate the feasibility of conducting a cognitive training trial in adult HCT survivors with cognitive impairment and to examine patients' attitudes towards communication of genetic risk. We propose a pilot cognitive training intervention using “brain exercises and games” based on the premise that these improvements will subsequently promote improvements in everyday activities. This is a single center, 2-arm wait-listed randomized trial. Thirty patients (15 in each arm) will be targeted for enrollment in the 12 weeks intervention. Disease characteristics and treatments received will be extracted from patient medical records. Self-reported depression, sleep, and fatigue will be assessed using standardized tools at study entry. At the end of the 12 weeks of cognitive training, patients will complete an intervention rating survey. Comprehensive cognitive function will be assessed using a standardized 90 minutes test battery administered pre- and post-intervention. At baseline patients will complete a genetics knowledge & attitude survey to identify patients' interest in receiving information regarding genetic risk of cognitive impairment post-HCT. Raw test scores from the neurocognitive test battery will be transformed into T-scores for each domain. Post-intervention score in association with treatment arm will be modelled using ANCOVA adjusted for pre-intervention score and other relevant variables including age, sex, race/ethnicity, education level, income level, and conditioning treatment intensity. The proposed study addresses a novel field of research aimed at evaluating cognitive training interventions in HCT survivors.

Co-Author(s): Noha Sharafeldin

Cancers attributable to infections in Canada

Presented by: **Karena Volesky**, PhD Student, McGill University

Several infectious viruses and bacteria, such as Epstein-Barr virus, human papillomavirus (HPV) and Helicobacter pylori (H. pylori), are well-established risk factors for certain cancers. The main objective of this study is to determine attainable infection-associated cancer incidence reductions for Canada. Auxiliary aims are to estimate attributable risks correcting for measurement error, and project incidence reductions by sex and age. Fulfilling these objectives will facilitate a better understanding of the burden of cancers attributable to infections. To determine the impact of infections on cancer incidence, data on the prevalence of infections and the magnitude of their association with cancer will be used to calculate population attributable risk (PAR) estimates. PAR estimates can quantify the possible reduction in cancer incidence if the infections in question were eliminated in the population. If the magnitude of the association between the infection and cancer is very strong (relative risk ≥ 20), the prevalence of a given infection in cancer cases approximates the PAR. Seven infectious agents, each linked to one or more cancers, will be analyzed; they are Epstein-Barr virus, H. pylori, hepatitis B and C, HPV, human T-cell lymphotropic virus type I, and Kaposi sarcoma virus. Data from studies identified through systematic reviews will be meta-analyzed for each of these agents and their corresponding cancer sites. Recently, the use of a more sensitive assay detecting H. pylori in gastric cancer has increased the proportion of gastric cancers attributable to this infectious bacterium. Our analysis will account for measurement error by correcting data from early generation studies that used low sensitivity assays. To summarize the number of potentially preventable cancers, the PAR estimates will be applied to Canadian annual cancer incidence among men and women age 18 years and older for the most recent year available. This analysis will be completed in spring 2017.

Co-Author(s): Karena Volesky, Mariam El-Zein, Sheila Bouten, Eduardo Franco, on behalf of the ComPARE team

Lung cancer risk at low radon exposures in the Czech, French and Canadian uranium miners (1953–1999)

Presented by: **Rachel Lane**, Radiation and Health Sciences Specialist, Canadian Nuclear Safety Commission

Assess the radon-lung cancer mortality risk using high quality low cumulative radon exposures, long term mortality follow-up. Effect modifiers and tobacco smoking on risk estimates are also assessed. The joint cohort of Czech, French and Canadian (Beaverlodge) male uranium miners included 408 lung cancer deaths, 394,236 person-years of risk, and < 100 working level months (WLM) cumulative radon exposures. Internal Poisson regression models, stratified by cohort, age and calendar year period at risk, calculated the linear excess relative risk (ERR) per unit cumulative radon exposure (WLM), lagged five years. The impact of effect modifiers: time since exposure, attained age, and exposure rate were assessed. Sensitivity analyses assessed the confounding effect of unmeasured tobacco smoking on the radon-lung cancer mortality risk estimate. A statistically significant relationship between radon and lung cancer mortality was found. The $ERR/WLM = 0.017$ (95% CI: 0.009–0.028) at < 100 WLM. In trend analyses, statistically significant risk was first observed at cumulative exposures as low as 10–19 WLM, with $RR = 1.64$ (95% CI: 1.03–2.65, $N = 48$ deaths). The risk of lung cancer mortality was greatest for exposures received in the most recent past (5-14 years previously) and the youngest attained age (< 55 years) and decreased with increasing time since exposure and attained age. No modifying effect of exposure rate was observed at low radon levels. The confounding effect of unmeasured tobacco smoking was small and did not substantially change the radon-lung cancer mortality risk estimates found. These findings provide strong evidence for an increased risk of lung cancer mortality after long-term low occupational radon exposures. Radiation protection measures are of significant importance for keeping modern uranium miners' radon exposures and residential radon levels very low.

Co-Author(s): Rachel Lane, Julian Little, Franco Momoli

Occupational exposure to asbestos and the risk of kidney cancer

Presented by: **Cheryl Peters**, Postdoctoral Fellow, Carleton University

The main objective of this study was to investigate whether occupational asbestos exposure contributes to the risk of kidney cancer in Canadian men. The National Enhanced Cancer Surveillance System is a population-based case-control study conducted from 1994-1997 in eight Canadian provinces. Incident cases of cancer were identified by provincial registry. Self-reported questionnaires obtained information on cancer risk factors and lifetime occupational history. For kidney cancer cases and controls, occupational hygienists coded occupational histories for asbestos exposure using variables of concentration, frequency, and reliability, enabling the development of several exposure metrics. Logistic regression was used to estimate odds ratios (OR) and 95% confidence intervals. Models were adjusted for age, province, BMI (since it is a known risk factor for kidney cancer), and cigarette smoking. Complete occupational data were available for 710 cancer cases and 2,450 controls. Overall, 33% of workers had ever-exposure to occupational asbestos, but nearly all of these (98%) were assessed as having low exposure concentration. As expected, obesity and older age were positively associated with kidney cancer, however smoking was not. Workers who had ever been exposed to asbestos were significantly more likely to have kidney cancer than those who were never exposed (OR 1.2, 95%CI 1.0 – 1.5). When examining duration of exposure as well as tertiles of cumulative asbestos exposure (calculated by multiplying relative frequency and concentration by duration), exposure was linked to an increased risk of kidney cancer, but only significantly so for those in the lowest tertile (OR 1.4, 1.0–1.9). Asbestos is a known lung and mesothelial carcinogen, although translocation to more distal organs and cancer initiation at these sites is plausible. Further analyses will investigate the patterns of exposure underlying the observed non-monotonic increase in risk.

Co-Author(s): Cheryl Peters, Marie-Elise Parent, Shelley A Harris, Lidija Latifovic, Linda Kachuri, Laura Bogaert, Paul Villeneuve

D4: NUTRITION, PHYSICAL ACTIVITY & OBESITY

Effects of prescribed aerobic exercise volume on objectively-assessed physical activity and sedentary time in postmenopausal women: Results from the Breast Cancer and Exercise Trial in Alberta (BETA)

Presented by: **Jessica McNeil**, Postdoctoral Fellow, Alberta Health Services

We examined the effects of two moderate-vigorous intensity exercise doses on total, light and moderate-vigorous physical activity, and sedentary time in postmenopausal women at study completion and one year later. The Breast Cancer and Exercise Trial in Alberta (BETA) was a two-center, two-arm, 12-month randomized controlled trial which included 400 inactive postmenopausal women randomized to either 150 (MODERATE) or 300 (HIGH) minutes/week of aerobic exercise. Physical activity and sedentary time were assessed at baseline, post-intervention (12 months) and follow-up (24 months) with waist-mounted accelerometer devices (Actigraph GTX3®). Intention-to-treat analyses were conducted using linear mixed models and adjusted for baseline variables. Of the 400 participants randomized at baseline, 331 participants had complete accelerometry data (at least 4 days of 10 hours/day of wear time) at baseline and post-intervention, and 283 participants had complete accelerometry data at 12-month follow-up. Total physical activity and moderate-vigorous intensity physical activity were greater in participants randomized to the HIGH vs. MODERATE group (least-squares mean difference (LSMD): 0.62 [95% CI: 0.08-1.15] MET-hours/day; P = 0.02, and 0.10 [95% CI: 0.01-0.19] hours/day; P = 0.03, respectively) from baseline to post-intervention. There were no statistically significant differences in light activity and sedentary time between baseline and post-intervention. Additionally, no statistically significant differences in any accelerometer-based measurements between baseline and follow-up, and post-intervention to follow-up, were noted. Greater prescribed exercise volumes led to increased overall and moderate-vigorous intensity physical activity in this intervention trial. Additionally, no significant changes in accelerometer-based measurements were noted at follow-up, suggesting that changes in activity levels resulting from the exercise interventions were maintained one year later.

Co-Author(s): Jessica McNeil, Megan Farris, Heather Merry, Brigid Lynch, Charles Matthews, Kerry Courneya, Christine Friedenreich

Diet quality and mortality risk in Canada: A population-based study using linked survey and health administrative data

Presented by: **Christopher Tait**, PhD Candidate, Dalla Lana School of Public Health, University of Toronto

Diet quality indices are increasingly being used in epidemiologic studies. The objective of this study is to investigate the association between the Healthy Eating Index (HEI) and mortality in Canada. We used data from Ontario respondents to CCHS 2.2 linked to health administrative data (n = 5,539). Adherence to the HEI was analyzed with a 24-hr dietary recall. Mortality was ascertained through the Registered Persons Database, and tracked up to 11.9 years from baseline. Cox proportional hazards models were used to estimate hazard ratios (HRs) and 95% confidence intervals (CIs) for all-cause mortality. Given obesity's potential role as a mediator, we explored the effects of removing BMI from the final model. We also conducted analyses stratified by BMI, to assess whether the association between HEI and mortality persisted across weight categories. High HEI adherence was significantly associated with a 35% reduction in mortality risk [HR = 0.65, 95% CI = 0.48-0.89]. Significantly decreased mortality risk was highest among Canadian males [HR = 0.58, 95% CI = 0.35-0.95]. Additional adjustment for BMI did not result in changes to the multivariable adjusted hazard ratios. However, stratified results indicated that diet quality was a weaker and less significant predictor of mortality at high levels of BMI. Importantly, this is the first study to evaluate the presumed efficacy of the HEI as a public health intervention strategy, in a population-based sample of Canadian adults. Our analyses provide epidemiologic evidence that adherence to the dietary recommendations of the HEI may decrease the long-term risk of mortality in the Canadian population, and demonstrate the utility of diet quality as a discriminating measure in predicting mortality risk in a population-based sample.

Co-Author(s): Christopher Tait, Mary L'Abbe, Peter Smith, Laura Rosella

Effects of total and recreational physical activity on cancer incidence in the Alberta Tomorrow Project cohort

Presented by: **Amanda Barberio**, Research Associate, Department of Cancer Epidemiology and Prevention Research, Alberta Health Services

Physical activity (PA) has been associated with lower risks of several cancers. We examined the association between total and domain-specific PA and risk of all and site-specific cancer risk. We analyzed baseline data from Alberta's Tomorrow Project (ATP), collected from 2001-2008. Specifically, those who completed the Past Year Total Physical Activity Questionnaire were included (n=26,750). Participants reported the type, duration, and intensity of PA and each activity was assigned a metabolic equivalent (MET) value in order to estimate energy expenditure. Total and recreational PA in MET-hrs/week were divided into quartiles. ATP data were linked to the Alberta Cancer Registry to identify incident cancer cases. The impact of PA on overall and site-specific cancer risk was examined using unadjusted and adjusted Cox proportional hazards models. A total of 2,224 participants (8.31%) developed cancer during the follow-up period. The median follow-up time among cases was 11.1 years. We observed a significant inverse association between total PA and all-cancer incidence in the unadjusted model (hazard ratio [HR]Q4vQ1=0.51, 95% confidence interval [CI]: 0.46-0.58, P< 0.001), which remained statistically significant in the fully-adjusted model (HR Q4vQ1=0.87, 95% CI: 0.77-0.99, P=0.03). When cancers occurring less than 2 years after baseline data collection were removed (n=282), higher total PA was still significantly associated with lower incidence of all cancer in the adjusted model (HR Q4vQ1=0.85, 95% CI: 0.75-0.98, P=0.02). The strongest site-specific associations with recreational PA were for breast (adjHR Q4vQ1 =0.77, 95% CI: 0.58-1.02, P=0.07) and lung (adjHR Q4vQ1=0.69, 95% CI: 0.44-1.07, P=0.10) cancers. In a geographically-based cohort of Albertans, higher total PA was associated with lower incidence of all cancers. Additional sensitivity analyses are underway to examine the associations among different PA domains (e.g. occupational), additional cancer sites and relevant sub-groups.

Co-Author(s): Amanda Barberio, Christine Friedenreich, Kristin Campbell, Darren Brenner

The impact of menopausal status on association between recreational moderate-to-vigorous physical activity and ovarian cancer among participants in the PRevention of Ovarian Cancer in Quebec (PROVAQ) study.

Presented by: **Anne Grundy**, Research Associate, Department of Social and Preventive Medicine, Université de Montréal and Centre de recherche du CHUM (CRCHUM)

We previously observed associations between lifetime physical activity and ovarian cancer, which varied by subtype. Here, we examined physical activity during different age periods, and potential modification by menopausal status. In a Montreal population-based case-control study that included 485 cases and 887 controls (2011-2016), participation in 17 recreational activities during adolescence and adulthood was assessed by in-person interview. The cumulative average recreational moderate-to-vigorous (MVPA) physical activity (in MET-hrs/week) and cumulative MVPA within specific age windows of 15-19, 20-44, 45-65 and 65+, was calculated and categorized in tertiles according to the control distribution. Odds ratios (OR) and 95% confidence intervals (CI) for ovarian cancer overall and by subtype were estimated in multivariable logistic regression models with modification by menopausal status explored in stratified analyses. Confounders were assessed using directed acyclic graphs. The OR (95% CI) for the highest vs lowest tertile of lifetime physical activity was 2.00 (1.15-3.46), p-trend=0.02, among women who were premenopausal at diagnosis (n=149 cases, 271 controls) and 0.99 (0.71-1.38), p-trend=0.95, among women diagnosed postmenopausally (n=324 cases, 590 controls; p-interaction=0.07). The increased risk with high levels of activity among premenopausal women persisted across ovarian cancer subtypes, with ORs (95% CIs) for the highest vs. lowest tertiles of 2.53 (0.94-6.86) for borderline, 1.73 (0.68-4.36) for type I and 1.98 (0.94-4.14) for type II cancers. When age-period specific activity was examined, the strongest increased risk was observed for activity performed from ages 20-44 among premenopausal women [1.80 (1.05-3.07), p-trend=0.04]; no similar increased risk in this age-period was observed for postmenopausal women [1.03 (0.74-1.45), p-trend=0.86]. These findings suggest that associations with MVPA differ between ovarian cancers diagnosed pre- vs postmenopausally and that the increased risk among premenopausal women is influenced by MVPA in early adulthood. Further understanding of the relevant biological mechanisms is needed to fully account for these differences.

Co-Author(s): Anne Grundy, Vikki Ho, Marie-Elise Parent, Jack Siemiatycki, Anita Koushik

CONCURRENT SESSION E: 1:15PM – 2:45PM

E1: BUILDING CANCER RESEARCH CAPACITY

The Canadian partnership for tomorrow project: a health research resource

Presented by: **Paula Robson**, Scientific Director, Alberta's Tomorrow Project

Experiences of cancer patients in transition study: from survey implementation to outcome modeling

Presented by: **Andrea Coronado**, Specialist, Health System Performance, Canadian Partnership Against Cancer

The Experiences of cancer patients in Transition study (Transitions study) is a national collaboration led by the Canadian Partnership Against Cancer (CPAC) to investigate the challenges faced by individuals with cancer after end of treatment. To address this objective, the Transitions Study sent a national survey across all provinces to over 40,000 individuals who had completed treatment in the previous one to three years. This presentation provides an overview of the Transitions study with an emphasis on the methods used for survey implementation and analysis of quantitative data.

Building cancer analytic capacity in Canada

Presented by: **Cheryl Louzado**, Program Manager, Data Integration, Canadian Partnership Against Cancer

E2: BIOSTATISTICS

Using machine learning methods to create chronic disease case definitions in a primary care electronic medical record

Presented by: **Brendan Lethebe**, Student, University of Calgary

The emergence of electronic medical records (EMRs) in primary care in Canada provides a unique opportunity for chronic disease surveillance using quality case definitions. Data were obtained from the Canadian Primary Care Sentinel Surveillance Network, an organization that houses primary care EMR information from across Canada. A chart review was conducted for the presence of 8 chronic conditions in a sample of 1920 primary care patients. The results of this validation study will be used as training data for developing machine learning and regression-based classification models capable of creating interpretable case definitions. Features will be selected from billing codes, medication prescriptions, laboratory values, encounter diagnoses and health-problem lists. A comparison of the accuracy (sensitivity, specificity, PPV, NPV) will be performed across algorithms. Classification and Regression Tree (CaRT) methods, C5.0 decision tree methods, CHAID decision tree methods, logistic regression using a lasso (or L1) penalty, and forward stepwise logistic regression were used for variable selection and case definition development. Complexity parameter values were determined using bootstrap methods to minimize the misclassification rate. Final accuracy measures were determined using k-fold cross validation. For hypertension, sensitivities range from 93.1% to 96.0%. Specificities range from 88.8% to 93.2%. For diabetes, sensitivities range from 93.5% to 96.3%. Specificities range from 97.4% to 99.0%. For osteoarthritis, sensitivities range from 82.0% to 84.3%. Specificities range from 92.7% to 94.0%. The decision tree and logistic regression methodologies yielded similar case definitions and validity measures for all 3 conditions. Improving overall surveillance quality will also allow for a more accurate assessment of chronic disease burden in populations and improve efficiency in terms of resource allocation. The next step is to implement this methodology to create case definitions for rare conditions.

Co-Author(s): Brendan Lethebe, Paul Ronksley, Hude Quan, Tolulope Sajobi, Tyler Williamson

Gene Set Analysis of Longitudinal Blood Pressure

Presented by: **Elham Khodayari Moez**, PhD Student, School of Public Health, University of Alberta

Incorporating longitudinal designs in genetics studies can advance our understanding of disease progression. However, handling longitudinal phenotypes in microarray data analysis is challenging due to the lack of appropriate method. We develop a two-step method which is an extension of the Linear Combination Test (LCT) for analysis of longitudinal phenotypes. Our technique is evaluated through a simulation study and then applied to microarray data from Genetic Analysis Workshop 19, which includes transcriptional profile data of 647 Mexican Americans collected in the San Antonio Family Heart Study (SAFHS). This data is characterised by the association between expressed gene sets and time trajectories of systolic and diastolic blood pressure. 185 gene-sets defined by KEGG database are examined considering the correlation between genes within the gene-sets and the correlation between phenotypes. We find 57 gene-sets significantly predict the simultaneous time trajectories of systolic and diastolic blood pressure after adjusting for the effect of smoking status. This method is an efficient self-contained gene set analysis for handling a wide range of data produced by biotechnology advancements. This method may contribute to development of therapeutic and diagnosis techniques by helping identify genomic biomarkers.

Co-Author(s): Elham Khodayari Moez, Irina Dinu, Jeffrey Andrews

Longitudinal Trajectories of Disease Severity in Children with Epilepsy

Presented by: **Anita Brobbey**, PhD Student, University of Calgary

Severity of epilepsy has been associated with clinical outcomes in individuals with epilepsy. We investigate variations in neurologists' ratings of disease severity across time in children newly diagnosed with Data were obtained from the Health-Related Quality of Life in Children with Epilepsy Study (HERQULES), a multicenter prospective cohort study of 373 children with newly-diagnosed epilepsy. Severity of epilepsy was measured using the neurologist reported Global Assessment of Severity of Epilepsy (GASE) scale. Repeated measures latent class analysis (RMLCA) was used to characterize the longitudinal trajectories for severity of epilepsy over a two-year period. Multinomial logistic regression was used to identify predictors among the latent classes of trajectories. Descriptive analysis suggested an overall improvement in severity of epilepsy over the two-year period. RMLCA identified four distinct trajectories of severity of epilepsy; "Early Large Improvement" (12.9%), "Early Moderate Improvement" (46.3%), "Late Moderate Improvement" (26.6%), and "Unchanged" (14.2%). The identified latent classes were significantly different with respect to comorbid cognitive problems, seizure type, and school age. RMLCA identified four distinct trajectories of severity of epilepsy, predicted by comorbid cognitive problems, seizure type, and school age. The knowledge of trajectories can aid development of prognostic models for predicting two years after health outcomes and health services utilization in children with new-onset.

Co-Author(s): Anita Brobbey, Samuel Wiebe, Meng Wang, Zhiying Liang, Shane Goodwin, Mark Ferro, Kathy Speechley, Tolulope Sajobi

Trajectories of Parent-Reported Health-Related Quality of Life in Children with Epilepsy

Presented by: **Tolulope Sajobi**, Assistant Professor, University of Calgary

This study aims to characterize the heterogeneity in health-related quality of life (HRQoL) trajectories and to evaluate predictors of differences among the identified subgroups in children with newly-diagnosed epilepsy. Data were obtained from the Health Related Quality of Life in Children with Epilepsy Study (HERQULES), a prospective multi-center study of 373 children with newly-diagnosed epilepsy who were followed over two years. Child HRQoL and family factors were reported by parents and clinical characteristics were reported by neurologists. Group-based multi-trajectory modeling was adopted to characterize longitudinal trajectories of HRQoL as measured by the individual domains of the 55-item Quality of Life in Childhood Epilepsy Questionnaire (QOLCE-55). Multinomial logistic regression was used to assess potential factors that may explain differences among the identified latent trajectory groups. Three distinct HRQoL trajectory subgroups were identified in children with newly-diagnosed epilepsy based on the QOLCE-55: "High" (44.7%), "Intermediate" (37.0%), and "Low" (18.3%) groups. While most trajectory groups exhibited increasing scores over time on physical and social domains, both flat and declining trends were noted on emotional and cognitive domains. Less severe epilepsy, an absence of cognitive and behavioral problems, lower parental depression scores, better family functioning, and fewer family demands were associated with a "Higher" or "Intermediate" HRQoL trajectory. The course of HRQoL over time in children with newly-diagnosed epilepsy appears to follow one of three different patterns. Addressing the clinical and psychosocial determinants identified for each pattern can help clinicians provide more targeted care to these children and their families.

Co-Author(s): Meng Wang, Samuel Wiebe, Anita Brobbey, Zhiying Liang, Shane Goodwin, Mark Ferro, Kathy Speechley, Tolulope Sajobi

Modeling the random effects covariance matrix for longitudinal data with covariates measurement error

Presented by: **Md Erfanul Hoque**, Student, University of Manitoba

Propose an approach to properly model the random effects covariance matrix in the class of Generalized linear mixed models (GLMMs) where covariates are subject to measurement error we extended the model introduced by Lee et al. (2012) to model the random effects covariance matrix for the GLMMs to the case when the covariates are subject to measurement error using modified Cholesky decomposition. This covariance matrix was decomposed to the GARPs and IVs parameters and this structure can accommodate the heterogeneous covariance matrix which depends on subject-specific covariates. We used Monte Carlo EM algorithm to estimate model parameters. Performance of the proposed approach is evaluated through simulation studies as well as a real longitudinal data application from Manitoba Follow-up Study (MFUS). Simulation studies demonstrated that the proposed approach performs very well in terms of bias, RMSE as well as coverage rate of the model parameters estimated. Also, the larger biases can occur in the fixed effects parameters by ignoring the measurement error in covariates and not specifying the distribution of random effects correctly. In MFUS data, our interest was to know how hypertension is associated with corresponding risk factors and how individual measurements vary within individuals. The results showed that the random effects covariance matrix differs by ischaemic heart disease (IHD) (subject-specific covariate) and there exists a variation in the magnitudes of the fixed effects for the Proposed method compared to the Naive methods. Also, we found BMI, Age and IHD are associated with hypertension. In the presence of covariates measurement error in longitudinal data, incorrectly modeling the random effects covariance matrix has significant effects on inference in model parameters. Proposed method presents the way to overcome it. This method can be extended to missing responses in longitudinal data.

Co-Author(s): Md Erfanul Hoque, Mahmoud Torabi

Predictors of Fragility Fracture among Chronic Oral Glucocorticoid Users in Ontario

Presented by: **Mohamed Amine Amiche**, PhD candidate, Leslie Dan Faculty of Pharmacy, University of Toronto

Oral glucocorticoids (GCs) is associated with increased fracture risk. We aimed to determine predictors of hip and vertebral fracture among oral GC users with respiratory disease and inflammatory arthritis. We identified new oral GC users aged 66 + (1998/01/01 – 2014/09/30). We included patients having an oral GC cumulative dose of ≥ 450 mg prednisone equivalent and ≥ 2 prescriptions during a 6-month ascertainment period following the first claim of oral GC. GC exposure was assessed during the ascertainment period (patterns, daily dose, and cumulative dose). Analyses were completed separately among patients with respiratory disease and inflammatory arthritis. We used Cox proportional hazard models to identify predictors of 1-year hip and vertebral fracture. Results are presented as adjusted hazard ratio and 95% confidence intervals. We identified 55,162 patients (mean age= 75(6.5), 52% women) with respiratory disease and 23,065 (mean age 75(6.4), 64% women) with inflammatory arthritis. Older age, female sex, psychiatric drug use, and previous fracture were common hip and vertebral fracture predictors for the 2 cohorts. Among patients with respiratory disease, asthma (0.7 [0.6-0.9]), dementia or Alzheimer's (1.6 [1.2-2.2]), and lipid lowering drug use (1.3 [1.1-1.6]) were associated with hip fracture; while fall risk factors (1.3 [1.1-1.6]), cumulative dose < 900 mg (vs. ≥ 1500 mg) (0.6 [0.5-0.8]), sporadic use (vs. continuous use) (0.7 [0.5-0.8]) were associated with vertebral fracture. Among patients with inflammatory arthritis, rheumatoid arthritis (1.5 [1.1-1.9]) was a predictor of hip fracture; and cumulative dose < 900 mg (vs. ≥ 1500 mg) (0.7 [0.5-0.9]) was a predictor of vertebral fractures. Assessing patient history such as previous fracture, psychiatric drug use and underlying indication may improve bone loss treatment and osteoporotic fracture prevention.

Co-Author(s): Mohamed Amine Amiche, Linda Lévesque, Tara Gomes, Jonathan Adachi, Suzanne Cadarette

Comparison of registered and reported outcomes in randomized clinical trials published in anesthesiology journals

Presented by: **Jeffrey Chow**, MSc Student, The University of Western Ontario

To examine whether randomized clinical trials (RCTs) published in six general anesthesiology journals were adequately registered and whether reported primary and secondary outcomes corresponded to the originally registered outcomes. Data was systematically screened and extracted from RCTs published in the top six general anesthesiology journals by impact factor (Anaesthesia, Anesthesia & Analgesia, Anesthesiology, British Journal of Anaesthesia, Canadian Journal of Anesthesia, and European Journal of Anaesthesiology) during the years 2007, 2010, 2013, and 2015. An adequately registered trial was defined as being registered in a publicly available trials registry prior to the first patient being enrolled with an unambiguously defined primary outcome in the registry entry. For adequately registered trials, the outcomes registered in the trial registry were compared with the outcomes reported in the the manuscript, with outcome discrepancies documented and analyzed by the type of discrepancy. Over all four years, there were 860 RCTs identified with 102 RCTs determined to be adequately registered (12%). The proportion of adequately registered trials increased over time, with 38% of RCTs being adequately registered in 2015. The most common reason in 2015 for inadequate registration was registering the RCT after the first patient had already been enrolled. Among adequately registered trials, 92% had at least one primary or secondary outcome discrepancy. In 2015, 42% of RCTs had at least one primary outcome discrepancy while 90% of RCTs had at least one secondary outcome discrepancy. Despite trial registration being an accepted best practice, RCTs published in anesthesiology journals still have a high rate of inadequate registration. If clinicians base their decisions on an evidence base distorted by outcome switching, patient care could be negatively affected.

Co-Author(s): Philip Jones, Jeffrey Chow, Miguel Arango, Jason Fridfinnson, Nan Gai, Kevin Lam, Timothy Turkstra

Cognition and Motor Function: A Novel Outcome Measure for Studies of Pre-Dementia Syndromes

Presented by: **Jacqueline K. Kueper**, M.Sc. Candidate, Western University

1) Create a proxy Alzheimer's Disease Assessment Scale–Cognitive Subscale (ADAS-Cog) using alternative outcome measures. 2) Assess whether adding motor function tests to the ADAS-Cog improves responsiveness in pre-dementia syndromes. Objective 1) A generalized additive model (GAM) was developed in the Alzheimer's Disease Neuroimaging Initiative (ADNI) to predict ADAS-Cog scores ("ADAS-Cog-Proxy") in The Gait and Brain Study (GABS). Candidate GAM covariates were theoretically similar to the ADAS-Cog and available in both ADNI and GABS. Objective 2) In GABS, various motor function tests were added to the ADAS-Cog-Proxy using a Pooled Index (PI) approach. Final PI components were selected based on theoretical importance and pairwise correlation coefficients. Responsiveness to baseline diagnosis was assessed with Kruskal-Wallis and Mann-Whitney U tests. Responsiveness to change over time was assessed with Standardized Response Means (SRM). The best of 5 candidate GAMs was selected based on predictive performance in a training subset of ADNI participants (n=415) with normal cognition (NC) or Mild Cognitive Impairment (MCI). In a testing subset (n=179) it predicted 61% and 85% of ADAS-Cog scores within 3 and 5 points of true scores, respectively. The novel PI combines the ADAS-Cog-Proxy, gait velocity, and dual-task gait velocity cost. Both the ADAS-Cog-Proxy and PI discriminated between participants with NC (n=12) and MCI (n=78) ($P < 0.001$), subjective cognitive impairment (SCI, n=19) and MCI ($P < 0.001$), but not NC and SCI. The PI demonstrated greater responsiveness to change over time than the ADAS-Cog-Proxy for 6 (SNR Ratio PI/ADAS-Cog-Proxy=2.39, n=86), 12 (Ratio=1.78, n=73), 24 (Ratio=1.46, n=54), 36 (Ratio=1.50, n=36), and 48 month (Ratio=3.49, n=24) follow-up periods. A GAM composed of the Clinical Dementia Rating Scale, Rey Auditory Verbal Learning Test, and Mini-Mental State Examination adequately approximates ADAS-Cog scores. Adding motor function tests to these ADAS-Cog-Proxy scores in a PI improves responsiveness to baseline diagnosis and changes over time in pre-dementia syndromes.

Co-Author(s): Jacqueline K. Kueper, Daniel J. Lizotte, Manuel Montero-Odasso, Mark Speechley

Prevalence of High-Risk Nodules in Screened Individuals Selected According to Standard Guideline Criteria vs. a Lung Cancer Risk Prediction Calculator in the Alberta Lung Cancer Screening Program

Presented by: **Niloofar Taghizadeh**, Postdoctoral associate, Division of Respiratory Medicine and Charbonneau Cancer Research Institute, University of Calgary, Calgary, AB, Canada

To compare the rate of detection of high-risk nodules according to participant eligibility criteria in the Alberta Lung Cancer Screening Program (ALCSP). ALCSP is an ongoing study which aims to screen 800 high-risk Albertans for lung cancer with low-dose computed tomography (CT). Eligible participants have a 1.5% lung cancer risk over 6 years, using an epidemiologic risk-prediction model (RPM) developed using Prostate, Lung, Colorectal, and Ovarian Cancer Screening Trial data, and/or meet the National Lung Screening Trial (NLST) inclusion criteria (ever smokers aged 55-74 years, 30 pack-years of smoking and < 15 years since quitting). We assessed the proportion of individuals either meeting or not meeting these inclusion criteria and determined the prevalence of high risk (10% malignancy risk) nodules on baseline CT in participants according to eligibility criteria. Baseline questionnaires were received from 1,453 individuals. 500 (34.4%) met the criteria for the ALCSP and underwent baseline CT screening [114 (23.0%) met the RPM criteria only, 82 (16.4%) met the NLST criteria only, and 304 (60.6%) met both criteria]. Of these 500 individuals, 385 (77%) had at least one detected lung nodule of any size. A trend towards more frequent detection of nodule(s) with a malignancy risk (the probability that a lung nodule will be diagnosed as cancer within a 2-4 year follow-up period) higher than 10% was noted in the RPM group (RPM: 4.4% (5/114) [95% Confidence Interval (CI): 2-10%], and NLST: 0% (0/82) [95% CI: 0-4%]. P -value=0.076). Participants meeting RPM but not NLST criteria may harbor more high-risk lung lesions than the converse. No high-risk nodules have been identified in the group exclusively meeting the NLST criteria. Full analysis of the cohort will be performed once all 800 participants have been screened.

Co-Author(s): Niloofar Taghizadeh, Paul burrowes, Paul MacEachern, Rommy Koetzler, James A. Dickinson, Ashley Gillson, Huiming Yang, Martin C. Tammemagi, Erika Penz, Sachin R. Pendharkar, Stephen C. Lam, Andrew Graham, Jessica Culling, Eric LR Bédard, Alain Tremblay

Ontario Pharmacy Smoking Cessation Program: More Pharmacies Need to Participate

Presented by: **Lindsay Wong**, MSc student, Leslie Dan Faculty of Pharmacy, University of Toronto

We aimed to describe the use of pharmacy smoking cessation services over time, and measure compliance with prescription smoking cessation medication. We analyzed medical and pharmacy claims data to identify the number of patients and pharmacies participating; compare patient characteristics over time (2011/09-2013/08 vs. 2013/09-2015/03); and estimate prescription smoking cessation medication compliance (proportion of days covered over 90 days \geq 80%). Analyses were stratified by drug plan group (seniors \geq 65 years; or social assistance $<$ 65 years), sex and region. Forty percent (n=1,710) of Ontario pharmacies participated, with 26% being new providers from 2013/09-2015/12. We identified 12,819 patients; patient characteristics remained similar over the two time periods, with 29% seniors (mean age=70, SD=4.7; 53% male) and 71% social assistance (mean age=46, SD=11.7; 49% male). Regional differences in use were identified. North East region had among the lowest prior use of physician smoking cessation services (80%), yet among the highest prior use of professional pharmacy services (55%). Among patients with one-year follow-up data, 58% received follow-up smoking cessation services and 74% received prescription smoking cessation medication. More patients starting prescription smoking cessation medication at enrolment were compliant (37%), compared to patients starting before (25%), or after (12%) enrolment. More pharmacies offering smoking cessation services may improve patient access to smoking cessation services, particularly in areas with limited access to physicians.

Co-Author(s): Lindsay Wong, Giulia Consiglio, Lisa Dolovich, Zahava Rosenberg-Yunger, Beth Sproule, Michael Chaiton, Sara Guilcher, Suzanne Cadarette

E4: INFECTIOUS DISEASE

Individual Level Modelling of Infectious Disease Data: EpiLLM

Presented by: **Vineetha Warriyar Kodalore Vijayan**, Postdoctoral Fellow, University of Calgary

Examine the main characteristics of individual level infectious disease models, and how to fit them to data within a Bayesian statistical framework using the R package "EpiLLM". The statistical modelling of infectious disease spread through a population generally requires the use of non-standard statistical models. This is primarily due to the fact that infection events depend upon the infection status of other members of the population and hence we cannot assume independence of infection events. Further complication is added by the fact that there are often complex heterogeneities in the population which we wish to account for, since, for example, populations do not tend to mix homogeneously. Sometimes, we may wish to account for such heterogeneities using spatial mechanisms that assume that transmission events are more likely to occur between individuals close together in space than individuals further apart. Sometimes, it is more natural to model such heterogeneities using contact networks that represent, for example, the sharing of supplier companies between farms. Typically, statistical inference for these models (e.g., parameter estimation) is done in a Bayesian context using computational techniques such as Markov chain Monte Carlo (MCMC). Here we examine the main characteristics of individual level infectious disease models, and how to fit them to data within a Bayesian statistical framework using the R package "EpiLLM".

Co-Author(s): Vineetha Warriyar Kodalore Vijayan, Rob Deardon

Epidemiology of Reported Cases of Enteric Pathogens in Alberta: 2013-2016

Presented by: **Kate Snedeker**, Surveillance Epidemiologist, Alberta Health Services

This study will describe the epidemiology of major notifiable enteric pathogens, including Campylobacter, Salmonella and Verotoxigenic E. coli, in Alberta from 2013 – 2016. Data on cases and outbreaks of notifiable enteric pathogens from 2013 to 2016 will be obtained from the Communicable Disease/Outbreak Management system. Case data for Alberta and the five health zones will be described in terms of serotype/subtype, demographic characteristics (age, sex), travel history and other factors. Outbreak data will be described by zone, pathogen and location type. Temporal trends in both case and outbreak data for Alberta and the 5 health zones will also be described.

Co-Author(s): Kate Snedeker, Lance Honish

Incorporating Contact Network Uncertainty in Individual Level Models of Infectious Disease using Approximate Bayesian Computation

Presented by: **Waleed Almutiry**, PhD candidate at Guelph university and visiting student at Calgary University, University of Guelph

To investigate the feasibility of using Approximate Bayesian Computation (ABC) to fit complex infectious disease models where the underlying transmission of a disease is modelled through a completely unknown contact network. We use network-based continuous-time Individual-Level models (ILMs) to analyze the transmission of disease through a contact network in a situation where the contact network data are unobserved. We show that such missing data can be accounted for in a Bayesian data augmented framework using Markov chain Monte Carlo (MCMC). However, fitting models in such a framework can be highly computationally intensive. Thus, we also investigate fitting the ILMs with completely unknown contact networks via population Monte Carlo (ABC-PMC) methods. This is done in the context of both simulated data, and data from the UK 2001 foot-and-mouth disease epidemic. Using ABC-PMC yields good performance, obtaining reliable parameter estimates and credible intervals. Also, we detect huge time savings using ABC-PMC rather than MCMC for analyzing larger epidemic data sets. We found that the degree distribution of the contact network tended to be underestimated in small data sets, where very limited information is provided, but well estimated for larger data sets. We also demonstrate good predictive properties under ABC-PMC. We show that using ABC-PMC for fitting complex infectious disease models results in reasonable approximations of the underlying infectious disease model, with huge savings in computation time.

Co-Author(s): Waleed Almutiry, Rob Deardon

Spatiotemporal Patterns of Occurrence of Shiga-toxigenic Escherichia coli (STEC) in Submitted Non-municipal Drinking Water from Southern Alberta

Presented by: **Colin Reynolds**, MSc Student, University of Alberta School of Public Health

To determine the occurrence of Shiga-toxigenic Escherichia coli (STEC) in submitted non-municipal drinking water samples from southern Alberta and to investigate spatial and temporal clustering of STEC occurrence from 2004-2016. E. coli-positive non-municipal drinking water samples submitted to an accredited public health laboratory between 2004-2016 were screened for the definitive STEC virulence genes stx1 and stx2 by polymerase chain reaction (PCR) analysis. Selective growth media was used to isolate presumptive STEC colonies from stx1/stx2-positive samples. Isolates were confirmed as STEC by stx1/stx2 PCR analysis, followed by biochemical microbial identification. The genetic similarity of multiple STEC colonies isolated from one sample were compared by repetitive element sequence-based PCR (rep-PCR) DNA fingerprinting. Unique isolates were sent for strain identification. Geographic information systems were used to investigate spatiotemporal associations of stx1/stx2-positive samples. Approximately 3% of the over 98 000 non-municipal drinking water samples tested between 2004-2016 were E. coli positive. Of the approximately 2000 E. coli-positive samples tested, 152 (8%) were positive for one or both stx1/stx2 genes. Two hundred and thirty one (231) isolated colonies, representing 53 (35%) of the 152 stx1/stx2-positive samples, tested positive for stx1/stx2 genes. From these 231 colonies, 63 clonally unique STEC isolates were identified. A strong seasonal trend in the occurrence of stx genes in non-municipal drinking water was observed, with an increase in warmer months, peaking in June and July. An increased occurrence of stx genes associated with extreme precipitation events was also observed. Apparent spatial clustering of STEC occurrence in submitted water samples is visible across southern Alberta. STEC are found in non-municipal drinking water in southern Alberta and pose a potential public health risk. Seasonality and extreme precipitation events likely influence the occurrence of STEC in groundwater systems. Strain classification, and statistical analysis to better define spatial and temporal associations, is ongoing.

Co-Author(s): Colin Reynolds, Sylvia Checkley, Linda Chui, Candis Scott, Norman Neumann

Investigating trends in the emergence of Lyme disease in Eastern Ontario

Presented by: **Isha Narula**, Student Researcher, University of Ottawa

To identify demographic factors and trends associated with Lyme Disease (LD) infection in Eastern Ontario; and to identify spatiotemporal patterns and map LD amongst ticks and humans in Eastern Ontario. Data from public health surveillance for LD in three health districts (LGL, KFL, OTT) from 2010 to 2016 will be analyzed using SAS to determine demographic characteristics and trends in the occurrence/expansion of LD over space and time. Additionally, a spatiotemporal analysis will be performed to map and compare patterns of human and tick LD infection over space and time. Poisson and Bernoulli-based models will be performed using SaTScan to detect clusters of human cases and ticks, respectively. ArcGIS will be used to investigate clusters and produce maps showing regional expansion of ticks, LD case distribution, and respective spatiotemporal clusters. From 2010 to 2016, a total of 761 cases of LD were reported with 247, 267, and 247 cases in Leeds, Grenville, and Lanark (LGL), Kingston, Frontenac, and Lennox and Addington (KFL), and City of Ottawa (OTT) regions, respectively. There was a higher prevalence of cases amongst males (437 cases, 57.4%) compared to females (321 cases, 42.2%) in all health units. There was a wide age range (1 to 93 years) amongst infected individuals and a general increase in cases over time within health units. Between 2010–2016, there were 7760 Ixodes scapularis ticks collected through surveillance activities in KFL, LGL, and OTT (2634, 3731, and 1395, respectively). Of records containing PCR test results, 1262 ticks (21.03%) tested positive for Borrelia burgdorferi. Spatiotemporal analyses will be performed to identify patterns and clusters over space and time, and the expansion of ticks, LD cases, and respective clusters will be mapped.

Co-Author(s): Isha Narula, Manisha Kulkarni, Monica Taljaard

CONCURRENT SESSION F: 4:00PM – 5:30PM

F1: PUBLIC HEALTH / POPULATION HEALTH

Are Indigenous determinants of health associated with anxiety disorders among First Nations adults?: Findings from the 2012 Aboriginal Peoples Survey

Presented by: **Ramanpreet Brar**, Master's Student, Western University

To estimate the prevalence of anxiety disorders among First Nations adults living off-reserve in Canada, and to assess the relationship between anxiety disorders and Indigenous determinants of health. The 2012 Aboriginal Peoples Survey was used to assess the relationship between self-reported anxiety disorders and Indigenous determinants of health (Status Indian, residential school attendance, knowledge of Indigenous language, and participation in traditional activities) after controlling for some socio-economic factors (age, sex, marital status, educational attainment, total personal income, and place of residence). Adjusted and unadjusted multivariable logistic regression models were performed using bootstrap weights and multiple imputations for missing data. Of the 6,160 First Nations adults, 56.8% were female and 51.8% were married. The majority of the respondents had post-secondary education (55.7%), had an income greater than \$20,000 (52.8%) and lived in an urban area (81.0%). Of the respondents, 70.6% had Status Indian, and 7% attended residential school while 42.7% indicated family members attended residential school. Nearly 62% participated in Indigenous traditional activities and more than half spoke or understood an Indigenous language. The prevalence of anxiety disorders was 14.51% among off-reserve First Nations adults. Adults who participated in Indigenous traditional activities had an increased odds of anxiety disorders compared to their counterparts (aOR: 1.46, 95% CI: 1.12 to 1.90). No association was found between anxiety disorders and other Indigenous determinants of health. There is a high prevalence of self-reported anxiety disorders among First Nations adults living off-reserve. However, further studies are warranted to identify and assess the potential role of Indigenous determinants of health on anxiety disorders and other prevalent mental health conditions affecting this population.

Co-Author(s): Sharifa Nasreen, Ramanpreet Brar, Samanpreet Brar, Alana Maltby, Piotr Wilk

Aboriginal Women and the Mining Industry

Presented by: **Raywat Deonandan**, Assistant Professor, University of Ottawa

Mining brings prosperity to Aboriginal communities, but can also bring deleterious health and social effects. We conducted a systematic review to explore Canadian Aboriginal women's perceptions of mining's effects. A systemic review was conducted of English refereed articles published between 2000 and 2015. Articles were retained if found to have direct qualitative empirical data with either an explicit focus on or sufficient inclusion of the perspectives of Canadian Aboriginal women. Textual data were extracted and analyzed thematically with the aid of NVivo software. Both direct quotations and author interpretations were extracted, as long as those interpretations were supported either by a direct quotation or by an implicit support from qualitative data gathered from the study. Thematic content analysis was applied to identify relevant themes. A total of 1367 references were identified from all databases, from which 114 were retained for full-text screening. After all filtering levels were applied, 14 studies remained for analysis. Several themes emerged: women's concerns over mining's contamination of the environment and denudement of tradition, their exclusion from mining's economic benefits, and how wage labour is aggravating existing social and health ills, including addiction and youth discipline issues. To ensure that women share equally in the benefits of mining, strategies must be devised to ensure that they have a greater role in commercial negotiations. Exclusion will erode the legitimacy of projects and undermine industry's social license to operate.

Co-Author(s): Raywat Deonandan

Consumer engagement with online Canadian media coverage of seasonal influenza vaccination: An exploratory study of user generated content in Web 2.0

Presented by: **Reenika Aggarwal**, Student, University of Waterloo

To identify ways Canadians engage with online media, and with each other, through user generated content around seasonal influenza vaccination/influenza vaccine, provision, and administration by community pharmacists and other HCPs. News reports published online by the Canadian Broadcasting Corporation (CBC) were analysed between September 2015 and October 2016. News reports were included if they were text-based, mentioned the flu vaccine either as product or service, and were open for user comments. 33/64 online articles included user comments (n=2042) which were extracted using Google Chrome data mining extension. Comments were thematically coded for tone, rhetorical devices, reasoning for/against product, service, and health care practitioners (HCPs). Analyzing user comments (n=2042) showed polarizing opinions (pro-vaccination vs. anti-vaccination) and very few neutral comments. Many of the articles were promotional in nature (i.e. campaigns, locations, HCP service delivery). CBC media coverage of the influenza vaccination did not contain any risk messages, but contained two of Bennett's (2010) fright factors; inescapable and inequitable. User comments suggest general public support for pharmacists as influenza immunizers as they are trustworthy and convenient. Beyond the common reasons for not getting the seasonal influenza vaccine, certain pharmacy specific hesitancy factors include: perceived pharmaceutical industry ties ("Big Pharma"), privacy concerns, questions around injection training and competency, retail nature of the pharmacy space, questions around profit, etc. There is general support for influenza vaccinations and for pharmacists as vaccine providers. Web 2.0 is an important strategy to engage with online communities and encourage positive vaccine conversations, support shared decision making, promote seasonal influenza vaccinations, and engage and educate around anti-vaccine rhetoric.

Co-Author(s): Reenika Aggarwal, Michelle Simeoni, Samantha Meyer, Richard Violette, Nancy Waite, Heather MacDougall

Connecting public health intervention density and Hepatitis C incidence rates: A proposed ecologic multigroup comparison study of communities in Ontario, 1991-2016

Presented by: **Charlotte McEwen**, Student, Lakehead University

Hepatitis C is the most burdensome infectious disease in Ontario; furthermore, its effects are projected to increase with the aging of Canada's population. Prevention programs have proven effective on the individual level, but their distribution and population-level effect have been insufficiently studied. This two-phase project will increase understanding of prevention programming in Ontario and determine the association between prevention program density and Hepatitis C incidence rates in communities across Ontario. While insufficient research has been conducted on this subject, experts suggest that the availability and density of prevention programming have an important effect on Hepatitis C at the population level. This study will test the association between prevention program density and Hepatitis C incidence in communities across Ontario, and will be conducted in two phases. Phase one will be a descriptive study of the Hepatitis C prevention programs available in a stratified sample of communities in Ontario. This data will be collected from community public health units using telephone interviews, and the density of prevention programming as well as program characteristics will be determined for the period of 1991-2016. Phase two will be an ecologic multigroup comparison study to explore the association between community Hepatitis C prevention program density and community Hepatitis C incidence rates from 1991-2016. The sample communities will be the ecologic units, an exposure measure for each year will be developed from the findings of phase one, and community Hepatitis C incidence rates extracted from Ontario's Integrated Public Health Information System will be the outcomes of interest. Finally, the association between prevention program density and Hepatitis C incidence rate will be analyzed using regression modelling. This exploratory study is appropriate as an initial effort to address this literature gap, and findings will inform future research projects. Project completion expected April 2018.

Co-Author(s): Charlotte McEwen, Vicki Kristman

F2: CANCER

Exposure to meat-derived carcinogens and bulky DNA adduct levels in normal-appearing colon mucosa

Presented by: **Vikki Ho**, Assistant Professor/Researcher, University of Montreal/University of Montreal Hospital Research Center (CRCHUM)

Meat consumption is a risk factor for colorectal cancer. This research investigated the relationship between meat-derived carcinogen exposure and DNA adduct formation, a biomarker of DNA damage, in colon mucosa. Patients (N=202) undergoing a screening colonoscopy were recruited; patients consented to having two pinch biopsies of normal-appearing colon tissue and answered a questionnaire prior to the colonoscopy date. Meat-derived carcinogen exposure was estimated by linking the questionnaire with a database which detailed concentrations of carcinogens (PhIP, MeIQx, DiMeIQx, BaP) and the overall mutagenic potential (meat mutagenicity) in commonly consumed meats. Polymorphisms in genes involved in the biotransformation of these carcinogens and DNA repair were investigated. Least squares regression was used to estimate mean adduct levels in colon tissue (measured using ³²P-postlabelling) within categories of carcinogen exposure, polymorphisms and their interaction. Exposure to meat-derived carcinogens and higher meat mutagenicity was not associated with levels of bulky DNA adducts in colon mucosa. The XPC (rs2228001) polymorphism was associated with bulky DNA adduct levels; the CC/CA genotypes, hypothesized to confer lower DNA repair activity, were associated with higher DNA adduct levels than the CC genotype (normal activity). Among individuals with genotypes associated with lower DNA repair (XPD, rs13181 and rs1799179) or detoxification activity (GSTP1, rs1695), both high PhIP and meat mutagenicity exposure were associated with higher levels of DNA adducts. A significant interaction between the XPC polymorphism (rs2228000) and both dietary PhIP and meat mutagenicity on DNA adduct levels was observed, but the patterns were not consistent with the hypothesized a priori direction of effect. These results suggest that in genetically susceptible individuals, exposure to meat-derived carcinogens may be associated with increased DNA damage occurring directly in the colon.

Co-Author(s): Vikki Ho, Vanessa Brunetti, Sarah Peacock, Thomas E. Massey, Roger Godschalk, Frederik-Jan van Schooten, Will D. King

Mammographic non-dense area and breast cancer risk: a causal inference approach

Presented by: **Héctor Velásquez García**, PhD Candidate, UBC School of Population and Public Health

To estimate the marginal effect of the mammographic non-dense area (as well as the other mammographic density parameters) on breast cancer, by using a causal inference approach. This study utilizes data from a CIHR-funded population-based case-control study with 715 female breast cancer cases, and 1,005 female controls in Greater Vancouver, British Columbia (BC), who participated in the Screening Mammography Program of BC (SMPBC).

Mammographic density (MD) measures were determined from digitized screening mammograms using computer-assisted software (Cumulus). Marginal odds ratios were estimated by using causal diagrams and the inverse-probability weighting (IPW) treatment-effect estimators (implemented in Stata). Akaike information criteria (AIC) and receiver operating characteristic (ROC) curves were used to assess the goodness of fit and predictive power of unconditional logistic models containing MD parameters. The marginal effect of mammographic non-dense area (NDA) after controlling for dense area (DA) decreased the likelihood of breast cancer by 65% when comparing the highest quartile with the lowest (OR 0.35, 95%CI 0.11–0.58, p-trend 0.001). The marginal effect of DA on breast cancer risk after adjusting for NDA increased the risk nearly 2.5 times in the highest quartile compared with the lowest (OR 2.45, 95%CI 1.70–3.19, p-trend < 0.001). The marginal effect of percent dense area (PD) also increased breast cancer risk, with the highest PD quartile being four times the risk of the lowest quartile (OR 4.03, 95%CI 2.55–5.50, p-trend < 0.001). No differences between PD, NDA plus DA, and DA were observed in terms of discrimination of the outcome of interest. The findings of the present analyses indicate that NDA is an independent risk factor (after adjustment for DA and other covariates), inversely related with the risk of breast cancer. However, it does not significantly improve prediction.

Co-Author(s): Héctor Velásquez García, Boris Sobolev, Wilson Christine, Carolyn Gotay, Kristan Aronson, John Spinelli

Impact of results from Canadian epidemiologic studies of pesticides and cancer on recent assessments of pesticide carcinogenicity by the International Agency for Research on Cancer (IARC)

Presented by: **Manisha Pahwa**, Research Associate, Cancer Care Ontario

The International Agency for Research on Cancer (IARC) recently assessed several pesticides as definite, probable, or possible carcinogens. We aimed to evaluate if Canadian epidemiologic studies impacted these IARC classifications. Canadian epidemiological studies included in IARC assessments of glyphosate, 2,4-D, malathion, diazinon, parathion, lindane, tetrachlorvinphos, DDT, pentachlorophenol, aldrin, and dieldrin were obtained. A search was conducted for additional Canadian epidemiologic studies not included in these IARC evaluations. Studies must have reported cancer risk estimates in association with exposure to the above specific pesticides. Peer-reviewed publications between 1970 and 2017 were considered. IARC criteria for evaluating the strength of evidence of epidemiologic data (i.e. sufficient, limited, inadequate, or lack of evidence of carcinogenicity) were applied to all Canadian studies, i.e. those included in IARC evaluations and found through the literature search. Eleven Canadian studies were included in IARC pesticide evaluations; 6 studies, identified via literature search, were not. Evidence from a large sawmill worker cohort supported the IARC classification of pentachlorophenol as a definite carcinogen for non-Hodgkin lymphoma (NHL) and multiple myeloma (MM). A six-province case-control study that found two-fold excess risks for lindane and NHL and MM also contributed to lindane's classification. This study provided limited evidence for glyphosate and NHL, with relatively higher risks for associations between malathion and NHL, and DDT and 2,4-D and both NHL and MM. Glyphosate, malathion, and DDT were deemed probable carcinogens by IARC; 2,4-D, a possible carcinogen. There were inadequate Canadian epidemiologic data for diazinon, parathion, tetrachlorvinphos, aldrin, and dieldrin, which were probable or possible carcinogens by IARC. Epidemiological evidence from Canadian studies of pentachlorophenol, lindane, glyphosate, malathion, and DDT influenced and contributed to IARC assessments of carcinogenicity. Inadequate or limited human evidence for certain pesticides emphasizes the need for further population-based studies to elucidate carcinogenic hazards of environmental exposures.

Co-Author(s): Manisha Pahwa, Shelley A Harris, John McLaughlin, Paul A Demers

Surveillance of prostate cancer risk by occupation and industry: results from the Canadian Census Health and Environment Cohort (CanCHEC)

Presented by: **Jeavana Sritharan**, PhD Candidate, Occupational Cancer Research Centre, Cancer Care Ontario; Institute of Medical Science, University of Toronto

As there are no established preventable risk factors for prostate cancer, our study investigated the relationship between occupation, industry, and risk of prostate cancer using a large national Canadian cohort. The Canadian Census Health and Environment Cohort (CanCHEC) was established by linking the 1991 Canadian Census Cohort to the Canadian Cancer Database (1969-2010), the Canadian Mortality Database (1991-2011), and the Tax Summary Files (1981-2011). A total of 37,695 incident prostate cancer cases were identified in men aged 25-74 years, based on age at diagnosis. Occupation and industry information was reported at baseline during the 1991 Census. Cox proportional hazards models were used to estimate hazards ratios (HR) and 95% confidence intervals (CI). All models were adjusted for age, ethnicity, education, and marital status. For men aged 50-74 years, elevated risks were observed in occupations of senior management (HR 1.09, 95% CI 1.02-1.17), office and administration (HR 1.16, 95% CI 1.08-1.24), finance services (HR 1.08, 95% CI 1.03-1.13), agriculture and farm management (HR 1.11, 95% CI 1.06-1.17), general farming work (HR 1.12, 95% CI 1.02-1.23), firefighting (HR 1.16, 95% CI 1.00-1.35), armed forces (HR 1.14, 95% CI 1.00-1.32), and police work (HR 1.28, 95% CI 1.14-1.42). In men aged 25-49 years, elevated risks were observed across similar occupations, with the exception of construction managers (HR 1.07, 95% CI 1.01-1.14). Industry results were also observed to be similar to occupation results. Elevated risks in white collar occupations may be attributable to sedentary behavior and increased prostate cancer screening. Elevated risks observed in agriculture and protective services may be linked to occupational exposures, similar to previous studies. Occupational exposures and screening behaviours need to be further investigated.

Co-Author(s): Jeavana Sritharan, Jill MacLeod, Shelley A Harris, Donald C Cole, Anne Harris, Michael Tjepkema, Paul A Peters, Paul A Demers

Height during childhood, adolescence and adulthood, and prostate cancer risk

Presented by: **Marie-Elise Parent**, Professor, Institut national de la recherche scientifique, University of Quebec

In the context of PROtEuS, a population-based case-control study conducted in Montréal, to assess the association between self-reported height during childhood, adolescence and adulthood, and risk of prostate cancer (PCa). Subjects included 1,933 incident PCa cases aged less than 76 years, diagnosed across French hospitals in Montreal in 2005-2009. Concurrently, 1,994 population controls were selected from French-speaking men on the electoral list. Subjects reported their height relative to others (shorter, similar, taller) during childhood (5-6 years) and adolescence (12-15 years). Self-reported height was also elicited for the ages of 20 years and currently. Unconditional logistic regression estimated odds ratios (ORs) and 95% confidence intervals (CI) for the association between height variables and PCa risk, considering potential confounders. Polytomous models estimated ORs by disease grade (high-grade: Gleason score 8+ or [4+3]). The OR for men reporting having been taller than others as children, as compared to those who reported having been of similar height, was 0.98 (95%CI 0.77-1.26) after adjusting for age, ancestry, fatness relative to others, and financial situation as a child. The corresponding OR for the period of adolescence was 0.94 (95%CI 0.74-1.19). As compared to men in the lower quartile of height, the OR for those in the upper quartile was 0.95 (95%CI 0.77-1.18) for height at age 20 and 0.88 (95%CI 0.72-1.08) for height at diagnosis/interview, after considering age, ancestry, body mass index, smoking, alcohol, fruit/vegetable use, financial situation, education and marital status. There were marginal differences according to PCa grade. Height in early or adult life was not associated with PCa risk. Findings for adult height are at odds with the positive associations observed in meta-analyses. However, they concur with those of recent Mendelian Randomization analyses, meant to circumvent the methodological shortcomings of observational studies.

Co-Author(s): Marie-Elise Parent, Jennifer Yu, Hugues Richard, Marie-Claude Rousseau

F3: BIOSTATISTICS

Geo-dependent individual-level models for infectious diseases transmission

Presented by: **Md Mahsin**, Doctoral Student, University of Calgary

1. Geo-dependent Individual-level models (GD-ILMs) will incorporate spatial effects salient to infectious disease spread for formulating aetiological hypotheses and identifying areas of unusually high risk to formulate preventive action; 2. a computationally efficient and tractable algorithm for performing statistical inference for these GD-ILMs (e.g., via MCMC or Approximate Bayesian Computation (ABC)) will be developed within a Bayesian framework; 3. We demonstrate this GD-ILMs on both simulated data, and data on influenza in Alberta. In recent years, a class of complex statistical models, known as individual-level models (ILMs), have been effectively used to model infectious disease transmission in discrete time. These models are well developed but assume the probability of disease transmission between two individuals depends only on their spatial (or network-based) separation and not on their spatial locations. However, spatially varying demographic and environmental factors could influence the disease transmission. Thus, it might be useful to incorporate the effect of the spatial location itself into the ILMs. In this study, we extend ILMs to Geo-dependent ILMs (GD-ILMs) that allow the evaluation of the effect of spatially varying social risk factors (e.g., education, social deprivation), environmental factors (such as temperature, air quality, rainfall, and humidity), as well as unobserved spatial structure, upon the transmission of infectious disease. We consider a conditional autoregressive (CAR) model to capture the effects of unobserved spatially structured latent covariates or measurement error. We show how GD-ILMs can be fitted to data within a Bayesian statistical framework using Markov chain Monte Carlo (MCMC) methods.

Co-Author(s): Md Mahsin, Rob Deardon

Trajectories of Physical and Psychosocial Functioning in Children with Epilepsy: The Moderating Role of Parental Depression

Presented by: **Anita Brobbey**, PhD Student, University of Calgary

This study aims to characterize trajectories of physical and psychosocial functioning in children with newly-diagnosed epilepsy and evaluate how parental depression modifies these trajectories over time. Data were obtained from the Health Related Quality of Life in Children with Epilepsy Study (HERQULES), a prospective cohort study assessing the course and determinants of health-related quality of life (HRQoL) of 373 children with newly-diagnosed epilepsy over two years. Child HRQoL and parental depression were reported by parents using the Child Health Questionnaire (CHQ) and Center for Epidemiological Studies Depression Scale, respectively. Group-based multi-trajectory modeling was adopted to characterize longitudinal trajectories of HRQoL as measured by the physical and psychosocial summary scores from the CHQ. Parental depression was included as a time-varying covariate within the modeling framework. Three distinct subgroups of physical and psychosocial functioning trajectories were identified: “Low, largely increasing” (12%), “High, minimally increasing” (79%), and “High, largely decreasing” (9%). Trajectory subgroup differences were associated with children’s age at seizure onset, seizure frequency, cognitive and behavioral problems, family functioning, and family demands. Parental depression was significantly associated with lowering the growth of the trajectory for the “Low, largely increasing” and “High, minimally increasing” groups over two years. Although most children had high physical and psychosocial functioning, approximately 9% experienced a significant decline in functioning over time. This knowledge can facilitate targeted prognostic information and guide disease management. Interventions aimed at alleviating parental depression to improve HRQoL in children with epilepsy warrant investigation.

Co-Author(s): Meng Wang, Kathy Speechley, Mark Ferro, Anita Brobbey, Zhiying Liang, Shane Goodwin, Samuel Wiebe, Tolulope Sajobi

Influenza Vaccination Forecast in North Zone, Alberta

Presented by: **Zhengrong Li**, Analyst, Alberta Health Services

This project aims to better predict immunization vaccination resources needed by each service area and office in North Zone during influenza season. The historical weekly influenza immunization data used in the forecast was obtained from North Zone Public Health. The ‘forecast’ package in R was utilized, applying the Seasonal and Trend decomposition using the Loess (STL) with Exponential Smoothing (ETS) model to predict influenza doses which would be administered each week. Several tests were conducted to validate the results. All data prior to Oct 2016 was used as historical data, and data from Oct 2016 to Jan 2017 was utilized to validate the model. Mean Absolute Scaled Error (MASE) was used to test the forecast accuracy compared with actual values. The number of total vaccine doses required for North Zone in future influenza weeks were forecasted using the described method. The MASE obtained was 0.52. Compared with other forecasting methodologies such as regression with ARIMA Errors and the Seasonal naïve method, the STL with ETS model was most accurate with the smallest MASE estimate. This forecasting method will be integrated into Tableau in order to update the forecast results on a weekly basis. This method will be further evaluated and optimized for use in public health surveillance and program planning.

Co-Author(s): Zhengrong Li, Li Huang, Graham Vance

Estimation of screening sensitivity and sojourn time from an organized screening program

Presented by: **Huan Jiang**, Biostatistician, Assistant Professor, Cancer Care Ontario

Regular screening with mammography is widely recommended to reduce breast cancer mortality. It is of great interest to rapidly estimate suitable measures of the screening effect. In this paper, two measures of interest, the length of the pre-clinical state and the screening false negative rate, are discussed. A procedure is proposed to model the pre-clinical disease state duration, the false negative rate of the screening exam, and the underlying incidence rate in the screened population. We applied the model to data from the Ontario Breast Screening Program in Canada. Given our assumption that the sojourn time follows an exponential distribution, one can calculate the probability of a sojourn time greater than a certain value. We estimate that approximately 35–40% of cases having a sojourn time of less than 2 years for all age groups. More than half of cases have a duration longer than 2 years, and this provides additional support for screening mammography being biennial, as recommended by the US and Canadian Taskforce on Preventative Health. We also find that the marginal gains by screening every two or three years were small. The study suggests that screening every three years could be an effective screening strategy without losing much benefit compared to biennial screening, provided breast cancer mortality was not significantly altered, but with possibly lower cost.

Co-Author(s): Huan Jiang

Exploration of Different Adaptation of Generalized Estimating for the Analysis of Clustered Longitudinal Data

Presented by: **Elmabrok Masaoud**, Senior Statistician/ Adjunct Professor, Canadian Food Inspection Agency / University of Ottawa

The objective of the study was to explore and assess different adaptation of generalized estimating equations for the analysis of binary repeated measures data with an additional hierarchical level. Such data are commonly encountered in human and veterinary epidemiological research, and one motivating setting for the present study was records of presence or absence of bacteria in milk samples obtained by approximately monthly sampling throughout the lactations of cows in dairy herds. An autocorrelated random effects model was behind the simulated data. The settings of this simulation study were chosen to reflect a real somatic cell count dataset, except that the within-subject time series were balanced, complete and of fixed length (4 or 8 time points). Four fixed effects parameters were studied: binary predictors at the subject (e.g., cow) and cluster (e.g., herd) levels, respectively, a linear time effect, and the intercept. Several statistical procedures were considered, and their performance was compared specifically for the four fixed parameters. The statistical procedures include: ordinary logistic regression (OLR), alternating logistic regression (ALR), marginal quasi-likelihood (MQL), different adaptation of the classical GEE framework by either modeling clusters by fixed effects (denoted here GEEf), ignoring the additional clustering (denoted GEEs) and shifting the GEE handling of correlation structure from the subject to the cluster level with either independence (GEEci) or exchangeable (GEEce). Estimates from ALR, MQL, GEEce and GEEci agreed closely, and all showed a small negative relative bias. Standard errors were generally, except for some settings for the time parameter, unbiased for ALR and all GEE procedures except GEEs. For estimation of parameters, all the methods are asymptotically consistent. The small negative bias is further assessed by rerunning the simulation study using a probit model. For probit model simulated data, GEEce, GEEci and ALR procedures gave virtually unbiased

Co-Author(s): Elmabrok Masaoud, IBRAHIM BASHIR AB. JARJAR

Smoking cessation in Regional Cancer Centres: Collection and reporting of data on tobacco use and smoking cessation activities

Presented by: **Mohammad Haque**, Research Associate, Cancer Care Ontario

To highlight the systematic collection and reporting of data on new cancer patients' tobacco use and smoking cessation (SC) activities in Ontario's Regional Cancer Centres (RCCs). As part of a broader provincial program to make SC a routine part of cancer care, each RCC systematically provides SC interventions to new cancer patients. In 2013, RCCs began collecting and regularly submitting a minimum set of standardized SC metrics, including patients' tobacco use status and the RCC's SC activities, into a provincial database. When submitted, data undergo a series of quality checks and data linkages to be fit for use. Collected data are currently being used to calculate SC performance indicators (tobacco screening and SC referral rates) to monitor performance and help RCCs identify areas for improvement. Since the SC program's implementation, notable improvements in the collected data have occurred. The number of RCCs submitting data increased from five (October 2013) to all 14 (April 2015). The monthly number and rate of patients screened for tobacco use consistently increased from 2,283 (42%) in April 2015 to 3,058 (62%) in December 2016, suggesting improved data completeness and better staff engagement. Between April 2015 and December 2016, just under 20% of new cancer patients identified as current or recent tobacco users, and approximately 20% of tobacco users accepted referral(s) to SC services. In addition to monitoring performance, these SC data can be linked with other administrative databases. Data limitations include: self-reported tobacco use; lack of follow-up data; and exclusion of certain patient groups. The collection of cancer patients' tobacco use status and cessation activities allows for monitoring SC performance in Ontario's RCCs, to ultimately improve patient care. This provincial database also provides a novel source for future research studies, or for driving health system improvements (e.g., cost-benefit analyses).

Co-Author(s): Mohammad Haque, Naomi Schwartz, Rebecca Truscott, Erin Cameron, Alice Peter

Automation of Syndromic Surveillance: Early Aberration Detection System (EADS) with Alberta Real-Time Syndromic Surveillance Net (ARTSSN) - Influenza-Like Illness Case

Presented by: **Sarah Edwards**, Director, Surveillance & Reporting, Alberta Health Services

This study develops a real time automated syndromic surveillance system for detecting and reporting aberration in earlier stage using Alberta Real-Time Syndromic Surveillance Net (ARTSSN) databases. We have looked into the ARTSSN databases as data source. Influenza-like illness (ILI) case was chosen for developing a framework for detection algorithms and a prototype. We identified highly associated complaints and determined area sizes using exploratory data analysis (EDA). The influenza peaks of laboratory detection were used for validation. Several detection algorithms were explored and their performance was compared. Automated detection processes were developed using SAS, SQL, and R. An outbreak monitoring dashboard was developed using Tableau. When an alert is triggered, the warning will be sent by email and visualized in the dashboard. We developed EADS to automate the data collection through to reporting process. In exploratory data analysis with historical data, specific age groups (0-8 and >55+ years) and chief complaints in emergency visits were highly associated with laboratory confirmed influenza peaks. The rates of ILI related complaints in those age groups increased prior to onset of laboratory detection. These features can be significant indicators for detecting the beginning of influenza season. Among various algorithms explored, CUSUM based methods were the optimal detection methods. EADS detected the start of Influenza outbreaks earlier or almost same as the start of laboratory detection. Furthermore, EADS automatically looked into the area of Influenza-Like Illness outbreak and reported a warning by email as well as alerted in an outbreak monitoring dashboard. The earlier warning for a certain aberration can reduce the spread of disease. The EADS can detect aberrations earlier than laboratory detection. We are including more algorithms and disease cases into this automated syndromic surveillance system. Additional data sources are being considered to increase performance.

Co-Author(s): Daniel Han, Sarah Edwards, Andrew Macmillan

Spatial and Temporal Analysis of Chlamydia trachomatis in Newfoundland and Labrador (NL) and its potential linkage to Migratory Employment.

Presented by: **James Valcour**, Associate Professor of Epidemiology, Memorial University of Newfoundland

To estimate chlamydial incidence rates for NL, examine the spatio-temporal distribution of chlamydia in NL, and examine role of migratory employment in the incidence of Chlamydia trachomatis infections. Reportable cases of Chlamydia trachomatis infections were obtained from NL Regional Health Authorities (RHA). Standardized incidence rates for age, sex, urban/rural, and RHAs were estimated using Statistics Canada population estimates for 2007 to 2013. Temporal trends in disease incidence were evaluated using graphs, the temporal scan statistic, and negative binomial regression. The spatial distribution of chlamydia incidence was evaluated using maps and spatial clusters of high disease incidence were identified using Moran's I and the spatial scan statistic. The impact of migratory employment, measured by CSD level of commuting and industry sector, on disease incidence, was assessed using linear regression. Results indicated higher standardized rates of Chlamydia trachomatis (per 1000 persons-year) infections younger age groups (15-19 yo: 5.21; 20-24 yo: 8.48; 25-29 yo: 3.32; 30-39 yo: 0.87; 40-59 yo: 0.11; 60+ yo: 0.01), women (1.61 vs 0.65), and rural areas (1.40 vs 1.24). Labrador-Grenfell had the highest age-sex standardized incidence rate (4.55 per 1,000; 95%CI (4.30 - 4.82)) of the RHAs by a factor of four. An increase of chlamydia rates was seen (Beta=0.122; IRR=1.13; $p < 0.001$) over the study period. Spatial analysis determined that the highest rates of chlamydia were found in Labrador. Moran's I indicated global clustering of high rates of chlamydia (0.183, p -value=0.004) and several localized spatial clusters were identified by the spatial scan statistic. Results from the employment migration are pending. The incidence of Chlamydia trachomatis infections is on the rise in NL. Age and sex trends were consistent with national data, although rates were higher in Labrador and in rural areas.

Co-Author(s): Adrian Gee, Maria Mathews, Shabnam Asghari, James Valcour

Impacts of Ottawa's Central Experimental Farm on ambient air pollution, and temperature: Findings from a mobile monitoring campaign

Presented by: **Natasha Prince**, M.Sc. candidate, Carleton University

The objective of this study is to determine if the Central Experimental Farm (CEF) influences the health of neighboring Ottawa residents, through the mitigation of air pollutants and high temperatures. A mobile monitoring campaign was conducted during two seasons (September 2016 and January 2017) to measure the concentrations of various air pollutants within the CEF, and the urban areas captured in the 2km border that surround it. The pollutants measured included: fine particulate matter (PM_{2.5}), black carbon (BC), and ultrafine particles (UFPs). Our campaign also captured variations in daily average temperature. Sampling took place over two one-hour intervals from 9:30-10:30 (AM) and 5-6 (PM) for 14 consecutive days per season. The data were averaged for each road segment over the two-week period, and statistical comparisons were made among averages. The sampling was done over a total of 120 road segments. Preliminary data obtained from the summer sampling campaign demonstrated some spatial variability across all road segments. Combining morning and evening data for each environmental factor, a 14-day average was obtained for each of the 120 road segments. The median values of each pollutant are as follows: PM_{2.5} (median (IQR) = 8(6-10) $\mu\text{g}/\text{m}^3$); UFPs (median (IQR) = 5.4(4.4-6.1) $10^3 \text{ pts}/\text{cm}^3$); BC (median (IQR) = 331(236-477) ng/m^3); and temperature (median (IQR) = 19.3(18.2-19.7) $^{\circ}\text{C}$). These data will be used to develop exposure surfaces that can capture variations in air pollution and temperature within and around the CEF, and to explore to what extent proximal green space can reduce these exposures.

Co-Author(s): Keith Van Ryswyk, Mona Ahmad, Erika Brisson, Natasha Prince, J. David Miller, Paul Villeneuve