Brazil's Family Health Strategy: factors associated with program uptake and coverage expansion over 15 years (1998-2012)

Monica V. Andrade, Augusto Q. Coelho, Mauro X. Neto, Lucas Carvalho, Rifat Atun, Marcia C. Castro

BRAZIL’S FAMILY HEALTH STRATEGY: FACTORS ASSOCIATED WITH PROGRAM UPTAKE AND COVERAGE EXPANSION OVER 15 YEARS (1998-2012)

Monica V. Andrade, Augusto Q. Coelho, Mauro X. Neto, Lucas Carvalho, Rifat Atun, Marcia C. Castro
We are very pleased to welcome you to the 2nd annual Harvard Chan Poster Day. This event has been organized to provide a valuable opportunity for members of the School to engage in interdisciplinary interaction, to share research results and to generate new ideas. We are using an electronic poster board format, provided by the Boston-based ePosterBoards. This new format has allowed greater flexibility in poster design by including audio and video components.

This booklet was created to provide a comprehensive dossier of the abstracts that accompany each poster presented. Please use this booklet as a guide. It outlines all of the research that has been submitted in order to make your visit to Poster Day easier to navigate.

Thank you for your participation in the 2nd annual Harvard Chan Poster Day. We hope that you enjoy this special event.

Sincerely,
Harvard Chan Poster Day Organizing Committee
## Presentation list

### Session 1
**(10:30 - 11:30)**

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**(11:30 - 12:30)**

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**Old and new pandemics and today’s public health threats**

**Physical, social, and environmental determinants of health**

**Public health in the developing worlds**

**Health Systems**
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Old and new pandemics and today's public health threats
Physical, social, and environmental determinants of health
Public health in the developing worlds
Health Systems
Session 1
Perinatal Quality Collaboratives: The Role of Stakeholder Composition in Sustainably Improving Perinatal Health
Sarah Hodin, Grace Galvin, Avery Plough, Zsakeba Henderson, Neel Shah

Objectives: Perinatal Quality Collaboratives (PQCs) are structured networks of multidisciplinary teams that work to improve perinatal health by promoting and implementing evidence-based practices. Although PQCs are increasingly common, they vary widely in effectiveness and face challenges to sustainability. This exploratory study examines differences in PQC composition, which may affect their ability to impact change in practice.

Methods and materials: PQCs were identified through the Centers for Disease Control and Prevention directory as well as strategic online keyword searches. Each PQC was contacted by phone to verify stakeholder composition and roles, funding sources, and projects or initiatives. Verified stakeholders were categorized as patients, providers, policymakers, purchasers, payers, and pharmaceutical companies.

Results: We identified 41 state-based PQCs in the United States. All 41 included patients, providers, and policymaker stakeholders, 28 included payers, 6 included the pharmaceutical industry, and only 2 included purchasers. The roles of stakeholders participating in PQCs include funding, agenda setting, data acquisition and analysis, and dissemination of improvement opportunities.

Conclusions: PQCs are composed of diverse stakeholders, however those that often offer the greatest financial benefit are also the least represented among state-based PQCs.

Impact and significance: PQCs may benefit from greater effort to engage stakeholders with the capacity to invest in sustainable improvements.

Are kids stronger than adults? Modeling childhood resistance to disease susceptibility: insight from a mouse model of flu
Freeman Suber, Lester Kobzik

Objectives: During the 1918 influenza pandemic, children experienced significantly lower mortality compared to adults. One clue is that puberty marks the transition to greater disease susceptibility. To explore the mechanisms that may underlie childhood resistance, we monitored flu (A/PR/8/34) mortality between prepubertal and pubertal (C57BL/6) mice.

Methods and materials: Age-matched mice were treated with a GnRH antagonist, to delay the onset of puberty. To test the effect of sex steroids on influenza mortality, gonads were surgically removed.

Results: We found a significant decrease in influenza mortality in the prepubertal mice (16%) when compared to pubertal mice (71%, p<0.05), for both sexes. Mice treated with the delayed puberty drug had improved survival when compared to mice with normal puberty (p= 0.0054). In addition, gonadectomized mice lost their resistance after receiving estrogen hormone replacement (p=0.057). Lung injury was more severe in pubertal mice with hyaline membrane deposition. Microarray studies revealed a deleterious role for the pubertal-onset hormone, estrogen and higher expression of IL-1beta in mice with the highest mortality. Estrogen receptor blockade given to male and female adult mice, three days after infection, resulted in improved survival (p = 0.0055 and p =0.0062, respectively). Moreover, late but not early, IL-1beta neutralization given during the post-infection period was protective (p=0.0018).

Conclusions: These findings suggest that the surge of estrogen that occurs with puberty and unopposed IL-1beta during the later period of influenza infection may result in a perturbation of the immune response that results in poor outcomes.
The Impact of Each Month of Delay in HAART Initiation on CD4 Count after 1 Year of Treatment: New Causal Methods Increase the Usefulness of Observational Data
Shu Yang, Susan Little, Davey Smith, Victor DeGruttola, Judith J. Lok
Department of Biostatistics

Objectives: We assess the impact of time from infection to starting ART on one-year ART effects using data from the observational prospective Acute Infection Early Disease Research Program (AIEDRP).
Methods and materials: AIEDRP data provides well-characterized estimated dates of infection (EDI). We used doubly robust estimation of Coarse Structural Nested Mean Models to adjust for baseline and time-varying confounders to eliminate selection bias.
Results: We modeled the expected CD4 count increase due to one-year ART as a linear function of time from EDI to ART initiation, given pre-treatment covariates. We estimated that 1453 people starting ART on their day of infection would gain 317 CD4 cells in the first year of treatment (95% CI 262 to 359), if people did not interrupt therapy. Each month of delay in starting ART can slice 7.6 CD4s off the tally (-14 to -0.4). In a model considering 1696 cohort members, 243 of whom interrupted ART, people would gain an estimated 311 CD4 cells in the first year of treatment if they started ART on the day of infection, and every month of delay cut that total by 5 CD4 cells (-12 to 0.5).
Conclusions: Earlier initiation of ART during acute and early infection improves the CD4 count gain associated with one-year of uninterrupted ART, emphasizing the importance of early detection of HIV infection and subsequent therapy.
Impact and significance: The new causal methods permit estimation of quantities that may be clinically relevant that require sophisticated methods.

Quality of cervical cancer screening in Brazil: external assessment for improving access and quality program (PMAQ)
Mara R. B. Barcelos, Rita d. C. D. Lima, Elaine Tomasi, Bruno Nunes, Suele M. S. Duro, Malgorzata Chalupowski, Timothy Rebbeck, Luiz A. Facchini
Department of Global Health and Population

Objectives: To evaluate the association between contextual, personal and health care characteristics and quality of screening for cervical cancer in users of basic health units participating in PMAQ.
Methods and materials: An analysis of a cross-sectional study of health services performed in 2012-2013 in Brazilian Health Units included 3,965 municipalities. The target population consisted of providers (17,202 teams), and users (35,844 women age 25-64). Low quality of care was assessed by lack of access to Pap Test, delay in the examination, and lack of guidance. We performed descriptive, bivariate and multivariate analyses by Poisson regression.
Results: Lack of access, delay in the examination and lack of guidelines were 6.7%, 11.2% and 19.2%, respectively. Problems of quality were lower compared to the increase in HDI and per capita income, increasing with the population size and municipal FHS coverage (p<0.001). The Midwest Region had the lowest quality (p<0.001). White women had lower prevalences of poor outcomes (p<0.001). Women with a partner, who received the benefit of the Bolsa Familia Program, or had paid work, had low quality of care (p<0.001). The appropriate structure and process decreased low quality of care (p<0.001).
Conclusions: Investments in structure and work process of health teams and in social programs are essential.
Impact and significance: This research can contribute to improvement of quality of screening for cervical cancer in Brazil.
Objectives: To evaluate the association between contextual, personal, and health care characteristics and quality of breast cancer screening in women participating in the PMAQ.

Methods and materials: Cross-sectional evaluation of health services was performed in 3,965 municipalities (June 2012 to March 2013). Target population included professionals and users. In total 21,059 female health care users age 40-69 were included. We performed Poisson regression.

Results: Lack of access to clinical breast exam and mammography was found 37.6% and 30.3%, respectively. The quality problems were lower with increase of HDI (p<0.001). Lack of access to clinical breast exam increased with population size (p<0.001) and Family Health Strategy coverage. North Region had the highest occurrences of low-quality care. White women with partner had lower prevalences of outcomes (p<0.001). Women with paid work had greater access to clinical breast exam (p<0.001). Women living with 6 or more people (p<0.001), who received the benefit (p=0.002) and highest per capita family income had greatest access to mammography (p<0.001). Appropriate structure increased access to mammography (p<0.001) and appropriate work process decreased the prevalence of low quality care (p<0.001).

Conclusions: Investments in structure and work process and improvement of social conditions of the population are essential.

Impact and significance: This research contribute to improvement of the quality of screening for breast cancer in Brazil.

Dynamic Control of Enhancer Repertoires during Hematopoiesis

Objectives: Enhancers are the primary determinants of cell identity, but the regulatory components controlling enhancer turnover during lineage commitment remain largely unknown.

Methods and materials: Here we compare the enhancer landscape, transcriptional factor occupancy and transcriptomic changes in human fetal and adult hematopoietic stem/progenitor cells and committed erythroid progenitors.

Results: We find that enhancers are modulated pervasively and direct lineage and stage-specific transcription. GATA2-to-GATA1 switch is prevalent at dynamic enhancers and drives erythroid enhancer commissioning. Examination of lineage-specific enhancers identifies TFs and their combinatorial patterns in enhancer turnover. Importantly, by CRISPR/Cas9-mediated genomic editing, we uncover unexpected functional hierarchy of constituent enhancers within the SLC25A37 super-enhancer.

Conclusions: Despite indistinguishable chromatin features, we reveal through genomic editing the functional diversity of several GATA switch enhancers in which enhancers with opposing functions cooperate to coordinate transcription.

Impact and significance: Thus, genome-wide enhancer profiling coupled with in situ enhancer editing provide critical insights into the functional complexity of enhancers during development.
Emerging Adolescent Sexual and Reproductive Behaviors in Ghana.  
Implications for Public Health Risks and Opportunities  
Deborah Atobrah, Albert Awedoba, Anna Langer, Mary J. Good  
Department of Global Health and Population

Objectives: Within the context of low contraceptive usage, high incidence of early pregnancy and childbearing, and high incidence of sexual violence among the Ga, this study investigates intergenerational differences in Ga sexual and reproductive cultures.

Methods and materials: Ethnographic approaches were used to collect and analyze qualitative data from seventy-two respondents in three generational cohorts. Narratives on respondents’ major SR experiences, through a biography of respondents’ body methodological framework.

Results: The findings of the study reveal that younger respondents (adolescents) were more likely to use flippant coinages for risky sexual and reproductive categories, which resonate with their narratives on their casual and unrestrained sexual and reproductive behaviors. Compared to elderly male respondents, adolescent males were less likely to exude exploitative and aggressive sexual behaviors. Compared to elderly females, adolescent females were more assertive, and active participants of their sexual encounters. They were less likely to hold reproductive aspirations.

Conclusions: Both adolescent males and females held recreational views of sex, an attribute which was absent in the narratives of elderly respondents.

Impact and significance: The study is important because it outlines areas of adolescent sexual and reproductive health risks and opportunities for public health practice.

Whole Blood MicroRNA Biomarkers for Acute Respiratory Distress Syndrome  
Zhaozhong Zhu, David Christiani  
Department of Environmental Health

Rationale: MiRNAs are small non-coding RNAs. They regulate gene expression by binding to specific target sites on mRNA and repress the targets. MiRNAs play important roles in inflammation and infection, which are common manifestations in ARDS. However, no study has investigated miRNA as biomarkers for ARDS in whole blood.

Methods: This study is a case-control study as part of a molecular epidemiology study of ARDS. Cases and controls were matched for age and gender. The study contains 75 ARDS cases and 75 at-risk controls. All subjects’ blood was drawn on the day of enrollment. MiRNA expression profile was examined by OpenArray miRNA panel. After strict miRNA QC procedure, we performed logistic regression to identify miRNA candidates that are potentially associated with ARDS and constructed a miRNA panel to strengthen the prediction power.

Results: Results suggest that miR-1291 and miR-744 was associated with decreased risk of ARDS (OR=0.58, 95% CI, 0.39-0.85; OR=0.58, 95% CI, 0.38-0.88); miR-92a and miR-331 were associated with increased risk of ARDS (OR=1.60, 95% CI, 1.11, 2.31; OR=1.67, 95% CI, 1.11, 2.52 respectively). A seven miRNA panel was built with an AUC of 0.80 (95% CI: 0.73 to 0.87).

Conclusion: To our knowledge, our study is the first study of miRNA in whole blood from ARDS patients. We identified a miRNA panel that can potentially be valuable for predicting ARDS development. Further research is needed to validate the performance of this panel in a separate cohort.
Determinants of Suicidal Thoughts in Korean American Elders: Analysis of Memory and Aging Study of Koreans (MASK)

Peter J. Na, Hochang B. Lee

Department of Biostatistics, Department of Epidemiology

Objectives: To examine the determinants and self-rated mental health status of Korean American elders who endorse suicidal thoughts.

Methods and materials: A community-representative sample of Korean American elders (N=1118) residing in the Baltimore-Washington area were asked about suicidal thoughts with Korean version of the Patient Health Questionnaire (PHQ-9K). In addition, sociodemographic characteristics, mini-mental state examination (MMSE-KC), self-rated mental health, and self-rated physical health status were obtained.

Results: 14.7% (n=164) of elders endorsed suicidal thoughts. Determinants of suicidal thoughts included living alone, shorter duration of residency in US, major depressive syndrome, and poorer Self Rated Mental Health status. 64.0% (n=105) of those who endorsed suicidal thoughts did not meet minor or major depressive syndrome.

Conclusions: Given low mental service utilization among Korean American elders and high rate of suicidal ideation, a targeted screening and intervention strategy should be developed to reduce suicide behavior among Korean American elders.

Impact and significance: The prevalence of suicidal thoughts in Korean American elders were three times higher than studies on other populations (USA, Japan, and Australia). Given that the suicide rate of Koreans living in Korea is the highest in the world, the Korean American elders are a high risk group for suicide in need of a tailored suicide prevention plan.

this antimicrobial platform has the potential to be scaled up and used across the farm to the fork continuum to enhance food safety and quality minimizing spoilage

Georgios Pyrgiotakis, Philip Demokritou

Department of Environmental Health, Center of Nanotechnology and Nanotoxicology

Objectives: Foodborne diseases caused by the consumption of food contaminated with pathogenic microorganisms or their toxins have very serious economic and public health consequences.

Methods and materials: Here we present the effectiveness of a recently developed nanotechnology based intervention method for inactivation of microorganisms on fresh produce, and food production surfaces using Engineered Water Nanostructures (EWNS).

Results: EWNS possess unique properties; they are 25 nm in diameter, remain airborne in indoor conditions for hours, contain Reactive Oxygen Species (ROS), a surface charge (between 10 - 40e/structure). Their properties can be "fined-tuned" during their synthesis to optimize their inactivation potential. Taking advantage of their charge, we developed and characterized, a "draw through" Electrostatic Precipitator Exposure System for the targeted delivery of the EWNS on surfaces. We explore their efficacy in inactivating representative foodborne bacteria such as E. coli, S. enterica, L. innocua, M. parafortuitum, and S. cerevisiae on the surface of organic cherry tomatoes. The inactivation was facilitated using a dose of 40,000 #/ml.

Conclusions: The preliminary results presented here showcased that EWNS can achieve microbial removal rates between 1 and 3.82 logs after 45 mins of exposure. Electron Microscopy imaging revealed that the EWNS destroy the bacteria membrane leading to their inactivation.

Implications and significance: This antimicrobial platform has the potential to be scaled up and used across the farm to the fork continuum.
Objectives: Extreme heat causes more fatalities in the U.S. than many other meteorological phenomena, especially in the elderly. The objective of this study was to understand the associations between heat exposure and health in an elderly, low-income population.

Methods and materials: A research project was conducted in Cambridge, MA to assess how indoor environment impacts health during extreme heat in older adults. Participants in building 1 (n=26) had central AC while participants in building 2 (n=26) used natural ventilation and window AC units. Participants were monitored during a variety of summer temperatures with a health monitoring watch that measured skin temperature, sleep patterns, perspiration, heart rate, and daily activity. Environmental sensors placed in each participant’s bedroom monitored indoor temperature, air quality, noise, and humidity. Assessments of living conditions, sleep, self-reported health, daily activity and sleep were completed.

Results: Participants were more apt to not use AC during moderately high temperatures, reducing exposure to drastic temperature variability when moving between indoor and outdoor environments during the warm season. Other preliminary results will be presented.

Conclusions: The results found here will be important to the future of urban building design, public health, and climate change adaptation.

Impact and significance: With climate change, heat waves are expected to become an even larger public health threat in the future.
Session 2
Circulating Lipids, Mammographic Density, & Breast Cancer Risk in the Nurses' Health Study I & II
Sarah A. Lucht, Heather Eliassen, Rulla Tamimi

Department of Epidemiology

Objectives: Mammographic density (MD) may be associated with lipoprotein levels among women with dense breasts, a risk factor for breast cancer. We examined the associations between lipid levels, MD, and breast cancer in healthy women with screening mammograms.

Methods and materials: We conducted a cross-sectional study of percent MD and total cholesterol (TC), high-density lipoprotein (HDL), and triglycerides among healthy women from the Nurses' Health Study and Nurses' Health Study II using multivariable linear regression, stratifying by menopausal status and body mass index. A nested case-control analysis was conducted investigating the association between breast cancer risk, TC, and percent MD.

Results: Among pre-menopausal women, we observed a non-significant inverse association between TC and percent MD (p-trend 0.08). There were no significant associations between TC, triglyceride and HDL levels and MD among pre- and post-menopausal women. HDL levels were positively associated with increasing MD in post-menopausal women with BMI ≤25 kg/m2. The association between MD and breast cancer risk was not modified by TC level.

Conclusions: Overall, we did not observe any association between lipid levels and mammographic density. Little evidence was seen for a possible interaction between MD and cholesterol on breast cancer risk.

Impact and significance: There is little evidence using the nurses' health studies of an association between circulating lipids, MD, and breast cancer risk.

Weight change patterns and risk of lethal prostate cancer and biochemical recurrence among men with localized prostate cancer

Department of Epidemiology

Objectives: Obesity is associated with an increased risk of fatal prostate cancer. However, the relevant timing of obesity for risk has not been established, and the impact of weight change has been understudied.

Methods and materials: We prospectively investigated the association between weight change, lethal prostate cancer, and biochemical recurrence among 5,173 men diagnosed with localized prostate cancer (cTNM-stage <T3b) from 1986 to 2012 in the Health Professionals Follow-up Study. Cox proportional hazards models were used to estimate hazard ratios for long-term (age 21 to diagnosis) and short-term (over the 4 years before diagnosis) weight change. Because weight, weight change, and mortality are strongly associated with smoking, we conducted the analysis among all prostate cancer patients and among never smokers only (N=2,554).

Results: Among all patients, long-term weight gain was associated with increased risk of lethal prostate cancer (HR for gaining >30 lbs vs. stable weight [±10 lbs] 1.44, 95% CI, 1.03-2.01, p-trend=0.07). Among never smokers, this association was stronger (HR 2.16, 95% CI, 1.28-3.65, p-trend=0.006). Short-term weight gain was suggestively, but not significantly, associated with lethal cancer among never smokers. No significant associations were found between weight change and biochemical recurrence.

Conclusions: Our findings suggest a positive association between adult weight gain and risk of lethal prostate cancer.

Impact and significance: Metabolic changes associated with weight gain may promote prostate cancer progression.
Ischemic Central Retinal Vein Occlusion in the Anti-Vascular Endothelial Growth Factor Era

Emily K. Y. Tam, Irena Tsui

Department of Health Policy and Management

Objectives: To characterize eyes with ischemic central retinal vein occlusions treated with anti-vascular endothelial growth factor. Anti-VEGF therapy has improved the prognosis and outcomes of patients with CRVO. The majority of clinical trials have excluded eyes with ischemic CRVO. The purpose of this abstract is to characterize eyes with ischemic CRVO treated with anti-VEGF.

Methods and materials: Multi-center study with retrospective data collection. Patients with ischemic CRVO treated with anti-VEGF and at least 1 year of follow-up were included. Charts were reviewed for age, past medical history, ocular history, starting and ending visual acuity, number and type of anti-VEGF injections, indication for treatment and rates of neovascularization and neovascular glaucoma.

Results: Forty-three patients from 4 centers were included in the study. Average age was 71.6 years and 70% of patients were male. 25% of patients had diabetes, and 74% of patients had hypertension. At presentation, 30% of patients had neovascular glaucoma and 95% had cystoid macular edema. During the course of 1 year of follow-up the mean number of injections ranged from 1-12 and the most common agent used was ranibizumab. Anatomical improvement as well as visual acuity correlated with increased number of anti-VEGF injections.

Conclusions: There was large variation in the use of anti-VEGF for ischemic CRVO and outcomes are improved with use.

Quality of Inpatient Psychiatric Care and Consumers' Trust in the Mental Health Care System

Morgan Shields, Christina Borba, Sara Singer, Nhi-Ha Trinh

Department of Health Policy and Management, Department of Social and Behavioral Sciences

Objectives: There is limited research on quality of inpatient psychiatric care (IPC) and consumers' perspectives. In this exploratory study, we evaluate the association between consumer-reported quality of IPC and trust in the mental healthcare system (MHS). Methods and materials: Utilizing a cross-sectional design, we administered surveys to 52 individuals (75% female; 44.2 average age; 85% white) who had experienced IPC. Participants were recruited from 15 states through social media, email, and flyers. Employing multiple logistic regression, we assessed the association between the Combined Assessment of Psychiatric Environments measure of quality and consumers' trust in the MHS, controlling for history of psychosis, education, insurance, race, time since hospitalization, number of hospitalizations, and admit status (voluntary/involuntary).

Results: Each 1-unit increase in consumer-reported quality of care was associated with a 1.08 times greater odds of trusting the MHS, controlling for covariates. Individuals diagnosed with a psychotic disorder had 500 times greater odds of not trusting the MHS relative to individuals not diagnosed with a psychotic disorder, controlling for quality and covariates. Both quality of IPC and history of psychosis were associated with trust in the MHS.

Impact and significance: This study lays important groundwork for studying determinants of consumers' trust and subsequent engagement with mental health care services.
Medical Students Offering Maternal Support (MOMS): Lessons Learned from a Pilot Study

Tiffany Lin, Allison Bladja, Mary Tate, Dodie Rimmelin, Ellen Fugate, Katharyn Atkins

Department of Health Policy and Management

Objectives: Limited opportunities exist for medical students to be involved in longitudinal patient care and to work with underserved populations that experience significant racial and socio-economic disparities in pregnancy-related health outcomes.

Methods and objectives: Medical Students Offering Maternal Support (MOMS) was piloted at Harvard Medical School (HMS) in 2014-15 as a mutually beneficial innovative education model. Four first-year students were paired with four patients at a community health center and attended prenatal appointments, delivery, and follow up. Students also participated in a curriculum centered on topics in pregnancy, patient support, and community resources. Individual student interviews and focus groups were utilized to assess their experience.

Results: The program was feasible and complementary for medical students’ schedule. Program challenges included transportation, communication and role ambiguity with patients. Key success factors include early matching and platform for student-patient communication.

Conclusions: More research is needed as to the impact on patients and the ability to positively affect patient health outcomes.

Implications and significance: MOMS has the potential to fill important gaps in medical education and was valued as a meaningful educational experience. In 2015/16, MOMS has expanded to 11 student-patient pairs, with the hope that it will not only continue to grow at HMS, but will also become a model that can be adopted at other medical schools.

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Perioperative use of NSAID analgesic ketorolac may suppress early relapse in breast cancer; Perhaps transient systemic inflammation plays a role

Michael Retsky, Romano Demicheli, Patrice Forget, William Hrushesky, Michael Baum, Jayant Vaidya, Rick Rogers, Vikas Sukhatme

Department of Environmental Health

Objectives: A bimodal pattern of hazard of relapse among early stage breast cancer patients has been identified in multiple databases from US, Europe and Asia. We are studying these data to determine if this can lead to new ideas on how to prevent relapse in breast cancer.

Methods and materials: Using computer simulation and access to a very high quality database for patients treated with mastectomy only, we proposed that relapses within 3 years of surgery are stimulated somehow by the host response to surgical wounding. Most relapses in breast cancer are in this early category.

Results: Retrospective data from an anesthesiology group suggests an unexpected mechanism. Kethorolac, a common NSAID analgesic used in surgery produced far superior disease-free survival in the first 5 years after surgery. The expected prominent early relapse events in months 9-18 are reduced 5-fold.

Conclusions: Transient systemic inflammation accompanying surgery could facilitate angiogenesis of dormant micrometastases, proliferation of dormant single cells, and seeding of circulating cancer stem cells (perhaps in part released from bone marrow) resulting in early relapse and could have been effectively blocked by the perioperative anti-inflammatory agent.

Impact and significance: If this observation holds up to further scrutiny, it could mean that the simple use of this safe, inexpensive and effective anti-inflammatory agent at surgery might eliminate early relapses.
Safety Climate Improved through a Safety Communication and Recognition Program for Construction: A Mixed Methods Study

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Objectives: To evaluate the efficacy of a safety communication and recognition program (B-SAFE), designed to encourage improvement of physical working conditions and hazard reduction in construction.

Methods and materials: We conducted a cluster randomized controlled trial on 8 sites (4 B-SAFE intervention sites, 4 control sites) for approximately five months per site. Pre- and post-exposure surveys were collected at all sites (n=615). Multi-level mixed effect regression models evaluated the effect of B-SAFE on safety climate, as assessed from surveys. Focus groups (n=6-8 workers/site) were conducted following data collection. Transcripts were coded and analyzed for thematic content using Atlas.ti(V6).

Results: The mean safety climate score at intervention sites, as measured on a 0-50 point scale, increased 0.5 points between pre- and post-B-SAFE exposure, compared to control sites that decreased 0.8 points. The intervention effect size was 1.64 (p-value=0.01), when adjusted for month started on-site, total time on-site, as well as individual characteristics (trade, title, age, and race/ethnicity). Workers at B-SAFE sites noted increased levels of safety awareness, communication, and teamwork.

Conclusions: B-SAFE led to many positive changes, including improvements in safety climate, awareness, teambuilding, and communication.

Impact and significance: B-SAFE was a simple intervention that engaged workers through effective communication infrastructures and had a significant, positive effect on worksite safety.

Determinants of early pregnancy serum Brain-derived neurotrophic factor in a Peruvian population

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Department of Epidemiology

Objectives: To examine the determinants of early pregnancy serum brain-derived neurotrophic factor (BDNF) levels.

Methods and materials: 982 women attending prenatal care clinics in Peru, were recruited in early pregnancy. Pearson’s correlation was used to evaluate the relationship of BDNF levels and continuous covariates. Analysis of variance and generalized linear models were used to compare unadjusted and adjusted BDNF levels according to categorical covariates. Multivariate linear regression models were applied to determine the factors that influence BDNF levels.

Results: Early pregnancy serum BDNF levels were positively associated with maternal age (r = 0.16, P < 0.001) and early pregnancy body mass index (BMI) (r = 0.17, P < 0.001), but inversely correlated with gestational age (r = -0.21, P < 0.001) and C-reactive protein (CRP) levels (r = -0.07, P < 0.05). Multivariate model showed that maternal age (β = 0.10, P = 0.002), early pregnancy BMI (β = 0.22, P < 0.001), gestational age (β = -0.33, P < 0.001) and serum CRP levels (β = -0.51, P = 0.007) were significantly associated with early pregnancy serum BDNF levels.

Conclusions: Maternal age, early pregnancy BMI, gestational age and early pregnancy CRP levels were determinants of early pregnancy serum BDNF levels in the low-income Peruvian women.

Impact and significance: Biological changes during pregnancy may cause alterations of BDNF levels. Further studies are needed to examine the role of BDNF during pregnancy.
Cardiovascular disease (CVD) risk profiles among HIV-infected and community based HIV-uninfected controls in Uganda

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Department of Epidemiology

Objectives: To compare CVD risk profiles between HIV-infected people on ART and age and gender-matched HIV-uninfected people in Uganda.

Methods and materials: We calculated each individual's CVD risk using 5 different risk scores, and used Kappa statistics to assess for agreement between these scores. We then used linear regression to compare risk scores and common carotid artery intima media thickness (C-CIMT).

Results: Of the 205 participants, 51% were HIV-infected, median age was 49 and ~50% were females. Compared with their HIV-infected counterparts, HIV-uninfected participants had higher median CVD risk scores (p<0.003) and higher C-CIMT values (0.68 vs. 0.63 p = 0.003). Agreement between the two Framingham risk scores (FRS) was 91% (k=0.7), and at least 81% (k=0.5) between FRS and ACC/AHA pooled risk score. Agreement between the Reynolds risk score (RRS) and FRS was at least 55% (k=0.2), and 62% (k=0.4) with ACC/AHA. The D:A:D score and RRS agreed in 75% of the time (k=0.6) and in less than 40% of the time with FRS and ACC/AHA scores. High CVD risk participants had higher C-CIMT scores when compared to low risk participants (p<0.01).

Conclusions: In this study, HIV-uninfected individuals had higher CVD risk scores than HIV-infected participants. There was poor agreement between existing CVD risk scores.

Impact and significance: Existing risk scores should be further evaluated in our settings to see which has greater predictive accuracy or if another prediction metric is needed.

Development and Characterization of Electronic-Cigarette Exposure Generation System: A versatile platform for the physico-chemical and toxicological assessment of electronic cigarette emissions

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Department of Environmental Health

Objectives: Electronic cigarettes (e-cig) have gained increasing attention, popularity and market share. However, while findings on toxicological implications continue to grow, major knowledge gaps on both exposure complex chemistry and toxicity exist, prohibiting public health assessors from assessing risks.

Methods and materials: Thus, a versatile electronic cigarette exposure generation system (Ecig-EGS) has been developed.

Results: Ecig-EGS allows generating e-cig emission, performing real time monitoring and time-integrated particles/gas sampling, physico-chemical characterization, and toxicological assessment (in vitro and in vivo). The platform is highly versatile and can be used with all e-cig types. It enables generation of precisely controlled e-cig exposure while critical operational parameters and environmental mixing conditions can be adjusted in a systematic manner to assess their impact. Results proved the versatility and reproducibility of Ecig-EGS. Results showed 10^6 - 10^7 particles/cm3 with the mode diameter approximately 200nm in e-cig emission under air change rate 60/h. Elevated CO2 and volatile organic species generation were observed. Furthermore, environmental mixing conditions also influenced e-cig emission profile.

Conclusions: The generated exposure and its physico-chemical profile raise the health and safety concerns.

Impact and significance: Ecig-EGS is currently in use to further understand the complex chemistry of the exposures and possible toxicological implications.
Nano-waste: Environmental health and safety (EHS) implications during thermal decomposition/incineration of nano-enabled products at their end-of-life

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Objectives: Conventional nanotoxicology has addressed adverse effects of pristine engineered nanomaterials (ENMs) but little is known about their property-transformation and particulate matter release over the lifecycle (LCPM) of a nano-enabled product (NEP). End-of-life of NEPs poses a nano-waste problem since nearly 20,000 tons of ENMs end up in incinerators every year globally.

Methods and materials: We assessed thermal decomposition of industrially-relevant thermoplastic nanocomposites, using a versatile Integrated Exposure Generation System (INEXS), that allows for systematic investigation of physicochemical, morphological and toxicological properties of byproducts (LCPM, residual ash). Polymer matrices (PU, PE, PP, PC, EVA) with different nanofillers (CNT, Fe2O3, TiO2) were studied at loadings (0.1-15wt%) at temperatures: 500, 800 °C.

Results: Low nanofiller release is detected in the LCPM, but released nanofiller amounts are affected by the matrix, nanofiller and nanofiller-loading. Chemistry of LCPM is >99wt% organic carbon across all matrices and nanofillers, however, the presence of nanofiller affects organic speciation toward formation of higher MW and more toxic PAHs. LCPM from CNT-PU shows significantly more biological activity and toxicity compared to pure PU. Findings also raise EHS concerns about ENM exposure to workers handling the residual ash and its fate and transport upon landfill disposal.

Impact and significance: Addressing these EHS issues will enable nano-risk assessment based on actual lifecycle exposures and nanotoxicology of LCPM.

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Childhood Abuse and Adult Onset Asthma among Peruvian Women

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Department of Epidemiology

Objectives: Childhood abuse (CA) has been found to be associated with adult onset asthma (AOA); however, this association has not been studied in low and middle income countries with a burden of gender-based violence, including CA. Our objective is to examine the odds of asthma diagnosed at age 18 or older in relation to physical and sexual CA among pregnant women in Peru.

Methods and materials: This cross-sectional study included 3272 pregnant women. Demographic characteristics, history of CA and asthma diagnoses were collected using in-person interviews. Logistic regression procedures estimated odds ratios (OR) and 95% confidence intervals (95%CI) for AOA diagnoses in relation to CA.

Results: Approximately 71% reported a history of physical or sexual CA (<18 years) while 2.5% were diagnosed with AOA. The prevalence of physical only, sexual only and both physical and sexual CA was approximately 38%, 8% and 25%, respectively. After controlling for known confounders, history of physical only (OR=1.18; 95%CI 0.64-2.19), sexual only (OR=1.90; 95%CI 0.83-4.35) or both physical and sexual CA (OR=1.60; 95%CI 0.85-3.00) were not significantly associated with increased odds of AOA.

Conclusions: Our results do not provide convincing evidence that CA is associated with AOA among pregnant women in Peru. However, the magnitude and direction of associations are largely similar to prior studies.

Impact and significance: Given the high prevalence of CA, further research is required to better understand the effects of CA on asthma.
Session 3
Recommendations to Improve Employee Thermal Comfort When
Working in 40°F Refrigerated Cold Rooms
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Objectives: Cold rooms for food storage and preparation are usually kept at 40°F following food safety guidelines. Some food preparation employees may spend 8 or more hours inside cold rooms but may not be aware of the risks associated with moderately cold temperatures. We characterized work conditions of cold room employees and provided recommendations to improve thermal comfort.

Methods and materials: We observed employees in two cold rooms at an airline catering facility, reviewed daily temperature logs, and evaluated employee's physical activity, work and rest schedules, and protective clothing use. We measured temperature, relative humidity, and air velocities at work stations inside the cold rooms.

Results: Employee's thermal comfort was influenced by air drafts at workstations, insufficient use of personal protective equipment (PPE) due to dexterity demands of their food preparation work, and lack of knowledge about good health and safety practices in cold rooms. We measured some air drafts that exceeded recommended guidelines.

Conclusions: Recommendations included redesigning air deflectors, installing suspended baffles to change air patterns, providing more options on PPE, changing out of wet clothing, providing hand warmers, and educating employees on cold stress.

Impact and significance: There is a need for guidelines and educational materials tailored to employees in moderately cold environments to improve thermal comfort and prevent health and safety problems.

Priming With Real Direct-to-Consumer Prescription Drug Advertisements
And Perceived Effectiveness Of Lifestyle Change vs. Drugs
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Department of Biostatistics

Objectives: Direct-to-consumer (DTC) prescription drug advertisements could induce a "boomerang effect," such that they reduce the perceived effectiveness of non-pharmaceutical treatment via lifestyle change. Objective was to determine the perceived effectiveness of lifestyle change versus drugs to alleviate disease among a sample of laypeople; to assess the effect of priming with real DTC television ads on these perceptions.

Methods and materials: 819 adults in the United States recruited via Amazon Mechanical Turk were randomized to view or not view a real television ad for a prescription drug. Subjects were further randomized to judge either lifestyle change (diet and exercise) or drugs on three measures: general effectiveness, disease severity for a hypothetical patient after using the health intervention, and personal intention to use the health intervention if diagnosed with the target health condition.

Results: Without ad exposure, subjects believed lifestyle to be more effective than drugs by measures of general effectiveness (p < 0.001) and personal intention (p = 0.004), and equally effective for disease severity score (p = 0.45). Ad exposure did not markedly or consistently shift perceptions in favor of drugs. Individual "problem status" (current healthy lifestyle) did not moderate the differential effect of ad exposure.

Conclusions: Our results are not consistent with real DTC advertisements substantially shifting decision-making via "boomerang effects."
Assessment on the validity of a dish-based semi-quantitative food-frequency questionnaire for rural Bangladesh population

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Department of Environmental Health

Objectives: The study used multi-facet statistical approach to assess the of a dish-based 42-item semi-food frequency questionnaire (FFQ) using two 3-day food diaries (FD) conducted in two different seasons.

Methods and materials: 248 subjects from 47 randomly selected families residing in Pabna, Bangladesh were interviewed and 190 agreed to participate. All participants completed one FFQ and two 3-day FD, and had duplicated food samples collected for all meals during the period of food diary collection. Pearson's product moment correlation, Spearman's sign rank test, paired t-test, percent difference, cross-classification, weighted Kappa coefficient, and Bland-Altman analysis were used to evaluate the various facets of validity of the FFQ using an integrative approach.

Results: The FFQ has good validity for total energy intake at the group level, with no presence of bias and the supporting validity at individual level is fair. Good validity was also found for macronutrient and mineral intakes. Some micronutrient intakes (thiamin, riboflavin, niacin, and folate) had good validity at both the group and individual levels with no presence of bias. Intake of l-ascorbic acid measured by FFQ had poor validity at both group and individual levels.

Conclusions: In conclusion, the FFQ provided good validity. This is the first study to use an integrative approach to assess the validity of a FFQ.

Impact and significance: Understanding dietary intake in rural Bangladeshi is important to study the interaction between diet and arsenic exposure.

A Pooled Analysis of Carbohydrate and Dietary Fiber Intake and Prostate Cancer Risk

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Department of Nutrition

Objective: To examine associations between carbohydrate and dietary fiber intake and advanced and fatal prostate cancer in the Pooling Project of Prospective Studies of Diet and Cancer, a consortium of 15 cohorts with validated measures of dietary intake.

Methods and materials: During follow-up of 842,149 men, 52,683 were diagnosed with prostate cancer. Study-specific multivariable relative risks (MVRR) were calculated and then pooled using random effects models.

Results: Median carbohydrate intake across studies ranged from 41%-64% of total energy. In preliminary analyses pooled MVRRs comparing the highest vs lowest quintile of carbohydrate intake were 0.90 (95% confidence interval [CI] 0.81-1.01) for advanced prostate cancer and 0.88 (95% CI 0.77-1.00) for fatal prostate cancer. Findings were similar for available carbohydrates (carbohydrates-dietary fiber). When carbohydrate intake was categorized using common absolute cut points across studies, no significant change in risk was observed for men consuming ≥55% vs 40%-<45% of energy from carbohydrates for either outcome. Total dietary fiber intake was not associated with risk of advanced or fatal prostate cancer.

Conclusions and significance: These preliminary findings suggest that high carbohydrate and dietary fiber intakes are not substantially associated with both outcomes. Further evaluation of low carbohydrate and dietary fiber intake on prostate cancer risk are needed in populations with low intakes of these nutrient
Risk of gestational diabetes mellitus in relation to maternal dietary calcium intake

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Department of Epidemiology

Objectives: We examined maternal preconceptional and early pregnancy dietary calcium intake with GDM risk in a cohort of women in Washington State, USA.

Methods and materials: We assessed preconceptional and early pregnancy dietary calcium intake and consumption of foods rich in calcium using a food frequency questionnaire among 3,414 participants in a prospective cohort study. We used multivariable generalized linear regression models to derive estimates of relative risks (RRs) and 95% confidence intervals (95% CIs).

Results: Higher dietary calcium intake was inversely, although not statistically significantly, associated with GDM risk. After adjusting for confounders the RRs (95% CI) for GDM according to successive quartiles of calcium intake were 1.00, 0.63 (95% CI 0.41-0.98), 0.66 (95% CI 0.39-1.11), and 0.57 (95% CI 0.27-1.21), with the lowest quartile as the reference (Ptrend=0.131). GDM risk was statistically significantly and inversely associated with low-fat dairy (Ptrend=0.032) and whole grains (Ptrend=0.019) consumption.

Conclusions: These findings suggest that higher levels of maternal preconceptional and early pregnancy calcium intake, particularly intake of calcium rich low-fat dairy products and whole grains, are associated with lower GDM risk.

Impacts and significance: Dietary teaching should be focus on educating women about national dietary recommendations, including calcium intake, prior to pregnancy.

Risk of colorectal cancer mortality after detection of colorectal adenomas in Sweden

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Objectives: To design cost-effective colonoscopic surveillance following detection of colorectal adenomas, we need improved understanding of their natural history to predict future risk of invasive cancer and death.

Methods and materials: We used local pathology registers in Sweden to empanel a cohort of 86,416 individuals with adenomas detected from 1980 to 2014. We compared the adenoma cohort with a population sample of 418,670 individuals without diagnosed adenomas, matched by age, sex and county of residence and also with standardized population mortality rates (SMR). We used multivariate Cox regression to estimate hazard ratios (HR) with 95% confidence intervals (CI).

Results: We observed a total of 817 deaths from colorectal cancer (CRC) in the adenoma cohort and 2,002 in the control cohort, which correspond to a HR of 1.95 (CI=1.78-2.13). The risk of dying from CRC was 52% higher in the adenoma cohort compared to SMR. In the colonoscopy cohort (restricted to individuals having a registered full colonoscopy) the risk was 2.04 (CI=1.63-2.56) adenomas vs. no adenomas.

Conclusions: Individuals with adenomas had a 52% increased risk of dying from CRC compared to SMR and an about twofold risk compared to individuals with no detected adenomas. Controls without detected adenomas had a 20% lower risk of dying from CRC compared to SMR.

Impact and significance: The relative risks of consecutive CRC death is higher than previously published but results are comparable in absolute risk.
Detection of aberrant opioid use in prescription claims data: Comparison and validation of five algorithms

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Objectives: Given soaring rates of prescription opioid abuse in the US, there is interest in using algorithms in prescription claims data to identify aberrant behaviors, such as misuse, abuse, and diversion. Objective was to compare and validate five algorithms to detect aberrant opioid use.

Methods and materials: Claims data for new prescription opioid users were extracted from the Medicaid Analytic eXtract (MAX) for 2000-2006 and United Healthcare for 2004-2013. Patients were followed 1 year after their first opioid dispensing, and aberrant opioid behavior was defined according to each of the five algorithms. Unadjusted risk differences between the identified aberrant and non-aberrant users were also calculated to assess risk of an opioid-related adverse event (defined as an ICD-9 code for opioid abuse, overdose, or dependence).

Results: There were 3.7 million eligible individuals in MAX and 4.3 million in United who received at least one new opioid prescription. Algorithms ranged from flagging potential aberrant behavior in 0.02% to 12.8% of patients in MAX and 0.01% to 7.9% of patients in United. Algorithms varied substantially in their ability to predict opioid-related adverse events, RDs ranging from 1.03% to 14.8% in MAX and .047% to 13.4% in United.

Conclusions: In large cohorts of publicly and commercially insured patients, we demonstrated that algorithms differed substantially in agreement and performance.

Impact and significance: Further evidence-based improvements to existing algorithms may be possible.

Determinants of High Blood Pressure and Barriers to Treatment among Adults in Dar es Salaam, Tanzania

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Department of Epidemiology

Objectives: Hypertension is a rising public health concern in sub-Saharan Africa. We assessed the prevalence and determinants of high blood pressure, and barriers to care and treatment, in Dar es Salaam, Tanzania.

Methods and materials: Survey of 2,174 adults aged 40 years and older in 2014 with a one-year follow-up.

Results: Hypertension prevalence was 37%. Major modifiable risk factors for higher systolic blood pressure (SBP) were overweight or obesity with 5.5 (95% Confidence Interval: 3.7, 7.4) mmHg higher mean adjusted SBP compared to normal weight; and inadequate physical activity with 4.8 (95% CI: 1.4, 8.1) mmHg higher SBP in the lowest quintile compared to the highest. Among hypertensives, 52% were undiagnosed, 77% were untreated, and 89% were uncontrolled. Hypertension screening increased the likelihood of visits to a healthcare professional, but did not improve treatment or control. Undiagnosed hypertension was more common among men, those who did not have health insurance, were poorer, had no education, and drank alcohol.

Conclusions: Hypertension in Dar es Salaam is largely due to overweight, obesity and inadequate physical activity, as well as limited access to quality medical care and treatment.

Impact and significance: Overweight, obesity, physical inactivity, and hypertension are highly prevalent in Dar es Salaam. Increased insurance coverage and community-based screening along with quality medical care and patient education may help control the burgeoning hypertension epidemic.
3-I  **Body Mass Index predicts Left Ventricular Mass in Male Firefighters**

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Department of Environmental Health

Objectives: Left ventricular mass (LVM) is a strong predictor of cardiovascular disease (CVD) events; increased LVM is common among firefighters; and plays a major role in firefighter sudden cardiac death (SCD). We aim to identify significant predictors of LVM among firefighters.

Methods and Materials: Cross-sectional study of 400 career male firefighters selected by an enriched randomization strategy. LVM was assessed by echocardiography (ECHO) and cardiac magnetic resonance, and normalized (indexed) for height. CVD risk parameters included vital signs, obesity, obstructive sleep apnea (OSA), cardiorespiratory fitness (CRF), hypertension (HTN) and physical activity. Linear regression models were performed.

Results: In multivariate analyses, BMI was the only consistent significant independent predictor of LVM indices (all, p<0.001). A 1-unit decrease in BMI was associated with 1 unit (kg/m1.7) reduction of LVM/height 1.7 after multivariate adjustment.

Conclusions: BMI was the strongest predictor of LVM indices among firefighters.

Impact and Significance: Our findings suggest that reducing obesity will improve CVD risk profiles and decrease on-duty CVD events in the fire service. Our results support targeted noninvasive screening for LVH with ECHO among obese firefighters.

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3-J  **Basal on-duty cardiac autonomic function and its association with cardiorespiratory fitness among firefighters**


Department of Environmental Health

Objectives: Firefighters' activities expose them to intense stressors, demanding adjustments in cardiac autonomic function (CAF). Little is known about firefighters' on-duty CAF. Objective was to evaluate the resting on-duty CAF of male firefighters and its association with cardiorespiratory fitness (CRF).

Methods and materials: We evaluated 38 firefighters. CRF was estimated by questionnaire and categorized as less fit (<12METs) or more fit (≥12METs). CAF was addressed by means of basal on-duty supine (SUP) and orthostatic (ORT) heart rate variability indices: 3 parasympathetic markers (pNN50, rMSSD and HFn); 1 sympathetic ( LFn) and the sympathovagal balance ratio (LF/HF). We used Wilcoxon and Mann-Whitney tests.

Results: Volunteers were 41 (35-46) yrs, BMI of 26.1 (22.8-30.6) kg/m2 and CRF of 12.1 (8.9-13.6) METs. HRV showed high inter-individual variation. HRV was sympathetic dominant in SUP and increased from SUP to ORT (p<0.01). Parasympathetic indices were higher in SUP as compared to ORT (p<0.01), while higher values of the sympathovagal balance were found in ORT (p<0.01). The less fit firefighters showed higher sympathetic dominance in ORT as compared to the fittest ones (p<0.05).

Conclusions: We found a physiological CAF responsiveness from SUP-to-ORT but with a sympathetic dominance that was associated with poor CRF.

Impact and significance: Our data may be helpful for better understanding the underlying mechanism associated with sudden cardiac death among firefighters.
3-K

The association of outdoor vegetation with ADHD-related behavior among children living in an urban community

Mahsa M. Yazdy, Jaime E. Hart, Kathleen F. Bush, Laura E. Jackson, Alexandra Mackey, Anthony Wilson, Susan A. Korrick

Department of Epidemiology

Objectives: In a sociodemographically diverse birth cohort, we evaluated the cross-sectional association of outdoor vegetation (OV) and distance to parks with ADHD-like behavior using the Conners' Rating Scale for Teachers (n=560), where higher values signify more adverse behavior.

Methods and materials: We calculated percent OV and percent tree cover within 50 and 500m of each child's home and school from high-resolution aerial imagery. Distance to parks was determined with GIS databases.

Results: Percent OV near the home was higher for children whose mothers were older, more educated, married, wealthier, non-Hispanic white race, and who did not use cigarettes or alcohol in pregnancy. In unadjusted models, an interquartile range increase in OV around the home was associated with better DSM-IV ADHD scores, -2.80 (95%CI: -4.28, -1.45) and -2.79 (95%CI: -4.36, -1.23), for 50 and 500m buffers respectively. However, effect estimates were attenuated substantially with control for sociodemographics (50m: 0.39; 95%CI: -1.24, 2.01 and 500m: 0.45; 95%CI: -1.35, 2.24). Results were similar for tree cover only, OV near school, and other ADHD-related outcomes.

Conclusions and significance: There was no clear evidence of benefit from proximity to parks. The association between nearby OV and childhood ADHD-like behavior was highly confounded by measures of SES such that there was no evidence of an independent protective effect of OV. Impact and significance: Our findings suggest future studies should consider community characteristics in assessment of health benefits of green space.

3-L

Is Japan ready for the next crisis?: The preparedness of Japan's hospitals that are designated for admission of patients with highly infectious diseases

Toyokawa Takao, Narumi Hori, Yasuyuki Kato

Department of Global Health and Population

Objective: To assess the preparedness of the 47 special hospitals in Japan that have been designated to admit and treat patients with highly infectious diseases (HIDs)

Methods: From September to November 2015 we conducted a cross-sectional study of all the 47 designated hospitals for Category 1 infectious diseases including Ebola Virus Disease (EVD), Lassa fever, and smallpox using a self-report questionnaire.

Results: The questionnaire addressed 5 issues: (1) characteristics of the hospital; (2) the availability and contents of hospital guidelines or protocols for the management of patients with suspected or confirmed viral haemorrhagic fevers including EVD; (3) the performance of preparedness activities in response to the recent Ebola crisis; (4) characteristics of isolation units for patients; (5) human resources and occupational issues.

Conclusions and significance: Our study showed some strengths of preparedness in designated hospitals in Japan including well-equipped facilities and diligent preparedness efforts for HIDs and identified critical challenges including the lack of guidelines and preparedness efforts especially associated with clinical or practical topics, issues of human resources and occupational issues. This is the first research which has revealed the preparedness for HIDs in designated hospitals in Japan. It is essential not only for Japan but other countries, preparing for the next threat of HIDs which might be more transmissible and more virulent than EVD.
Session 4
Spatiotemporal Downscaling of Erythemal Ultraviolet Radiation Using Geostatistics

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Department of Epidemiology

Objectives: To develop a high-resolution spatiotemporal model of erythemal ultraviolet radiation (UVEry) of the U.S. by downscaling coarse-scale remote sensing images using geostatistics.

Methods and materials: Area-to-point (ATP) residual kriging was used to downscale National Aeronautics and Space Administration (NASA) Total Ozone Mapping Spectrometer (TOMS) and Ozone Monitoring Instrument (OMI) UVEry images (grids) to a finer 1 km spatial resolution in the northeastern U.S. from 1998-2012. Predicted average July noon-time UVEry from ATP models and NASA grids were compared to UV-B Monitoring and Research Program (UVMRP) measurements using mean absolute error (MAE) and root mean square error (RMSE).

Results: Predictors included cloud cover, dew point, elevation, latitude, and surface incoming shortwave flux. From 1998-2004, downscaled UVEry (MAE 9.0; RMSE 10.2) more accurately estimated UVEry at UVMRP stations compared to NASA grids (MAE 21.3; RMSE 21.7). Model performance from 2006-2012 was poor.

Conclusions: Preliminary results indicate ATP residual kriging can provide accurate fine-scale UVEry estimates. Modeling is ongoing to improve prediction performance and expand across the U.S.

Impact and significance: Accurate environmental exposure assessment is critical to epidemiologic studies elucidating the role UVEry may play in impacting health outcomes. This model provides a finer scale alternative to current models limited in spectral, spatial, and temporal resolution.
Duration and level of exposure to serum LDL-cholesterol and risk of coronary heart disease - an application of the parametric g-formula

Peter Ueda, Pablo Gulayin, Priyanka Jain, Goodarz Danaei

Department of Global Health and Population

Objectives: To assess the effects of different levels and durations of serum LDL-cholesterol (LDL) on risk of coronary heart disease (CHD).

Methods: We followed 2,567 participants from the Framingham Offspring Study between 1987-2007 using data from the 4th-7th examinations. We applied the parametric g-formula to adjust for time-varying confounding by other major cardiovascular risk factors and estimated the population risk of CHD under 4 scenarios by setting LDL levels to the following ranges and durations: (1)<130 mg/dL (low LDL) for 16 years (2) 130-160 (moderate LDL) for 16 years; (3) 160-190 (high LDL) for the last 4 years of follow-up (4) 160-190 for the last 8 years; and (5) >190 (very high) for the last 4 years.

Results: 218 CHD events were observed. The observed 16-year risk of CHD was 8.54% and the simulated risk under no intervention was 8.67% indicating that the models were valid under the null. The estimated CHD risk under selected interventions were; low LDL: 7.3%; moderate LDL for 16 years: 9.0% (relative risk (RR) vs low LDL = 1.23); high LDL for 4 years 9.4% (RR=1.30); high LDL for 8 years: 9.9% (RR=1.36); and very high LDL for 4 years: 10.1% (RR=1.39).

Conclusions: Long-term exposure to moderate LDL raises CHD risk, on par with risks of 4 years of exposure to high LDL which is an indication for lifestyle modification or treatment.

Impact and significance: Both duration and level of exposure to LDL are of importance for CHD risk and could be used to guide clinical decisions.

The economic impact of risk factors for childhood stunting in 137 developing countries

Kathryn G. Andrews, Goodarz Danaei, Gunther Fink, Christopher R. Sudfeld, Mary C. Smith Fawzi, Wafaie W. Fawzi, Majid Ezzati

Department of Global Health and Population

Objectives: Determining the economic cost of risk factors for childhood stunting could help identify areas where intervening could generate savings. We estimated the impact of 18 risk factors and 5 risk factor groups jointly on wage income losses in 137 developing countries.

Methods and materials: We estimated shifts in height-for-age z-score (HAZ) associated with the burden of stunting attributable to these risks and risk groups. We combined these with changes in schooling associated with HAZ, returns to schooling, and earnings to produce estimates of lifetime wage earnings lost due to the risk factors in question.

Results: Term, small-for-gestational age was responsible for the greatest economic cost (US$32, 95% CIs 25, 41 billion of lost wages) among the cohort of children born in developing countries in 2010. This was followed by childhood diarrhea and unimproved sanitation, accounting for US$22 (95% CIs 9, 36) billion and US$18 (14, 23) billion, respectively. The risk factor group with the greatest cost was foetal growth restriction and preterm birth, with US$46 (95% CIs 36-57) billion, followed by the environmental risk group at US$23 (95% CIs 18, 29) billion.

Conclusions: This analysis is the first to generate comparable estimates of the economic burden of key risk factors for stunting in children across developing countries.

Impact and significance: These results provide information on the financial consequences of failing to address these risks, and have the potential to be used in intervention cost-benefit approximations.
Acceptability and utilization of a medium-quantity lipid-based nutrient supplement formulated for pregnant women in rural Niger

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Objectives: Lipid-based nutrient supplements (LNS) are a viable strategy for meeting the increased dietary requirements of pregnant women. Before introduction of a new 40g LNS formulation (Epi-E), we sought to assess its acceptability and utilization among pregnant women in rural Niger.

Methods and materials: We conducted a two-part study among pregnant women presenting for routine antenatal care in June (Ramadan) and September (non-Ramadan) 2014. Part I evaluated a 50g Epi-E/porridge mixture through two days of test meals. Part II included a 14-day trial with an Epi-E take-home ration. After each part, a questionnaire with close- and open-ended questions was administered.

Results: In Part I, participants consumed >90.0% of each test meal. They rated Epi-E highly on all categories of a hedonic scale. No variation in findings emerged between test day or study period. In Part II, participants consumed Epi-E as prescribed. No sachets went unused and none were sold/traded. Participants reported consuming Epi-E directly from its sachet, citing "convenience" and "flavor". Differential utilization patterns emerged by study period.

Conclusions: Epi-E, a 40g LNS formulation with increased micronutrient content, was well accepted and appropriately used by women regardless of study period.

Impact and significance: LNS may be provided to help meet the nutritional needs of women during pregnancy. The Epi-E formulation is acceptable and may be an appropriate strategy for doing so in this setting.

Nineteen Public Health 101 Nanocourses offered in 2013-2016: a pooled analysis of course evaluations

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Department of Environmental Health

Objectives: The Public Health 101 nanocourse initiative was developed and launched in 2013 by the Postdoctoral Association of the Harvard T.H. Chan School of Public Health, under the guidance of the Harvard Medical School Curriculum Fellows program. Nanocourses are condensed mini-courses that meet for a minimum of 6-hours in a two half-day course format. These unique courses provide teaching opportunities for postdoctoral fellows, and are available to both Harvard and non-Harvard affiliates free of charge.

Methods and materials: Quantitative course evaluations for nineteen Public Health 101 nanocourses offered in 2013-2016 were analyzed (n=312, approximate response rate=35%).

Results: Average quality ratings ranged from 5.2 to 6.7 (SD=.42) while average usefulness ratings ranged from 4.6 to 6.1 (SD=.43) out of 7 scale. Also, we utilized text mining based on Euclidian distance clustering to analyze the qualitative feedback for the four flagship "Introduction to Public Health" nanocourses. Four key themes from qualitative data indicate: 1) Satisfactory scope and goals of the courses; 2) Helpfulness of course presentation styles and methods; 3) A desire for more specific hands-on examples and succinctness when covering highly technical topics; and 4) A demand for more accommodating course administration.

Conclusion: Our analysis was a useful and efficient approach for compiling feedback from multiple course offerings and will be used to better meet the needs and expectations of students attending the Public Health 101 nanocourse.
Income Volatility and Depressive Symptoms among Older Adults in South Korea

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Objectives: Whereas negative associations of low income with psychological health are widely reported, little is known about the impact of income fluctuations. This study is to examine relationship between income volatility and depression among older adults in South Korea.

Methods and materials: Data derived from the Korean Longitudinal Study of Aging 2006-2012, a nationally representative longitudinal study for middle- and old-aged adults. CES-D score in 2012 was used as outcome variable. Income volatility was measured as the variance of logged income at four waves. Negative Binomial regression models were used, adjusting for potential confounders such as income level, baseline (2006) depression and health status. We assessed the relation of income volatility to depressive symptoms and the relationship depends on co-residence with child by adding the interaction term.

Results: Income volatility and co-residence with child were not associated with CES-D scores. However, the model with interaction term showed the effects of income volatility differs by co-residence with child. Among individuals not co-residing with child, more volatile income is related to higher CES-D scores. For the elderly living with child, income volatility showed negative association with CES-D scores. Conclusions: When the elderly live alone or only with spouse, fluctuating income would threaten psychological health.

Impact and significance: The finding implies that social protection policies for elderly households that live with an unstable income are needed.

Brazil's Family Health Strategy: factors associated with program uptake and coverage expansion over 15 years (1998-2012)

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Objectives: To examine factors associated with the implementation and expansion of the Family Health Strategy (FHS) across 5,419 Brazilian municipalities from years 1998 to 2012.

Methods and materials: Official databases were merged into a longitudinal dataset by municipality covering the years 1998-2012. Density curves of the FHS coverage were represented by Epanechnikov kernel density estimators. To investigate factors associated with the FHS implementation and expansion, we used a MLM model for change considering the municipality as the unit of analysis.

Results: During the 15 year study period, the national coverage of the FHS increased from 4.4% to 54%, and municipalities that had not adopted the program decreased from 86.4% to 4.9%. The increase in FHS uptake and coverage was not homogenous, was positively associated with small population size, low population density, low level of private health insurance coverage, low economic development, alignment of the political party of Mayor-Governor, and availability of health care supply.

Conclusions: Efforts to expand the FHS coverage will need to focus on increasing the availability of health personnel, on diversifying the financial incentives for municipalities to uptake/expand the FHS, and on devising new policy regulations that encompass both private and public sectors.

Impact and Significance: Establishing a primary health care program with high coverage is the first step towards achieving universal health coverage.
Primming airway epithelial cells with transforming growth factor beta recapitulates the biophysical properties of asthmatic cells

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Background: We previously showed that primary human bronchial epithelial (HBE) cells in air-liquid interface (ALI) culture undergo a transition from a fluid-like unjammed to a solid-like jammed state during maturation. This transition is delayed in HBE cells from asthmatic donors compared to cells from non-asthmatic donors.

Methods and materials: We tested the hypothesis that this delay is recapitulated by conditioning non-asthmatic cells with transforming growth factor-beta (TGF-β), a fibrotic mediator elevated in asthmatic airways. HBE cells were incubated with vehicle or TGF-β during expansion, then plated in ALI culture. We quantified cell motions during maturation in ALI, and measured cell-substrate tractions and monolayer stresses exerted by the same cells plated on soft polyacrylamide gels.

Results: Control HBE cells were highly mobile at day 3 of ALI culture, but were immobile by day 7, while conditioned HBE cells remained mobile until day 10. Compared to control cells, conditioned cells exhibited significantly higher tractions and stresses by 1.7- and 1.5-fold, respectively. Both control and conditioned cells unjammed at day 14 by mechanical compression mimicking bronchospasm, but the response of the conditioned cells was higher. Inhibition of TGF-β signaling both reduced mechanical compression-mediated unjamming, and also augmented jamming with increasing ALI days in cells from asthmatic donors.

Conclusion: Our data suggests that TGF-β promotes a dysmature epithelial phenotype that delays HBE cell jamming in asthma.

Persistent DNA methylation changes link prenatal mercury exposure and cognitive performance in childhood

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Introduction: Prenatal exposure to mercury is associated with lower cognitive scores. Fetal epigenetic programming events could explain neurodevelopmental effects.

Methods: Within Project Viva, a US birth cohort, we examined associations of prenatal mercury exposure with offspring DNA methylation, and DNA methylation with child cognition. We measured mercury in 2nd trimester maternal erythrocytes. DNA methylation of leukocytes was measured in umbilical cord blood (N=321), early in childhood (n=70) and mid-childhood (n=291). Childhood cognitive performance was evaluated using two tests: WRAVMA and PPVT.

Results: In males, a doubling in mercury exposure decreased mean cord blood DNA methylation by 2.3% in a region of the PON1 gene with 9 CpGs (95% CI: -3.7, -0.8). This association persisted during early childhood (-4.7%, 95% CI: -9.2, -0.2) and in mid-childhood (-1.2%, 95% CI: -2.5, 0.1). Methylation of the PON1 region was associated with a marginal decrease of 2.7 points on cognitive PPVT scores per 10% increase in methylation (95% CI: -5.6, 0.3). No associations were present between PON1 methylation and WRAVMA scores. In individual CpG analyses, two loci were associated with mercury exposure and sex-specific alterations were present. Associations in males persisted into childhood.

Conclusions: Moderate mercury exposure during pregnancy can lead to sex-specific functional epigenetic alterations that persist throughout childhood and are associated with cognitive performance.
Air pollution at breast cancer diagnosis and survival from breast cancer
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Background: Among women, breast cancer is the most common cancer diagnosed and the 2nd leading cause of cancer death in the US. Inflammation-related exposures, such as aspirin, may influence the prognostic course of breast tumors. Furthermore, ambient air pollution induces systemic inflammation. Air pollution levels at diagnosis were positively associated with subsequent breast cancer mortality in the California SEER registry data.

Methods: Participants from the Nurses’ Health Study with confirmed Stage I-III breast cancer who had particulate matter (PM) data (n=6,428) were followed until breast cancer death, death from another cause, or the end of the study. PM was estimated using GIS-based spatio-temporal models linked to residential addresses. We performed Cox regression to estimate the hazard ratio (HR) of breast cancer death for every 10 μg/m3 increase in the annual level of PM at diagnosis.

Results: There were 888 deaths due to breast cancer. There were positive associations between PM size fractions and breast-cancer survival. For every 10 μg/m3 increase in annual PM2.5 at diagnosis, the rate of breast cancer death was 1.13 times higher (95% CI 0.94, 1.37). The HR was 1.02 for PM2.5-10 (95% CI 0.89, 1.17).

Conclusion: Fine particulate matter may influence breast cancer prognosis; however, further analyses are ongoing.

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Viral Suppression in HIV Studies: Combining Times To Suppression and Rebound
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In HIV-1 clinical trials the interest is often to compare how well treatments suppress the HIV-1 RNA viral load. The current practice in statistical analysis of such trials is to define a single ad hoc composite event which combines information about both the viral load suppression and the subsequent viral rebound, and then analyse the data using standard univariate survival analysis techniques. The main weakness of this approach is that the results of the analysis can be easily influenced by minor details in the definition of the composite event. We propose a straightforward alternative endpoint based on the probability of being suppressed over time, and suggest that treatment differences be summarized using the restricted mean time a patient spends in the state of viral suppression. A nonparametric analysis is based on methods for multiple endpoint studies. We demonstrate the utility of our analytic strategy using a recent therapeutic trial, in which the protocol specified a primary analysis using a composite endpoint approach.
The Harvard Chan Poster Day Organizing Committee would like to thank the individuals who made this event a success. First and foremost, Poster Day would not have been possible without the hard work from the Organizing Committee volunteers. Specifically,

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- Representatives from the Harvard Chan Student Government:
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We appreciate all of the efforts that went in to planning and organizing this event, and we look forward to the same enthusiasm at the next Harvard Chan Poster Day.
Nano-waste: Environmental health and safety (EHS) implications during thermal decomposition/incineration of nano-enabled products at their end-of-life
Dilpreet Singh, Christa Watson, Georgios A. Sotiriou, Fang Zhang, Philip Demokritou