Public Health Forum
Spring 2019

Friday, May 10, 2019
Anschutz Medical Campus - Education 2 South and Education 2 North Buildings and the Education 2 Bridge

11:30 AM – 12:00 PM  MPH Public Health Forum Opening Session
                      Education 2 South Auditorium Room 1102

12:00 PM – 3:15 PM  MPH Oral Presentations - Education 2 North and Education 2 South Buildings (see schedule)

3:30 PM – 5:00 PM  Poster Presentations and Reception
                    Education 2 Bridge

The Capstone projects presented are the culminating experiences of students in the Master of Public Health program at the Colorado School of Public Health.

Please note, presentation times may vary slightly due to unforeseen scheduling changes.
<table>
<thead>
<tr>
<th>TIME</th>
<th>Event</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:00 PM</td>
<td>Microhabitat and Temperature Preference of the Culex, Aedes, and Culiseta Mosquitoes in Weld County, Colorado</td>
<td>Isaiah Francis - EPI</td>
</tr>
<tr>
<td>12:15 PM</td>
<td>Employee Ergonomic Evaluations: Prevalence of Back Discomfort at Children’s Hospital Colorado</td>
<td>Erika Karcher - EPI</td>
</tr>
<tr>
<td>12:45 PM</td>
<td>Youth Access to Tobacco Products: Neighborhood Characteristic Predictability of Tobacco Retailer Compliance Failure and At-Risk Community Indicator Analysis in the Seven-County Denver Metro Region</td>
<td>Lindsey Whittington - EPI</td>
</tr>
<tr>
<td>1:00 PM</td>
<td>Improving Developmental Screening and Referral for Non-English Non-Spanish Speaking Refugee Children</td>
<td>Joy Richards - EPI</td>
</tr>
<tr>
<td>1:15 PM</td>
<td>Nutrition in Older People Living with HIV Receiving ART: Impact of Food Insecurity and Undernutrition on Frailty and Physical Functioning</td>
<td>Brianna Wolford - EPI</td>
</tr>
<tr>
<td>1:30 PM</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>1:45 PM</td>
<td>Effects of Testosterone on Executive Function in Adolescents with Klinefelter Syndrome</td>
<td>Caroline Harrison - EPI</td>
</tr>
<tr>
<td>2:00 PM</td>
<td>Report on Current Personal Protective Equipment Use and Hand Hygiene Practices Among Health Care Workers at Denver Health</td>
<td>Madeleine Monroe - EPI</td>
</tr>
<tr>
<td>2:15 PM</td>
<td>Concentrated Disadvantage and Ambient Air Pollution in the Denver Metro Area</td>
<td>Kevin Andersen – EPI</td>
</tr>
<tr>
<td>2:30 PM</td>
<td>The Effects of HIV Infection on Age and Stage at Cancer Diagnosis Among Cervical Cancer Patients in Lusaka, Zambia</td>
<td>Yuli Chen - EPI</td>
</tr>
<tr>
<td>2:45 PM</td>
<td>Investigation of Variants in Vitamin D Pathway Genes (VDR, CYP24A1, CYP2R1, GC, and DHCR7/NADSYN1) and Rheumatoid Arthritis-Related Autoimmunity Among those at Increased Risk for the Development of Rheumatoid Arthritis</td>
<td>Craig Rothfuss – EPI and MPA</td>
</tr>
<tr>
<td>3:00 PM</td>
<td>The Effect of Delivery Mode on Ability to Meet Breastfeeding Intentions and Breastfeeding Duration</td>
<td>Leah Adams - EPI</td>
</tr>
<tr>
<td>3:15 PM</td>
<td>Poster Session &amp; Reception, Group A Presenting - Education 2 North Student Community Bridge</td>
<td></td>
</tr>
<tr>
<td>3:30 – 4:15 PM</td>
<td>Poster Session &amp; Reception, Group B Presenting - Education 2 North Student Community Bridge</td>
<td></td>
</tr>
</tbody>
</table>

BIOS= Biostatistics, CBHS= Community & Behavioral Health, CHE= Community Health Education (UNC), EHOH= Environmental Health and Occupational Health, EPID= Epidemiology, HSMP= Health Systems Management & Policy, LPH=Leadership in Public Health, MCH=Maternal & Child Health

See next page for more presentations!
<table>
<thead>
<tr>
<th>TIME</th>
<th>TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ed 2 South – Room 2305</td>
<td></td>
</tr>
<tr>
<td>Facilitator: Kathleen Garrett, MA</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>12:00 PM</th>
<th>Allie Hoffman - CBH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Policy Analysis of Colorado’s Proposed Legislation to Tackle the Cost of Prescription Drugs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>12:15 PM</th>
<th>Alicia Bowyer - CBH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Addressing Food Insecurity via Mobile Farm Carts: A Process Evaluation for Implementation in a Healthcare Setting</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>12:30 PM</th>
<th>Alyssa Jeffers - CBH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A Qualitative Evaluation of a Cervical Cancer Screening and Awareness Program in Rural South India</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>12:45 PM</th>
<th>Joanna Espinoza - CBH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A Mixed Methods Evaluation of a Health Education and Lifestyle Change Program for Patients at Two Denver Health Clinics</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1:00 PM</th>
<th>Hannah LaDow - CBH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Factors Related to Alcohol and Other Drug Use in a Community College Student Population</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1:15 PM</th>
<th>Kayla Ortega - CBH</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>1:30 PM</th>
<th>Break</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>1:45 PM</th>
<th>Melissa Nguyen - CBH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>After-Care Counseling for Women Undergoing Pregnancy Termination - Quality Assessment Initiative</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2:00 PM</th>
<th>Lindsey Houston - CBH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>“Stronger Together”– A Social Network Analysis of Community-Based Opioid Treatment Organizations in Larimer and Weld Counties</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2:15 PM</th>
<th>MacKenzie Mixer – CBH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A Mixed Methods Evaluation On Community Health Worker Knowledge Retention After A Health Education Training In The Loreto Region Of Peru</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2:30 PM</th>
<th>Jasmine Bains - CBH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Improving Early Childhood Outcomes in Colorado: a Quality Improvement Assessment of the Developmental Decision Support Tool</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2:45 PM</th>
<th>Katie Guthmiller - CBH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A Framework for Understanding the Health Consequences of Breastfeeding at the Breast and Milk Expression</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3:00 PM</th>
<th>Jaime Moore - CBH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Impact of a Community Based Childhood Obesity Intervention on Weight Related Quality of Life</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3:15 PM</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>3:30 – 4:15 PM</th>
<th>Poster Session &amp; Reception, Group A Presenting - Education 2 North Student Community Bridge</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>4:15 – 5:00 PM</th>
<th>Poster Session &amp; Reception, Group B Presenting - Education 2 North Student Community Bridge</th>
</tr>
</thead>
</table>

BIOS= Biostatistics, CBHS= Community & Behavioral Health, CHE= Community Health Education (UNC), EHOH= Environmental Health and Occupational Health, EPID= Epidemiology, HSMP= Health Systems Management & Policy, LPH=Leadership in Public Health, MCH=Maternal & Child Health

See next page for more presentations!
<table>
<thead>
<tr>
<th>TIME</th>
<th>Time</th>
<th>Presenter</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:00 PM</td>
<td>Meredith Morrison – MCH</td>
<td></td>
<td>Layers of Love: A Comprehensive Sexual Health Education Series for Disadvantaged Women in Denver.</td>
</tr>
<tr>
<td>12:15 PM</td>
<td>Amy DeRosa – MCH</td>
<td></td>
<td>Healthy Hearts Training Assessment</td>
</tr>
<tr>
<td>12:30 PM</td>
<td>Madeline Nealis – MCH</td>
<td></td>
<td>Evaluating the Need for Maternal and Child Health Curricula for Public Health Professionals in Canada</td>
</tr>
<tr>
<td>12:45 PM</td>
<td>Anna Kelly, MD – MCH</td>
<td></td>
<td>Preventing Recurrent Teen Pregnancies: Using an Inter-conception Screening Tool to Increase the Use of Long-Acting Reversible Contraceptives in Adolescents</td>
</tr>
<tr>
<td>1:00 PM</td>
<td>Olivia Ainsworth – MCH</td>
<td></td>
<td>Recruitment Strategies and Relevant Features for a Mobile Health Intervention to Reduce Alcohol-Exposed Pregnancies in American Indian/Alaska Native Young Women</td>
</tr>
<tr>
<td>1:15 PM</td>
<td>Austin Van Grack - MCH</td>
<td></td>
<td>Understanding Donor Milk Recipients’ Breastfeeding Practices in Colorado and the United Kingdom</td>
</tr>
<tr>
<td>1:30 PM</td>
<td>Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:45 PM</td>
<td>Carolina Ramirez – MCH</td>
<td></td>
<td>Motherhood in the Workplace: Examining Quality and Access to Lactation Rooms at the Children’s Hospital Colorado</td>
</tr>
<tr>
<td>2:00 PM</td>
<td>Ashleigh Allen – MCH</td>
<td></td>
<td>Human Trafficking Awareness: A Needs Assessment of Current Knowledge, Experience, and Views of Healthcare Professionals in the Denver Metro Area</td>
</tr>
<tr>
<td>2:15 PM</td>
<td>Natalia Zamboni Vergara – MCH</td>
<td></td>
<td>Assessing the Usability and Acceptability of an Education Program for Clinical Providers at the Trifinio Center for Human Development</td>
</tr>
<tr>
<td>2:30 PM</td>
<td>Minuri Gamage – MCH</td>
<td></td>
<td>Evaluation and Revision of Sexual and Reproductive Health Trainings in Disaster-prone Districts of Rural Sri Lanka</td>
</tr>
<tr>
<td>2:45 PM</td>
<td>Dannah Raz – MCH</td>
<td></td>
<td>Community Provider Training and Support for Early Diagnosis of Autism Spectrum Disorders</td>
</tr>
<tr>
<td>3:00 PM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3:15 PM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3:30 – 4:15 PM</td>
<td>Poster Session &amp; Reception, Group A Presenting - Education 2 North Student Community Bridge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4:15 – 5:00 PM</td>
<td>Poster Session &amp; Reception, Group B Presenting - Education 2 North Student Community Bridge</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

BIOS = Biostatistics, CBHS = Community & Behavioral Health, CHE = Community Health Education (UNC), EHOH = Environmental Health and Occupational Health, EPID = Epidemiology, HSMP = Health Systems Management & Policy, LPH = Leadership in Public Health, MCH = Maternal & Child Health

See next page for more presentations!
<table>
<thead>
<tr>
<th>TIME</th>
<th>Presenters/Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:00 PM</td>
<td>Ashley Berry - CHE&lt;br&gt;Agents of Change - A Community Art Program to Educate Wellness and Lower Stress in Youth</td>
</tr>
<tr>
<td>12:30 PM</td>
<td>Rachael Burnett – CBH&lt;br&gt;Preeclampsia Diagnosis: An Analysis of the Criteria Used in Bolivia in Relation to the American College of Obstetrics and Gynecology (ACOG) Guidelines</td>
</tr>
<tr>
<td>12:45 PM</td>
<td>Abby Bohannan – CBH and MURP&lt;br&gt;Mobile Homes, Health, &amp; Harvey: An Exploration of Housing Tenure’s Impact on Vulnerability and Wellness in Houston</td>
</tr>
<tr>
<td>1:00 PM</td>
<td>Colleen Sherry - CBH&lt;br&gt;Evaluation of Self-Reported Substance Use by Expecting Mothers Participating in the Nurse Family Partnership</td>
</tr>
<tr>
<td>1:15 PM</td>
<td>Shannon Shaw – CBH and MD&lt;br&gt;“Was It Racist?” A YouTube Video Series on the American Health Care System</td>
</tr>
<tr>
<td>1:30 PM</td>
<td>Break</td>
</tr>
<tr>
<td>1:45 PM</td>
<td>Kate Ytell - CBH&lt;br&gt;The Relationship Between Social Determinants and Self-Reported Health Status of Refugees Resettled in the Denver-Metro Area</td>
</tr>
<tr>
<td>2:00 PM</td>
<td>Kaitlin Delaney Roach – CBH&lt;br&gt;Early Perspectives on Social Determinants of Health Screening and Referral Implementation</td>
</tr>
<tr>
<td>2:15 PM</td>
<td>Lindsey Eierman – CBH&lt;br&gt;Colorado Regional Health Connector Core Competency Assessment Tool</td>
</tr>
<tr>
<td>2:30 PM</td>
<td>Noel Metcalf – CBH&lt;br&gt;StartSmart™ Beta Testing: Acceptability, Feasibility and Refinement Analysis of an mHealth Screening Tool</td>
</tr>
<tr>
<td>2:45 PM</td>
<td>Molly Moss – CBH&lt;br&gt;Formative Evaluation of a Global Newborn Care Curriculum</td>
</tr>
<tr>
<td>3:00 PM</td>
<td>Emily Martin – CBH&lt;br&gt;Promoting Physical Activity in Schools Through Healthy Public Policy</td>
</tr>
<tr>
<td>3:15 PM</td>
<td></td>
</tr>
<tr>
<td>3:30 – 4:15 PM</td>
<td>Poster Session &amp; Reception, Group A Presenting - Education 2 North Student Community Bridge</td>
</tr>
<tr>
<td>4:15 – 5:00 PM</td>
<td>Poster Session &amp; Reception, Group B Presenting - Education 2 North Student Community Bridge</td>
</tr>
</tbody>
</table>

**BIOS** = Biostatistics, **CBHS** = Community & Behavioral Health, **CHE** = Community Health Education (UNC), **EHOH** = Environmental Health and Occupational Health, **EPID** = Epidemiology, **HSMP** = Health Systems Management & Policy, **LPH** = Leadership in Public Health, **MCH** = Maternal & Child Health, **GH** = Global Health

See next page for more presentations!
<table>
<thead>
<tr>
<th>TIME</th>
<th>Presentations</th>
</tr>
</thead>
</table>
| 12:00 PM   | Ahmed Hassanin, MD – EPI  
*Predictors of Mortality in Hospitalized Heart Failure Patients: Insights from the Egyptian Cohort of the European Society of Cardiology Heart Failure Long Term Registry* |
| 12:15 PM   | Hannah Cruz – EPI  
*Association of Kidney Stones with Kidney Function and Growth in Patients with Autosomal Dominant Polycystic Kidney Disease (ADPKD)* |
| 12:30 PM   | Katelyn Pruett – EPI  
*Changing Epidemiology of Shigellosis: Trends in Demographics and Hospitalization in Colorado* |
| 12:45 PM   | Sydney Bowen – EPI  
*Examining the Association of Fatty Liver Disease and PRISm in a Large Group of Smokers* |
| 1:00 PM    | Kayla Sankey – EPI  
*Trends of Depression in Denver County Using Electronic Health Records, 2015-2017* |
| 1:15 PM    | Jake Fox – EPI and MD  
*Cross-Sectional Analysis of Chronic Kidney Disease of Unknown Origin in the San Luis Valley of Colorado* |
| 1:30 PM    | Break |
| 1:45 PM    | Christine VanTubbergen – EPI  
*Lyme Disease Activities Conducted by Jurisdictions Funded by the Centers for Disease Control & Prevention (CDC), 2018-2019* |
| 2:00 PM    | Chelsey Thibodeaux – EPI  
*Cluster Analysis of Cannabinoids and Terpenes as a Classification Method for Cannabis Varietals in Colorado* |
| 2:15 PM    | Brooke Palay – EPI  
*Patient and System Predictors of Adherence to Turner Syndrome Cardiometabolic Screening Guidelines in a Tertiary Care Children’s Hospital* |
| 2:30 PM    | Cody Dawson – EPI  
| 2:45 PM    | Abdulrahman Alyamani – EPI  
*Preventing Occupational Zoonoses in Colorado Through Improved Public Health Surveillance* |
| 3:00 PM    | Kira Elsbernd – EPI  
*HIV-Exposed, Uninfected Infant Health Outcomes in Southwestern Kenya: A Secondary Analysis of the MOTIVATE Study* |
| 3:30 PM    |  
| 4:15 PM    | Poster Session & Reception, Group A Presenting - Education 2 North Student Community Bridge |
| 5:00 PM    | Poster Session & Reception, Group B Presenting - Education 2 North Student Community Bridge |

**BIOS** = Biostatistics, **CBHS** = Community & Behavioral Health, **CHE** = Community Health Education (UNC), **EHOH** = Environmental Health and Occupational Health, **EPID** = Epidemiology, **HSMP** = Health Systems Management & Policy, **LPH** = Leadership in Public Health, **MCH** = Maternal & Child Health

*See next page for more presentations!*
<table>
<thead>
<tr>
<th>TIME</th>
<th>Speaker</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:00 PM</td>
<td>Pamela Salapong – EHOH</td>
<td>Determining Effectiveness of Workplace Wellness Programs at Denver Health using Leave of Absence (LOA) Data</td>
</tr>
<tr>
<td>12:15 PM</td>
<td>Aspen Becker – EHOH</td>
<td>Implementation of Gratitude-Based Wellness Programming and Improving Occupational Health in Teachers at Harrison School District 2</td>
</tr>
<tr>
<td>12:30 PM</td>
<td>Cedra Goldman – EHOH</td>
<td>The Association of Health-Promoting Strategies Related to the Built Environment and Improved Employee Satisfaction and Well-Being</td>
</tr>
<tr>
<td>12:45 PM</td>
<td>Kacy Lorber – EHOH</td>
<td>Cardiovascular Events and Multi-Well Unconventional Oil and Gas (UO&amp;G) Development in Colorado</td>
</tr>
<tr>
<td>1:00 PM</td>
<td>Claire McFadyen – EHOH</td>
<td>Spatial Analysis of Cancer Incidence in Populations Living Near Nuclear Power Plants in Angra dos Reis, Brazil 2007-2012</td>
</tr>
<tr>
<td>1:15 PM</td>
<td>Elle Rich – MPH and MURP</td>
<td>Nourished Futures: Leveraging the Role of Children’s Hospital Colorado as an Anchor Institution in Promoting a Sustainable Food Landscape</td>
</tr>
<tr>
<td>1:30 PM</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>1:45 PM</td>
<td>Dymond Ruybal - EHOH</td>
<td>Improving Health Promotion and Protection Strategies in Western Miners</td>
</tr>
<tr>
<td>2:00 PM</td>
<td>Atisha Morrison – EHOH and EPI</td>
<td>Kansas Foodborne Illness Complaint Surveillance System Evaluation, 2009-2017</td>
</tr>
<tr>
<td>2:15 PM</td>
<td>Lindsay Nichols – EHOH</td>
<td>The Association Between Vegetation Density and Property Crime in Two Distinct Colorado Counties</td>
</tr>
<tr>
<td>2:30 PM</td>
<td>Ronna Bond – EHOH</td>
<td>Participatory Justice in State-Level Oil and Gas Regulatory Decision-Making, a Descriptive Case Study</td>
</tr>
<tr>
<td>2:45 PM</td>
<td>Moses Ongalo - EHOH</td>
<td>Evaluation of Sun Protection Education using the Reveal Imager Photo-aging and the SPA Questionnaire (ESPERISQ)</td>
</tr>
<tr>
<td>3:00 PM</td>
<td>Taylor Tomita – EHOH</td>
<td>Sulfur Dioxide Exposure Assessment of the 2018 Lower East Rift Zone Eruption Event on Hawaii Island</td>
</tr>
<tr>
<td>3:30 PM</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>3:30 – 4:15 PM</td>
<td>Poster Session &amp; Reception, Group A Presenting - Education 2 North Student Community Bridge</td>
<td></td>
</tr>
<tr>
<td>4:15 – 5:00 PM</td>
<td>Poster Session &amp; Reception, Group B Presenting - Education 2 North Student Community Bridge</td>
<td></td>
</tr>
</tbody>
</table>

BIOS = Biostatistics, CBHS = Community & Behavioral Health, CHE = Community Health Education (UNC), EHOH = Environmental Health and Occupational Health, EPID = Epidemiology, HSMP = Health Systems Management & Policy, LPH = Leadership in Public Health, MCH = Maternal & Child Health

See next page for more presentations!
<table>
<thead>
<tr>
<th>TIME</th>
<th>Presentations</th>
</tr>
</thead>
</table>
| 12:00 PM     | **Ngozi Obi – EPI**  
Bullying and Use of Electronic Cigarettes in the Healthy Kids Colorado Survey (HKCS) Cohort |
| 12:15 PM     | **Monica Murray – EPI**  
Infusion Related Reactions in Multiple Sclerosis Patients Receiving Differing Premedication Before an Ocrelizumab Infusion |
| 12:30 PM     | **Catherine Kress – EPI**  
| 12:45 PM     | **Abdimajid Siad – EPI**  
Prevalence of Latent Tuberculosis Infection (LTBI) and Treatment Compliance among Newly Arrived Refugees at Colorado Refugee Wellness Center |
| 1:00 PM      | **Matthew Campbell, MD – EPI**  
Efficacy of a Brief Tool to Assist Teacher Identification of Children with Mental Health Challenges in LMICs |
| 1:15 PM      | **Anastasia Cornell – EPI**  
Acetaminophen Misuse and Related Medical Outcomes |
| 1:30 PM      | **Break** |
| 1:45 PM      | **Martha Henze – EPI**  
Association Between Self-Reported Sugar Intake and a Sugar Biomarker (δ13C) in Children at High Risk for Type 1 Diabetes |
| 2:00 PM      | **Brianna Raymes – EPI**  
Schistosomiasis Infection in Bovines in Sichuan, China: A Secondary Analysis |
| 2:15 PM      | **Gabriela Reyes – EPI**  
Identifying Predictors of Anemia and Evaluating Treatment Outcomes in Children aged 0-5 in the Trifinio Region of Southwest Guatemala. |
| 2:30 PM      | **Carlie Anderson – EPI**  
Collecting Large Scale Data: Agreement Study of the UK Biobank’s Self-Reported Health Status Questionnaire |
| 2:45 PM      | **Carey Colbert – EPI**  
Impact of Maternal Demographic Factors on the Severity of Autism Symptoms |
| 3:00 PM      | **Cameron Niswander – EPI and MD**  
Acute Disease Exacerbation with Associated Changes in Climate in the San Luis Valley of Colorado |
| 3:15 PM      | **Poster Session & Reception, Group A Presenting - Education 2 North Student Community Bridge** |
| 3:30 – 4:15 PM | **Poster Session & Reception, Group B Presenting - Education 2 North Student Community Bridge** |

**See next page for more presentations!**
<table>
<thead>
<tr>
<th>TIME</th>
<th>EVENT</th>
</tr>
</thead>
</table>
| 12:00 PM   | John Armstrong - HSMP  
**Value-Based Purchasing of Pharmaceuticals with Alternative Payment Models** |
| 12:15 PM   | Christine Woodruff - HSMP  
**Evaluation of Children’s Hospital Colorado 2018 Urgent Care Restructure** |
| 12:30 PM   | Alissa Scharpen - HSMP  
**Optimizing Family Engagement in Pediatric Research** |
| 12:45 PM   | Carrington Lott - HSMP  
**Identifying & Responding to Concerns Among Stakeholders on African American Infant Mortality in Denver, CO** |
| 1:00 PM    | Halley Flammer – HSMP and MD  
**Training the Next Generation of Patient Advocates** |
| 1:15 PM    | Victoria Ramirez – LPH and MPA  
**Evaluation of Double Up Food Bucks Participating Farmers’ Markets in Colorado** |
| 1:30 PM    | Break                                                                 |
| 1:45 PM    | Birdie Moua - HSMP  
**A Case Study of the Colorado Medical Legal Partnership at Children’s Hospital Colorado Using a Mixed Methods Approach for Quality Improvement** |
| 2:00 PM    | Chelsea Leiper, PharmD – HSMP  
**Effect of Educational Messaging on Emergency Department Utilization** |
| 2:15 PM    | Audrey Keenan – HSMP  
**Policy Statement on Adoption and Implementation of the Current US Food and Drug Administration’s Food Code** |
| 2:30 PM    | Emilee Kaminski – HSMP  
**Evaluation of Community Benefit Programs throughout Catholic Health Initiatives** |
| 2:45 PM    | James Boyer – HSMP  
**Parent First Response: A Pediatric First Aid Training Pilot Program** |
| 3:00 PM    |                                                                                   |
| 3:30 – 4:15 PM | *Poster Session & Reception, Group A Presenting - Education 2 North Student Community Bridge* |
| 4:15 – 5:00 PM | *Poster Session & Reception, Group B Presenting - Education 2 North Student Community Bridge* |

**BIOS**= Biostatistics, **CBHS**= Community & Behavioral Health, **CHE**= Community Health Education (UNC), **EHOH**= Environmental Health and Occupational Health, **EPID**= Epidemiology, **HSMP**= Health Systems Management & Policy, **LPH**=Leadership in Public Health, **MCH**=Maternal & Child Health

See next page for more presentations!
<table>
<thead>
<tr>
<th>TIME</th>
<th>Facilitator: Heather Kennedy, MPH</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:00 PM</td>
<td>Arianna Roberts – HSMP</td>
</tr>
<tr>
<td></td>
<td>Improving Health Equity in Colorado: A Case Study Examining Multiple Organizations’ Approaches to Increasing Access to Health Care Services</td>
</tr>
<tr>
<td>12:15 PM</td>
<td>Rayna Hetlage – HSMP</td>
</tr>
<tr>
<td></td>
<td>Looking Within: Assessing and Addressing Food Insecurity Among Children’s Hospital Colorado Team Members</td>
</tr>
<tr>
<td>12:30 PM</td>
<td>Zoe Marchand – HSMP</td>
</tr>
<tr>
<td></td>
<td>A Financial Performance Assessment of Medicare Payments: A Reimbursement Analysis for Critical Care Pulmonary and Sleep Associates</td>
</tr>
<tr>
<td>12:45 PM</td>
<td>Austin Reed - HSMP</td>
</tr>
<tr>
<td></td>
<td>Denver Tech Center Pulmonary Clinic Expansion</td>
</tr>
<tr>
<td>1:00 PM</td>
<td>Chelsea Andrews - HSMP</td>
</tr>
<tr>
<td></td>
<td>Promoting Robust Human Trafficking Protocols in Health Care Organizations: A Descriptive Analysis for UCHealth, Colorado</td>
</tr>
<tr>
<td>1:15 PM</td>
<td>Roxanne Radi, MD – MPH</td>
</tr>
<tr>
<td></td>
<td>The Millennial Physician: Addressing Challenges with Information Access in an Orthopaedic Residency Program</td>
</tr>
<tr>
<td>1:30 PM</td>
<td>Break</td>
</tr>
<tr>
<td>1:45 PM</td>
<td>Johnny Williams - HSMP</td>
</tr>
<tr>
<td></td>
<td>The Meaning Behind Menthol: A Qualitative Inquiry into the Attitudes Surrounding Tobacco Use in Denver’s Black Community</td>
</tr>
<tr>
<td>2:00 PM</td>
<td>Summer West - HSMP</td>
</tr>
<tr>
<td></td>
<td>Understanding Contributions and Identifying Gaps and Challenges in Telehealth and Telemedicine Programs</td>
</tr>
<tr>
<td>2:15 PM</td>
<td>Thomas Rotering – HSMP</td>
</tr>
<tr>
<td></td>
<td>Educate and Inoculate: How Inoculation Theory in Health Communication Can Build Stalwart Support for Tobacco Price Increases</td>
</tr>
<tr>
<td>2:30 PM</td>
<td>Mario Perez, MD – MPH</td>
</tr>
<tr>
<td></td>
<td>Associated Factors in Emergency Hospital Services and Prescription Opioid Use: Modeling Using a Claims Database</td>
</tr>
<tr>
<td>2:45 PM</td>
<td>Jack Murphy – HSMP</td>
</tr>
<tr>
<td></td>
<td>Approaches to Skin Cancer Prevention Among Coloradans Experiencing Homelessness</td>
</tr>
<tr>
<td>3:00 PM</td>
<td>Christina Yebuah – MPH</td>
</tr>
<tr>
<td></td>
<td>Health After Lock-Up: An Assessment of Physician Attitudes Towards Patients Recently Released From Incarceration</td>
</tr>
<tr>
<td>3:15 PM</td>
<td></td>
</tr>
<tr>
<td>3:30 – 4:15 PM</td>
<td>Poster Session &amp; Reception, Group A Presenting - Education 2 North Student Community Bridge</td>
</tr>
<tr>
<td>4:15 – 5:00 PM</td>
<td>Poster Session &amp; Reception, Group B Presenting - Education 2 North Student Community Bridge</td>
</tr>
</tbody>
</table>

**BIOS** = Biostatistics, **CBHS** = Community & Behavioral Health, **CHE** = Community Health Education (UNC), **EHOH** = Environmental Health and Occupational Health, **EPID** = Epidemiology, **HSMP** = Health Systems Management & Policy, **LPH** = Leadership in Public Health, **MCH** = Maternal & Child Health

See next page for more presentations!
<table>
<thead>
<tr>
<th>TIME</th>
<th>Speaker(s)</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:00 PM</td>
<td>Kelly Leach – BIOS</td>
<td>Dietary Sodium Intake and Cognitive Function in the Chronic Renal Insufficiency Cohort Data</td>
</tr>
<tr>
<td>12:15 PM</td>
<td>Ana Babinec – BIOS</td>
<td>The Effect of Practice Baseline Capacity on Intervention Success: A Mixed Effects Longitudinal Analysis of Clinical Quality Measures for Cardiovascular Disease from the EvidenceNOW SouthWest Study</td>
</tr>
<tr>
<td>12:30 PM</td>
<td>Hunter Hudson – BIOS</td>
<td>SSRI vs Non-SSRI Antidepressants: A Case-Control Study Comparing Their Impact on Suicidal Ideation in Cancer Patients Seeking Psychotherapy</td>
</tr>
<tr>
<td>12:45 PM</td>
<td>Joshua Morrison – BIOS</td>
<td>Estimation of the Effect of Pharmacotherapy Adherence on Work Disability Incidence for Patients with Major Depressive Disorder</td>
</tr>
<tr>
<td>1:00 PM</td>
<td>Anjin Singh – BIOS</td>
<td>Predictors of Patient Experience: A Multi-site Retrospective Cohort Study</td>
</tr>
<tr>
<td>1:15 PM</td>
<td>Mindy Mach - BIOS</td>
<td>The Determinants of Life Expectancy in the Colorado Metro Denver Area</td>
</tr>
<tr>
<td>1:30 PM</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>1:45 PM</td>
<td>Kaysie Schmidt – LPH</td>
<td>Don’t Go Breaking My Heart: Training Health Professionals on Self-Measured Blood Pressure, an Evidence-Based Intervention for Cardiovascular Disease</td>
</tr>
<tr>
<td>2:00 PM</td>
<td>Carrie Hankins – CBH</td>
<td>Sexy Nerd Games: A Technology-Driven Exploration of HIV &amp; PrEP Knowledge Among College-Age, Cisgender Women</td>
</tr>
<tr>
<td>2:15 PM</td>
<td>Kimberly Bautista – MCH</td>
<td>Utilizing the Health Belief Model to Evaluate Home Glucose Testing Compliance Among Children at High Risk for Type 1 Diabetes</td>
</tr>
<tr>
<td>2:30 PM</td>
<td>Kenneth “Jimmy” Naccaratto – LPH</td>
<td>Aurora Together: Community Collaboration to Address Health Disparities</td>
</tr>
<tr>
<td>2:45 PM</td>
<td>Jennie Martin – LPH</td>
<td>Intermountain Humane Society Emergency Preparedness and Evacuation Plan</td>
</tr>
<tr>
<td>3:00 PM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3:15 PM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3:30 – 4:15 PM</td>
<td>Poster Session &amp; Reception, Group A Presenting - Education 2 North Student Community Bridge</td>
<td></td>
</tr>
<tr>
<td>4:15 – 5:00 PM</td>
<td>Poster Session &amp; Reception, Group B Presenting - Education 2 North Student Community Bridge</td>
<td></td>
</tr>
</tbody>
</table>

**BIOS** = Biostatistics, **CBHS** = Community & Behavioral Health, **CHE** = Community Health Education (UNC), **EHOH** = Environmental Health and Occupational Health, **EPID** = Epidemiology, **HSMP** = Health Systems Management & Policy, **LPH** = Leadership in Public Health, **MCH** = Maternal & Child Health
<table>
<thead>
<tr>
<th>Name</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leah Adams</td>
<td>Melissa Nguyen</td>
</tr>
<tr>
<td>Olivia Ainsworth</td>
<td>Kaylee Ortega</td>
</tr>
<tr>
<td>Ashleigh Allen</td>
<td>Brooke Palay</td>
</tr>
<tr>
<td>Abdulrahman Alyamani</td>
<td>Katelyn Pruett</td>
</tr>
<tr>
<td>Kevin Andersen</td>
<td>Carolina Ramirez</td>
</tr>
<tr>
<td>Jasmine Bains</td>
<td>Victoria Ramirez</td>
</tr>
<tr>
<td>Ashley Berry</td>
<td>Dannah Raz</td>
</tr>
<tr>
<td>Abby Bohannan</td>
<td>Joy Richards</td>
</tr>
<tr>
<td>Sydney Bowen</td>
<td>Kaitlin Delaney Roach</td>
</tr>
<tr>
<td>Alicia Bowyer</td>
<td>Craig Rothfuss</td>
</tr>
<tr>
<td>James Boyer</td>
<td>Kayla Sankey</td>
</tr>
<tr>
<td>Rachael Burnett</td>
<td>Shannon Shaw</td>
</tr>
<tr>
<td>Yuli Chen</td>
<td>Colleen Sherry</td>
</tr>
<tr>
<td>Hannah Cruz</td>
<td>Chelsey Thibodeaux</td>
</tr>
<tr>
<td>Cody Dawson</td>
<td>Austin Van Grack</td>
</tr>
<tr>
<td>Heather Deis</td>
<td>Christine VanTubbergen</td>
</tr>
<tr>
<td>Amy DeRosa</td>
<td>Lindsey Whittington</td>
</tr>
<tr>
<td>Lindsey Eierman</td>
<td>Brianna Wolford</td>
</tr>
<tr>
<td>Kira Elsbernd</td>
<td>Kate Ytell</td>
</tr>
<tr>
<td>Joanna Espinoza</td>
<td>Natalia Zamboni Vergara</td>
</tr>
<tr>
<td>Jake Fox</td>
<td></td>
</tr>
<tr>
<td>Isaiah Francis</td>
<td></td>
</tr>
<tr>
<td>Minuri Gamage</td>
<td></td>
</tr>
<tr>
<td>Katie Guthmiller</td>
<td></td>
</tr>
<tr>
<td>Caroline Harrison</td>
<td></td>
</tr>
<tr>
<td>Ahmed Hassanin</td>
<td></td>
</tr>
<tr>
<td>Allie Hoffman</td>
<td></td>
</tr>
<tr>
<td>Lindsay Houston</td>
<td></td>
</tr>
<tr>
<td>Alyssa Jeffers</td>
<td></td>
</tr>
<tr>
<td>Erika Karcher</td>
<td></td>
</tr>
<tr>
<td>Anna Kelly</td>
<td></td>
</tr>
<tr>
<td>Matthew Klein</td>
<td></td>
</tr>
<tr>
<td>Hannah LaDow</td>
<td></td>
</tr>
<tr>
<td>Emily Martin</td>
<td></td>
</tr>
<tr>
<td>Noel Metcalf</td>
<td></td>
</tr>
<tr>
<td>MacKenzie Mixer</td>
<td></td>
</tr>
<tr>
<td>Madeleine Monroe</td>
<td></td>
</tr>
<tr>
<td>Jaime Moore</td>
<td></td>
</tr>
<tr>
<td>Meredith Morrison</td>
<td></td>
</tr>
<tr>
<td>Molly Moss</td>
<td></td>
</tr>
<tr>
<td>Madeline Nealis</td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Name</td>
</tr>
<tr>
<td>--------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Carlie Anderson</td>
<td>Austin Reed</td>
</tr>
<tr>
<td>Chelsea Andrews</td>
<td>Gabriela Reyes</td>
</tr>
<tr>
<td>John Armstrong</td>
<td>Elle Rich</td>
</tr>
<tr>
<td>Ana Babinec</td>
<td>Arianna Roberts</td>
</tr>
<tr>
<td>Kimberly Bautista</td>
<td>Thomas Rotering</td>
</tr>
<tr>
<td>Aspen Becker</td>
<td>Dymond Ruybal</td>
</tr>
<tr>
<td>Ronna Bond</td>
<td>Pamela Salapong</td>
</tr>
<tr>
<td>Matthew Campbell</td>
<td>Alissa Scharpen</td>
</tr>
<tr>
<td>Carey Colbert</td>
<td>Kaysie Schmidt</td>
</tr>
<tr>
<td>Anastasia Cornell</td>
<td>Abdimajid Siad</td>
</tr>
<tr>
<td>Halley Flammer</td>
<td>Anjin Singh</td>
</tr>
<tr>
<td>Cedra Goldman</td>
<td>Taylor Tomita</td>
</tr>
<tr>
<td>Carrie Hankins</td>
<td>Summer West</td>
</tr>
<tr>
<td>Martha Henze</td>
<td>Johnny Williams</td>
</tr>
<tr>
<td>Rayna Hetlage</td>
<td>Christine Woodruff</td>
</tr>
<tr>
<td>Hunter Hudson</td>
<td>Christina Yebuah</td>
</tr>
<tr>
<td>Emilee Kaminski</td>
<td></td>
</tr>
<tr>
<td>Audrey Keenan</td>
<td></td>
</tr>
<tr>
<td>Catherine Kress</td>
<td></td>
</tr>
<tr>
<td>Kelly Leach</td>
<td></td>
</tr>
<tr>
<td>Chelsea Leiper</td>
<td></td>
</tr>
<tr>
<td>Kacy Lorber</td>
<td></td>
</tr>
<tr>
<td>Carrington Lott</td>
<td></td>
</tr>
<tr>
<td>Mindy Mach</td>
<td></td>
</tr>
<tr>
<td>Zoe Marchand</td>
<td></td>
</tr>
<tr>
<td>Jennie Martin</td>
<td></td>
</tr>
<tr>
<td>Claire McFadyen</td>
<td></td>
</tr>
<tr>
<td>Atisha Morrison</td>
<td></td>
</tr>
<tr>
<td>Joshua Morrison</td>
<td></td>
</tr>
<tr>
<td>Birdie Moua</td>
<td></td>
</tr>
<tr>
<td>Jack Murphy</td>
<td></td>
</tr>
<tr>
<td>Monica Murray</td>
<td></td>
</tr>
<tr>
<td>Kenneth (Jimmy) Naccaratto</td>
<td></td>
</tr>
<tr>
<td>Lindsay Nichols</td>
<td></td>
</tr>
<tr>
<td>Cameron Niswander</td>
<td></td>
</tr>
<tr>
<td>Ngozi Obi</td>
<td></td>
</tr>
<tr>
<td>Moses Ongalo</td>
<td></td>
</tr>
<tr>
<td>Brandon Penix</td>
<td></td>
</tr>
<tr>
<td>Mario Perez</td>
<td></td>
</tr>
<tr>
<td>Roxanne Radi</td>
<td></td>
</tr>
<tr>
<td>Brianna Raymes</td>
<td></td>
</tr>
</tbody>
</table>
The Colorado School of Public Health
MPH Capstone Experience

Goal:
The goal of the Capstone experience for Master of Public Health (MPH) students is to connect all aspects of the curriculum, including seminars, lectures, course work, independent studies, projects and direct experiences to establish an understanding, appreciation and working knowledge of public health practice and, specifically, how their chosen areas of concentration enhance public health practice in Colorado, the nation and the world.

Objectives:
1. To develop products that can be added to the student’s portfolio, documenting her/his reasoning, decision-making, analytical and authorship skills as they relate to linking important public health projects to the MPH learning objectives and competencies.
2. To provide a collaborative environment for students from all concentrations to review and discuss the core competencies of the MPH curriculum in relationship to their practice related experiences.
3. To provide an independent but guided opportunity for the student to practice and document the role that her/his specific concentration skills play in public health practice.
4. To develop awareness of personal strengths and competencies as a public health professional.
5. To improve skills related to presenting project results in oral and written formats.

Spring 2019 MPH Capstone Faculty

Madiha F. Abdel-Maksoud, MD, PhD, MSPH
Lori Crane, PhD, MPH
Kathleen Garrett, MA
Cerise Hunt, PhD, MSW
Heather Kennedy, MPH
Mondi Mason, PhD, MPH
Lisa McKenzie, PhD, MPH
Lisa Miller, MD, MSPH
Teresa Sharp, PhD
Patricia Valverde, PhD
Virginia Visconti, PhD, MAT
Kayla Williamson, MS

Teaching Assistant: Carl LoFaro, MSW
The Effect of Delivery Mode on Ability to Meet Breastfeeding Intentions and Breastfeeding Duration

Leah Adams
Preceptor: Anna Bellatorre, PhD
Site: Lifecourse Epidemiology of Adiposity and Diabetes (LEAD) Center

Background: Breastfeeding is a crucial part of infant development and has health benefits for mothers. Cesarean sections have been associated with adverse effects on the likelihood of breastfeeding. With increasing rates of planned cesarean sections, it is important to better understand this relationship and its implications. The goal of this study is to examine the differences in rates of meeting breastfeeding intentions and breastfeeding duration based on mode of delivery while considering potential confounders.

Methods: The study sample included a prospective cohort of women from the Healthy Start Study conducted from 2009 through 2014 (n=1,040) in the state of Colorado. Differences in maternal characteristics, infant characteristics, and delivery characteristics were examined using a Chi-Squared test. Multinomial Logistic Regression was used to determine the relationship between mode of delivery and the concordance or discordance of breastfeeding intentions. Ordinary Least Squares Regression was used to determine the relationship between mode of delivery and exclusive breastfeeding duration.

Results: After adjusting for confounders, the effect of having a planned cesarean section relative to a vaginal delivery significantly increased the risk of discordant breastfeeding outcomes relative to breastfeeding when intended by 72% (Model 5 RR = 1.72, 95% CI: 1.001, 3.002).
After adjusting for confounders, having a planned cesarean section significantly decreased breastfeeding duration by 9.78 weeks (p-value = 0.0007, 95% CI: -15.43, -4.13).

Conclusions: The single largest predictor of discordant breastfeeding outcomes was having a planned cesarean section. For planned cesarean sections that are not medically necessary, effort should be made to reduce them.
Recruitment Strategies and Relevant Features for a Mobile Health Intervention to Reduce Alcohol-Exposed Pregnancies in American Indian/Alaska Native Young Women

Olivia Ainsworth
Preceptor: Carol Kaufman, PhD
Site: Centers for American Indian and Alaska Native Health (CAIANH)

Background: American Indian and Alaska Native (AIAN) young women are at high risk of alcohol-exposed pregnancies (AEP), increasing risk for fetal alcohol spectrum disorders (FASD). A mobile health (mHealth) intervention that uses social media for recruitment and adherence to an AEP prevention program could prove effective in addressing AEP in this population. The purpose of this qualitative study was to develop recommendations on effective recruitment strategies and relevant features for a mobile health program that addresses alcohol-exposed pregnancies in American Indian/Alaska Native women aged 16 - 20.

Methods: We conducted 10 qualitative interviews with AIAN women aged 16-20 living in urban areas (population > 50,000). Interviews were 45 minutes and included questions on recruitment strategies, culture, AEP interest, and access to internet and data. Interviews were then coded inductively. We used descriptive statistics to evaluate data from Facebook and Instagram ads.

Results: Facebook ads yielded more link clicks than Instagram ads; however, participants were more likely to use Instagram than Facebook. Participants mentioned peer and family encouragement as being helpful in recruitment. Participants also mentioned that discussion boards, quizzes, and text message reminders with prizes would be effective features to include in an mHealth intervention, as well as culturally relevant material.

Conclusions: Effective recruitment strategies for this study include disseminating targeted ads on Facebook, leveraging peer and family relationships, and considering incentives for participation. Further research needs to be done on the efficacy of specific mHealth delivery methods, including options for individuals with limited data and internet access.
Background: Human trafficking remains a public health issue affecting mostly underserved local families and communities. The health-care system plays an important role in identifying and treating trafficking victims, yet trafficking-specific training and treatment protocols are sporadic, incomplete, or non-existent.

Methods: We modified the PROTECT survey to align with our fifteen key informants; medical professionals employed in Denver Metro Area healthcare facilities. The self-administered survey contained open-ended, multiple choice, dichotomous, and likert-scale questions aimed to assess the current knowledge and training gaps specific to human trafficking. Topics ranged from background, training, perceived and actual knowledge, and experience in responding to human trafficking in order to inform standard training and treatment protocols.

Results: The knowledge base and training concerning human trafficking varied among our five respondents. Participants were confident in their ability to engage with minors, and all participants reported having a current protocol pertaining to child abuse. Human trafficking training seems haphazard and providers seem unsure how to support patients with outside resources. The most common barriers concerning interacting with trafficked patients include identification of these patients, and connecting patients to proper outside resources.

Conclusions: Healthcare centers may benefit from human trafficking protocols that are modified from existing child abuse protocols and having knowledge of specific resources. Creating a ‘master list’ of local resources may be valuable for healthcare professionals. Training should focus on identification of and interacting with trafficked individuals. An evaluation of the current comprehensive training module will show how effectively it communicates the above concepts.
Preventing Occupational Zoonoses in Colorado through Improved Public Health Surveillance

Abdulrahman Alyamani
Preceptor: Alice White, MS
Site: Colorado School of Public Health

**Background:** Surveillance and control of occupational-associated zoonoses are public health priorities for Colorado and other agricultural states. The Colorado Integrated Food Safety Center of Excellence systematically developed fields for occupational-associated zoonoses, which were integrated into Colorado’s Electronic Disease Reporting System (CEDRS) for enteric pathogens in March 2017. The objectives of this project were to evaluate the quality and completeness of the new occupational fields and describe the occupational distribution of enteric illness cases in Colorado.

**Methods:** We evaluated CEDRS occupational fields for enteric disease cases from January 2014 to December 2018. We compared illness rates by occupation to 2017 Colorado Occupational Employment and Wage Estimates and 2013 Concentrated Animal Feeding Operations (CAFO) data. We included working-age persons with a laboratory diagnosis of *Campylobacter, Cryptosporidium, Cyclospora, Shiga toxin-producing E.coli, Listeria, Salmonella, Shigella, Vibrio,* or *Yersinia.*

**Results:** The completeness and quality of the new occupational fields improved, as compared to the previous fields. Agricultural workers represented 2.6% of enteric illnesses in CEDRS, compared to 0.2% in state occupational estimates. Rates of *Campylobacter* and *Salmonella* were highest in counties with a high density of CAFO locations.

**Conclusions:** The new occupational fields have improved the overall quality and completeness of occupational data, which allowed us to demonstrate that workers in certain high-risk occupations (e.g., with animal-contact) are diagnosed with enteric disease at a higher rate than would be expected. Occupational health surveillance data will allow us to document the burden of occupational zoonoses, set research priorities, and target future strategies to improve worker health.
Collecting Large Scale Data: Agreement Study of the UK Biobank’s Self-Reported Health Status Questionnaire

Carlie Anderson
Preceptors: Myles Cockburn, PhD, Catherine Sudlow, DPhil
Site: Usher Institute of Population Health Sciences and Informatics

Background: A majority of agreement studies on the topic of self-reported health conditions pertain to agreement between a patient’s self-report and the same patient’s medical record. There is far less research on the topic of agreement for health history surveys in longitudinal studies. This study endeavored to expand the current research regarding patient’s agreement of diagnosis history on longitudinal health history questionnaires.

Methods: An anonymized sample 15,368 repeat and 7,447 imaging participants from the UK Biobank were analyzed for reliability of self-reported condition diagnosis using simple proportions and kappa ($k$). Difference in self-reported date of diagnosis was calculated by subtracting the reported date of diagnosis on the baseline assessment from the reported date of diagnosis on the repeat/imaging assessment.

Results: After correcting for diagnosis after baseline, the most reliable self-reported conditions for both the repeat and the imaging questionnaires ($k$ greater than 0.80 on) were Diabetes, Angina/MI, Hypothyroidism, Asthma, and DVT/PE. The least reliable self-reported conditions ($k$ less than 0.30) were Uterine Fibroids, Pneumonia, COPD, Prolapsed/Slipped Disc, and Gall Stones.

Conclusions: This study indicates that reliability of self-reported health history is dependent upon the severity of the diagnosis. Acute conditions without an extreme or acute presentation were more likely to be reported in baseline and follow up questionnaires. This indicates that this health history questionnaire may not be a reliable measure of mild and chronic disease occurrence and scientists using this data to explore health status should be considerate of the conclusions they reach.
Concentrated Disadvantage and Ambient Air Pollution in The Denver Metropolitan Area

Kevin Andresen
Preceptor: Anne Starling, PhD
Site: Colorado School of Public Health

Background: Ambient air pollution (particulate matter of < 2.5 microns [PM$_{2.5}$]) is a leading mortality risk factor worldwide. This study seeks to evaluate the relationship between PM$_{2.5}$ and socioeconomic status (SES) in the Denver Metropolitan Area during the spring and summer of 2018. Census tracts with low SES were hypothesized to have higher concentrations of PM$_{2.5}$.

Methods: PM$_{2.5}$ was measured at 54 points across the Denver Metropolitan area from May to August of 2018 using ultrasonic personal aerosol samplers. SES was spatially defined at the census tract level using a Concentrated Disadvantage Index (CD) calculated from five 2017 American Community Survey variables. Census tract mean PM$_{2.5}$ concentrations were modeled using the Empirical Bayesian Kriging method and compared to census tracts with high CD (low SES) using linear regression.

Results: The average PM$_{2.5}$ spring concentration was 10.67 µg/m$^3$ and rose to 11.07 µg/m$^3$ during the summer. Census tract urbanity, a potential confounder, had no relationship with PM$_{2.5}$ concentrations. There was no significant association between CD and PM$_{2.5}$ for the spring (-0.17 [95%CI: -0.38, 0.03]) or combined (-0.1 [95%CI: -0.24, 0.04]) datasets. Mean summer PM2.5 concentrations were 0.18 µg/m$^3$ (95%CI: 0.25, 0.1 µg/m$^3$) lower in census tracts with high CD than in census tracts with low CD.

Discussion: The slight protective effect of low SES during the summer may be due to wildfire smoke disproportionately affecting the western census tracts which had higher levels of SES. Increased continuous monitoring locations would help account for variation in PM$_{2.5}$ concentrations around the Denver Metropolitan Area.
Background: The majority of identified human trafficking (HT) survivors reported receiving professional health care during their time in captivity but were either never identified or identified late. Current health care system protocol standards are not sufficient to inform providers about HT victim identification, reporting, and intervention. This descriptive analysis identifies key components of HT-related protocols to be recommended to UCHealth’s HT committee in their foundation and implementation of a robust HT protocol.

Methods: ATLAS.ti 8 software was used to analyze collected data. Seven HT protocols, toolkits, and frameworks were manually coded, and component themes identified. Three structured interviews were completed and recorded via phone, manually transcribed, then analyzed for thematic trends.

Results: 64 codes and 7 component themes were identified. A protocol rubric was built based on the identified key component themes: education, identification red flags, barriers, procedures, safety, reporting, and resources. The rubric was submitted to the UCHealth HT team for their reference in founding and implementing a robust HT protocol throughout UCHealth.

Conclusions: This descriptive analysis identified key components of a robust HT protocol. The UCHealth HT protocol resulting from this rubric will equitably promote early identification and intervention of HT victims within the UCHealth system, thus reducing their long-term health consequences. However, barriers to disclosure, data security, ethical considerations, and resource access remain considerable limitations of organization-level HT protocols.
Background: Value-based purchasing, linking costs directly to health outcomes, has received increased attention in the U.S. healthcare system as a way to contain costs and achieve better patient outcomes. This research on alternative payment models (APMs) for pharmaceuticals seeks to explain and define these agreements for future policy decisions.

Methods: A literature review for existing reports on APMs from reputable sources of different stakeholders with various perspectives, including legal documents, white papers and reports to understand what regulations govern APMs and their potential for pharmaceutical cost savings for a non-partisan audience and one interview with a Medicaid pharmacy director who created value-based contracts.

Results: A growing body of literature exists on the possibilities of using value-based purchasing in U.S. pharmaceutical contracts from sources like SMART-D and JMCP with over 40 sources cited. There are multiple APM variations including health outcomes-based and indication-specific. There are a growing number of contracts between drug manufacturers insurers as well by state Medicaid agencies to control costs and achieve value.

Conclusions: Stakeholders voiced concern about disagreements between manufacturers and insurers over defining value, administrative costs and health data systems, but also optimism that these contracts can help solve America’s rising pharmaceutical costs caused by high cost specialty drugs. The number of U.S. alternative payment models is increasing in private insurance markets and with approvals for value-based Medicaid pharmaceutical contracts, but is limited by a decentralized insurance system with limited negotiating power.
The Effect of Practice Baseline Capacity on Intervention Success: A Mixed Effects Longitudinal Analysis of Clinical Quality Measures for Cardiovascular Disease from the EvidenceNOW SouthWest Study

Ana Babinec
Preceptor: Miriam Dickinson, PhD.
Site: University of Colorado, Department of Family Medicine

Background: Heart disease is the leading cause of death for men and women in the United States with 735,000 heart attacks occurring each year. In Colorado and New Mexico, 20 percent of adults die of heart disease. Modifiable risk factors—known as the ABCS of heart health—have known success and can be implemented in primary care clinics to reduce the risk of heart disease. The purpose of this analysis is to assess whether baseline practice characteristics, relating to capacity, affect ABCS improvement, which was measured using Clinical Quality Measures (CQMs).

Methods: Quarterly data, including CQMs and practice characteristics, were collected from 194 practices in CO and NM. Random intercept general linear mixed models with contextual effects assessed the relationship between baseline practice characteristics and intervention success. Baseline capacity was assessed using practice ownership, registry use, ACO Membership, Meaningful Use Stage 1, rural location, and CPCQ (Change Process Capability Questionnaire) score.

Results: Adjusted mixed models showed significant contextual effects for all CQM models, however they varied by CQM (p-value<0.05). Potential ceiling effects were found for predictors of interest, indicating that high performers at baseline have less capacity for change.

Conclusions: The analysis showed that baseline practice characteristics are significantly associated with intervention success over time, as measured by CQM trajectories. These characteristics significantly impact the quality and outcomes of patient care and health. This suggests that practice infrastructure should be improved before intervention implementation or interventions should be modified depending on practice characteristics.
Improving Early Childhood Outcomes in Colorado: a Quality Improvement Assessment of the Developmental Decision Support Tool

Jasmine Bains
Preceptor: Claire Ulrickson, MPH
Site: Assuring Better Child Health & Development

Background: The use of a standardized validated screening tool is to identify areas of concern with the purpose of referring to services as appropriate. The American Academy of Pediatrics recommends children under age 3 receive regular developmental screenings to identify those who may need further support. The Developmental Decision Support Tool (DDST) was created by Assuring Better Child Health & Development (ABCD) to be used by medical providers to discuss referral options available to caregivers with a collaborative approach.

Methods: To evaluate how the DDST would be received by caregivers, ABCD conducted two focus groups. A focus group guide was created that included how caregivers would rate the tool and how likely they are to follow-up with treatment. Data was analyzed by transcribing the data, creating codes, identifying themes, and synthesizing. Final recommendations were outlined to edit the DDST.

Results: Qualitative data analysis found common themes regarding visual representation and data dissemination. Overall, there was a group consensus that the DDST would make caregivers more likely to follow-up with treatment. Final recommendations included updating public health symbols on the tool and providing caregivers a copy of what was discussed in their appointment to take home.

Conclusions: Various aspects of the DDST were overlooked during initial creation and focus group feedback will be used to evolve this tool. This project demonstrated the value of community members’ input regarding a tool used by medical providers in Colorado, an area of key importance in collaborative efforts within public health clinical practice.
Utilizing the Health Belief Model to Evaluate Home Glucose Testing Compliance Among Children at High Risk for Type 1 Diabetes

Kimberly Bautista
Preceptors: Cristy Geno, PhD and Kathleen Waugh, MS
Site: Barbara Davis Center

**Background:** Accurate risk perception, anxiety and social support encourage parents to engage in home glucose testing (HGT) to monitor their children for progression to type 1 diabetes (T1D) and avoid diabetic ketoacidosis (DKA) at onset. This project utilized the Health Belief Model (HBM) to evaluate self-efficacy to completing HGT among children at higher risk for T1D from the Autoimmunity Screening for Kids (ASK) program.

**Methods:** Twenty-two children at higher risk for T1D and their parent received HGT education from ASK staff. A questionnaire based on the HBM assessed how parent’s attitudes and beliefs about their child’s risk for T1D influence self-efficacy with HGT. An 18-item survey to measure HGT self-efficacy, HGT compliance, and social support.

**Results:** Accurate parental T1D risk perception increased and anxiety decreased between baseline and 3-month follow-up (63.3% to 72.7% and 54.5% to 77.3%, respectively). Younger children and single marital status were associated with higher anxiety at baseline (p= 0.04, p= 0.02 respectively), which diminished by the next visit. However, inaccurate risk perception increased among Hispanics. Logistic regression analysis revealed higher self-efficacy is significantly associated with younger parents (p= 0.03). Parents reported a high level of social support.

**Conclusions:** The findings support the HBM as parents of children in the ASK program gained an accurate perception of their child’s risk for T1D informing their level of anxiety. Future ASK program activities should develop targeted strategies to adjust risk perception among Hispanics, self-efficacy of older parents and anxiety for parents of younger children and single parents.
Implementation of Gratitude-Based Wellness Programming and Improving Occupational Health in Teachers at Harrison School District 2

Aspen Becker
Preceptor: Debbie McGee
Site: Harrison School District 2

Background: Teachers self-report high levels of stress, anxiety, and depression which can have negative impacts on student health and educational attainment, as well as teacher retention rates. We hypothesize that gratitude practice may be a low-cost intervention to alleviate negative outcomes and increase positive health effects. These include increased use of strategies to cope with stress, healthier social relationships, and increased positive emotions.

Methods: Intervention was conducted at Harrison School District 2 in Colorado Springs from February-March 2019. 205 participants were recruited based on previous involvement with district wellness initiatives and were randomly assigned to a 2-week or 3-week group. Participants completed gratitude journaling exercises every day of the intervention. Pre and post-intervention surveys were emailed to all participants 1-week before and 1-day following the intervention. Survey questions were measured on a Likert scale. A t-test was run to compare pre and post-survey results. The significance threshold was set at .10.

Results: Pre and post-survey completion rates were 95% and 80%. Improvements were seen in all outcomes surveyed, with more pronounced effects in the 3-week group. We observed a significant improvement in job satisfaction, job meaningfulness, and perceived work failures. Additionally, in combined results for the two groups, we observed significant improvement in perceived overall health and work enthusiasm. Participant feedback expressed wanting a longer intervention.

Conclusion: Our results support the use of gratitude journaling to improve teacher emotional health and workplace satisfaction. Future interventions should evaluate longer intervention periods and the long-term effects of gratitude journaling.
“Agents of Change”:
A Community Art Program to Educate Wellness and Lower Stress in Youth

Ashley Berry
Preceptor: Koreena Montoya
Site: Westminster High School

**Background**: Health disparities among low-income populations and people of color can cause stress and damaged life outlook; especially among marginalized youth. Art can be a form of therapy, building new skills, confidence and efficacy in one’s capabilities.

**Purpose**: To determine if an integrated art and health promotion education workshop, Agents of Change (AOC), affects attitudes in youths’ sense of confidence and resilience.

**Methods**: The AOC workshop was implemented through the Westminster High School Trio (college readiness program serving first generation and low-income youth of color) program over four weeks (one 2.5 hour session/week). The Bridge Positive Youth Assessment (BPYA) survey was administered prior to and immediately following the implementation of the AOC workshop to assess changes in attitudes.

**Results**: Eighteen Trio participants attended weekly AOC workshops and completed pre and post surveys. Average survey scores were combined, followed by a Comparison analysis measuring the 5 constructs of the BPYA (confidence, competence, connection, character, caring and compassion). Although students reported no significant changes in attitudes from pre to post surveys, qualitative feedback indicates opportunities for AOC enhancement.

**Conclusions**: Based on students' feedback, art can be used as a technique to explore personal creativeness and decrease stress levels. AOC allowed student voices to be heard regarding topics of importance and they were able to convey this through the completion of collaborative art pieces.

**Public Health Significance**: AOC provides youth with alternative strategies for addressing multiple dimensions of health and coping with stress.
Mobile Homes, Health, & Harvey: An Exploration of Housing Tenure’s Impact on Vulnerability and Wellness in Houston

Abby Bohannan
Preceptor: Carrie Makarewicz, PhD, MUPP
Site: University of Colorado, College of Architecture and Planning

**Background:** Mobile homes (MH) are the largest source of unsubsidized affordable housing in the country, and are becoming increasingly exposed to natural disasters as the climate shifts. Current regulatory restrictions around the placement and upkeep of MHs lead to increased vulnerability for the residents, but there is a gap in the literature that calls for a broader understanding of the range of intersecting factors, including health disparities, that contribute to the vulnerability of these communities.

**Methods:** ArcMap was used to compile, synthesize, and map census-level data for 41 health indicators; these were used to form a hypothesis about the correlation between health disparities and mobile home locations. An Independent Sample Kruskal-Wallace Test was used to determine significance \((p=.05)\). A Key Informant interview guide was developed and used to investigate potential health outcomes, following Hurricane Harvey.

**Results:** Many MHs were located in geographic areas with lower rates of preventative care. Blood cholesterol checkups, 65+ living alone, linguistic isolation, food access, educational attainment, life expectancy, and public transit commuters were found to be statistically significant among census tracts with zero, little, and high concentrations of MHs \((p=0.05)\). Interview results suggested distrust of healthcare, nutritional deficiencies, preventable infections (skin, respiratory,) PTSD, and low social connectivity contributed to additional health disparities for MH residents.

**Conclusions:** Residents of mobile homes are uniquely vulnerable for many reasons, and this is exacerbated by a natural disaster. Reducing barriers to preventative care, maintaining community connections, and supporting interdisciplinary collaboration between health and housing may boost MH resident resilience.
**Participatory Justice in State-Level Oil and Gas Regulatory Decision-Making, a Descriptive Case Study**

Ronna Bond  
Preceptor: Katherine Dickinson, PhD  
Site: Colorado School of Public Health

**Background:** Participatory Justice states that those affected by environmental impact and regulatory decisions have the right to adequate and appropriate access to the decision-making process. In Colorado, rapid growth in both population and oil and gas development has resulted in a burgeoning population of resident stakeholders potentially adversely affected by living amid oil and gas activities. This study describes resident stakeholder participation in two regulatory rulemakings conducted by the Colorado Oil and Gas Conservation Commission (COGCC).

**Methods:** This descriptive case study is based on review of COGCC rulemaking practice and procedure documents, data from two rulemakings, literature review and participation in the December 2018 Special School Setback Rulemaking. I documented the rulemaking process and compared types of participants and modes of participation to discover participation trends and identify possible barriers to resident stakeholder participation in rulemakings.

**Results:** Resident stakeholders participated more in informal participation processes while industry participated more in formal, pre-hearing processes. Across both rulemakings, organized resident stakeholder groups produced discrete contributions per entity ratios (3.6 and 3.67) comparable to those of industry, (3.72 and 3.33) and much higher than those of individual resident stakeholders (1.09 and 1.0). In 2018, a coalition of organized resident stakeholder groups and industry increased overall resident stakeholder representation in the rulemaking but did not include any individual resident stakeholders or process transparency.

**Conclusion:** Resident stakeholder access to and participation in state-level regulatory decision-making may be improved through increased availability of informal participation processes and support of organized resident stakeholder groups.
Examining the Association of Fatty Liver Disease and PRISm in a Large Group of Smokers

Sydney Bowen
Preceptor: Kendra A Young, PhD
Site: Department of Epidemiology, Colorado SPH, AMC

**Background:** Chronic obstructive pulmonary disease (COPD) is a leading cause of death worldwide and the third leading cause of death in the US. Fatty liver disease (FLD) is associated with smoking and comorbidities of smoking, including COPD. The Global Initiative for Chronic Obstructive Lung Disease (GOLD) stage group classified as preserved ratio impaired spirometry (PRISm) is analyzed in efforts to prevent or slow the onset of COPD. This study examines the relationship of PRISm and FLD.

**Methods:** Using a cross-sectional model, 9398 subjects from the COPDGene cohort were split into two groups by presence of fatty liver disease. Categorical variables were assessed with Chi-square test. Continuous variables were assessed with a two-tailed t-test. Logistic regression was used to assess the relationship between PRISm and FLD in 8495 subjects. Interactions between PRISm and sex and PRISm and race were also assessed.

**Results:** Chi-square and t-test results showed significant differences in gender, current smoking status, BMI, high blood pressure and PRISm between the group that had FLD and the group that did not (p<.0001). Logistic regression results showed that gender, BMI and subcutaneous fat were predictors for FLD (p<.0001). PRISm was also a significant predictor (p<0.0290). Tests for confounding and effect modification were not significant.

**Conclusions:** PRISm is a significant predictor of FLD in this cohort of smokers. Dissimilar to other groups at risk for FLD, there does not appear to be effect modification by sex or race in this cohort of heavy smokers. Prevention efforts for COPD should focus on PRISm individuals.
Background: Farmers markets and carts have gained acceptance as a method for increasing access to produce in communities experiencing food insecurity. Children’s Hospital Colorado holds food insecurity and access to produce as a focal point for population health efforts. A process evaluation for strategic implementation of an onsite farm cart was conducted for best practice and population-specific recommendations.

Methods: Guided by the RE-AIM framework, a literature review, two key informant interviews with representatives from local food-access efforts, and an intercept survey (on-site survey that does not require recruitment in advance) gathered information on factors for successful implementation. The literature review gathered information to develop data collection materials, and examine similar models for addressing food insecurity. Semi-structured key informant interviews focused on best-practices and lessons learned. The intercept survey was conducted at the hospital, and consisted of two-item validated household food insecurity screener and questions related to factors that influence likelihood of use of the farm cart. Data was triangulated to produce recommendations.

Results/Conclusion: Recommendations include the following: the farm cart operates once or twice a week, in the early or late morning; pricing should be simple and affordable; payment options should include food assistance programs, and all payment options should be displayed with equal prominence; word of mouth from internal clinics, web presence, signs and fliers are recommended at minimum for communication and promotion; low cost, freshness, knowledge of how to prepare, and convenience are primary factors for use by desired population; and information and resources should be provided.
**Parent First Response: A Pediatric First Aid Training Pilot Program**

Kelsey James Boyer  
Preceptor: Sara E. Miller, MPA  
Site: Otowi Group LLC

**Background:** Injury-related causes account for 60.6% of child (1-19 years) mortality in the United States; comprising 6 of the top 10 causes of death. Many of these preventable deaths can be avoided with appropriate first aid care. This project worked to develop a business plan and training curriculum designed to increase the knowledge, aptitude and confidence of parents to respond to emergencies involving their child.

**Methods:** A literature review of first aid knowledge and course efficacy was conducted. A Likert scale survey was developed and delivered to parents to assess their self-efficacy in responding to emergencies involving their young children. Results were assessed using ANOVA tests. Current first aid course offerings were compared.

**Results:** The literature review demonstrated self-efficacy as the strongest indicator of effectiveness and propensity to act in an emergency. To increase self-efficacy, more and repeated first aid courses are recommended, but the literature showed that no one specific first aid training method has been proven best. Survey results showed that CPR certification does not indicate a significantly improved self-efficacy and that parents who took a prenatal class with first aid training had a higher self-efficacy (p-value .08). Findings show available courses do not meet the needs of parents to respond to a variety of emergencies.

**Conclusion:** A new first aid course for parents is warranted and should include: 1) community-based developed training, 2) realistic emergency scenarios with behavior-related discussions and 3) classes taught by experienced healthcare providers.
Preeclampsia Diagnosis: An Analysis of the Diagnostic Criteria Used in Bolivia in Relation to the American College of Obstetrics and Gynecology (ACOG) Guidelines

Rachael L. Burnett
Preceptors: Dr. Lorna G. Moore & Dr. Colleen G. Julian
Site: University of Colorado Anschutz Medical Campus
Departments of Obstetrics/Gynecology and of Medicine

Background: Preeclampsia is a primary contributor to Bolivia's elevated maternal and infant mortality rates, each twice the Latin American average. Improving preeclampsia diagnosis and treatment can facilitate achievement of reductions in maternal and infant mortality. The purpose of this study was to determine the criteria used for diagnosis of preeclampsia in Bolivia and assess compliance with the American College of Obstetrics and Gynecology (ACOG) guidelines.

Methods: Prenatal and delivery records were examined for all women diagnosed with preeclampsia or other hypertensive disorders of pregnancy (cases, n=248) and more than twice as many randomly-selected normotensive pregnancies (controls, n=668) delivering between April 1, 20017 and March 31, 2018 at Hospital Materno Infantil, the largest delivery site in La Paz, Bolivia. Data were recorded using REDCap. Sample characteristics were described using independent t-tests and chi-square. Fisher's exact test was used to evaluate the proportion of cases that met ACOG criteria for preeclampsia.

Results: Compared to controls, cases had higher pre-pregnancy weight and body mass index, and delivered lower-birth weight infants. Maternal age, education, and gravidity did not differ. Cases had higher blood pressures but 80% did not meet criteria for preeclampsia diagnosis as stipulated by ACOG (new onset proteinuria, thrombocytopenia, renal insufficiency, impaired liver function, pulmonary edema, or cerebral/visual symptoms).

Conclusions: Standardizing medical record collection to ensure that all information necessary for adherence to ACOG criteria is available could facilitate diagnosis of pregnancy-related hypertensive disorders and distinguish those posing the greatest threat to maternal and infant morbidity and mortality in Bolivia's resource-limited environment.
Efficacy of a Brief Tool to Assist Teacher Identification of Children with Mental Health Challenges in LMICs

Matthew Campbell, M.D.
Preceptors: Molly M. Lamb, Ph.D., and Michael Matergia, M.D.
Site: Center for Global Health

Background: Access to mental health providers is limited for children in low and middle income countries (LMICs). An innovative approach to meet this treatment gap is to utilize primary school teachers. However, teachers’ time is limited and interventions must be appropriate to their training level. The Behavioral Rating Scale (BRS) is a decision support tool created for this study, which is short and easy to use, and can help identify the students most in need of mental health support. The purpose of this study is to compare the BRS with a lengthier, validated measurement tool, the Achenbach System of Empirically Based Assessment Teacher Report Form (TRF).

Methods: Twenty-one primary school teachers from five rural, low-cost, private schools located in Darjeeling, India attended a 10-day training course. Afterwards, each teacher evaluated all students assigned to their class utilizing the BRS, and then used the results to help identify their two most at-need students. The teachers then completed TRFs for the same students. TRF and BRS scores were compared using Spearman Rank Correlation.

Results: BRS and TRF scores for each student were weakly correlated (Spearman’s ρ = 0.34, p < 0.0001).

Conclusion: The time saving and simplicity of the BRS may compensate for the lack of a strong correlation with the TRF in a LMIC primary school classroom setting. The BRS is an promising tool which may assist teachers who have undergone a short training course to efficiently and accurately identify students in need of mental health support, facilitating further psychological intervention.
Background: Zambia carries the world’s second highest burden for cervical cancer. Co-infection with HIV is a major risk factor for developing precancerous lesions and the progression to cancer. This study evaluated the effects of HIV infection on the stage and age at diagnosis among cervical cancer patients in Lusaka, Zambia.

Methods: This was a retrospective case-case analysis of 2628 cervical cancer cases diagnosed at the Cancer Disease Hospital between 2008 and 2012 in Lusaka, Zambia. Logistic regression framework was utilized to estimate the effect of HIV status on stage and age at diagnosis. Stage was categorized as early (stages I, II) or late (stages III, IV) stage while age was categorized as <40 and >40 years. We conducted a linkage of HIV-positive cases with Zambia’s national electronic HIV database to obtain HIV diagnostic and treatment details. Separate logistic regression models were used to assess the effect of HIV severity on stage and age at diagnosis. Marital status, occupation, and tribe were evaluated as possible confounders.

Results: The odds of being diagnosed with cervical cancer at age 40 or younger was 2.4 (95%CI: 2.09, 2.67) times higher among HIV-positive compared to HIV-negative women after adjusting for marital status (p<0.0001). Among HIV-positive women, a one-year increase in length of HIV infection was associated with 20.2% lower odds (OR = 0.80, 95%CI: 0.66, 0.97) of having late stage diagnosis (p=0.02).

Conclusion: Our findings suggest that access to HIV care and treatment among HIV-positive women may facilitate early detection of cancer.
Impacts of Maternal Demographic Factors on Severity of Autism Symptoms

Carey Colbert
Preceptor: Steven Rosenberg, PhD
Site: Study to Explore Early Development

Background: The Study to Explore Early Development (SEED) is a multi-site case-control study investigating phenotypes and determinants of Autism Spectrum Disorder (ASD) and developmental disabilities (DD). Increases in ASD among minority populations are cause for further investigation. The purpose of this study was to determine effects of maternal demographic factors, specifically maternal birthplace, on ASD diagnosis and severity of symptoms.

Methods: SEED study data from six study sites collected from 2006-2017 were used for analysis. Demographic data were collected via telephone interviews, ASD symptom severity assessed via the Social Responsiveness Scale (SRS) questionnaire reported by the caregiver. Significant covariates were incorporated into multivariate logistic regression or general linear models. Purposeful selection was conducted to arrive at final models.

Results: Adjusting both models for child gender and maternal demographics, there was significant association between foreign born mothers and ASD (OR= 1.48, p=0.0002), in addition to an increase in SRS score among mothers born outside the US (p=0.03). Our second model noted a decrease in SRS score with increasing maternal education level (p<0.0001). Among both models, race/ethnicity, smoking history, and alcohol use remained significant.

Conclusions: Analyses indicate both likelihood of ASD and severity of symptoms are significantly associated with maternal birthplace. Data suggest higher mean SRS score reported by foreign born mothers may be contributing to the greater likelihood of ASD diagnosis. Potentially the same effect is observed in maternal education, where higher mean SRS score reported among mothers with some college had comparatively higher odds than those with a bachelor’s degree.
Acetaminophen Misuse and Related Medical Outcomes

Anastasia Cornell
Preceptor: Kate Reynolds, MPH
Site: Rocky Mountain Poison and Drug Center

**Background:** Acetaminophen is the leading cause of acute liver failure (ALF) and hepatotoxicity in the United States. With serious medical outcomes including ALF and death, it is important to understand why individuals are misusing acetaminophen in order to reduce the burden of associated morbidity and mortality. This study examines the relationship between deviation from labelled instructions (excluding self-harm and suicide) and medical outcomes hypothesizing that those who intentionally misuse acetaminophen will have greater incidences major effects (including acute liver failure or cardiac arrest) or death.

**Methods:** A retrospective cohort study was performed using data from acetaminophen manufacturers, the FDA, and NPDS. Cases were individual instances of acetaminophen misuse. Multiple logistic regression was used to assess the relationship between root cause for misuse, sex, maximum daily dose (MDD), number of products used, and medical outcome.

**Results:** 1,716 cases were eligible for this study - mean age for the sample was 43.97 years; 37.20% were male; and 45.92% intentionally misused acetaminophen. The model was adjusted for age and sex, and showed that the odds of suffering a major effect or death after intentional acetaminophen misuse were 0.08 (95% CI 0.06 to 0.11, p <0.0001) compared to odds of no effect, minor effect or moderate effect of 0.05 (95% CI 0.04 to 0.07, p<0.0001). MDD, root cause, and sex were associated with medical outcomes.

**Conclusions:** Further efforts should be made to characterize intentional misuse of acetaminophen and direct interventions towards this group to reduce the incidence of serious medical outcomes.
Association of Kidney Stones with Kidney Function and Growth in Patients with Autosomal Dominant Polycystic Kidney Disease (ADPKD)

Hannah Cruz  
Preceptor: Kristen Nowak, PhD, MPH  
Site: University of Colorado School of Medicine

**Background:** Autosomal dominant polycystic kidney disease (ADPKD) is the most common life-threatening kidney disease, affecting between 1:400 and 1:1000 individuals. In ADPKD patients, secondary renal injury results in further disease progression. Kidney stones may represent this secondary renal injury, thus, the purpose of this study is to evaluate the effects of kidney stone formation on kidney function and growth in patients with autosomal dominant polycystic kidney disease (ADPKD).

**Methods:** The aims for this study were evaluated using a post-hoc analysis of the HALT-PKD trials. Aims one and two examined the association between an incident kidney stone event and annual change in estimated glomerular filtration rate (eGFR, n=1080) and height corrected total kidney volume (htTKV, n=543), measured by magnetic resonance imaging, using multivariable linear regression. High dietary sodium and low dietary fluid intake were analyzed as risk factors for kidney stone formation using logistic regression (n=6481).

**Results:** After adjusting for covariates, kidney stone formation is significantly associated with a 2.43 reduction in annual eGFR rate (95% CI -3.5, -1.4) and a 32.91 increase in annual htTKV (95% CI 5.6, 60.2). Dietary sodium and fluid intake were not significantly associated with kidney stone formation (OR: 1.0, 95% CI: 1.0,1.0).

**Conclusions:** Kidney stone formation in patients with ADPKD is independently associated with a decline in kidney function (measured by eGFR) and an increase in kidney volume (measured by htTKV). Kidney stone prevention is an important consideration in ADPKD progression, and further research on these associations can inform treatment methods for ADPKD.

Cody Dawson
Preceptor: Karen Hampanda, PhD, MPH
Site: Center for Global Health, Colorado School of Public Health, University of Colorado Anschutz Medical Campus

Background: In low-resource settings, practices for prevention of mother-to-child transmission of HIV (PMTCT) include women’s adherence to antiretroviral therapy (ART) and exclusive breastfeeding (EBF) for the first six months of the infant’s life. Disclosure, mental health, and partner support have shown to be important in PMTCT engagement. This study’s purpose was to determine what intrapersonal and interpersonal factors interact with a mother’s adherence to ART and EBF practices.

Methods: A cross-sectional study was conducted under a randomized control trial of intervention impacts on PMTCT outcomes. Between May and September 2017, 200 HIV-positive postpartum mothers were surveyed at 24 health facilities across western Kenya. Multivariable logistic regression models assessed stigmas, disclosure status, and partner support on outcomes of EBF and ART adherence.

Results: For safe infant feeding, the odds of EBF were 74% lower among women who disclosed status to their mother, compared to those who had not (95% CI:0.09-0.75). Conversely, anticipated stigma odds were 23% higher in EBF mothers compared to non-EBF mothers (95% CI:1.04-1.47). For ART adherence, internalized stigma was 21% lower in women who adhered compared to women who did not (95% CI:0.80-0.99), while the odds were 3.55 times higher with partner reminders to take medications (95% CI:1.21-10.38).

Conclusion: These findings indicate the importance of disclosure, stigma, and social support for critical health behaviors among HIV-positive mothers. It is necessary to ensure influential individuals within interpersonal networks have correct information regarding safe infant feeding for HIV-positive mothers. Male partners appear important in supporting women’s ART adherence surrounding pregnancy.

Heather Deis, BSN, RN  
Preceptor: Dr. Karen Hampanda PhD, MPH  
Site: Center for Global Health

**Background:** Despite progress, many countries are not on track to meet the goal of eliminating mother-to-child transmission of HIV (<5% incidence). Male involvement in HIV care around the time of pregnancy is a critical aspect of prevention of mother-to-child transmission. The goal of this project was to assess male partner involvement within couples enrolled in the MOTIVATE! Study, and use these results to inform intervention recommendations.

**Methods:** Together, 19 male qualitative interviews and 19 female partner quantitative surveys were analyzed, integrated and compared. Similarities and differences in perceptions regarding male involvement in healthcare attendance, encouraging facility delivery, HIV medication reminders, transport money, and infant feeding were examined. Quantitative data were analyzed using descriptive statistics and qualitative responses were analyzed using a thematic content approach.

**Results:** Couples largely agreed on the relative importance of male involvement but differed on perceptions of men’s healthcare attendance and transport money. The majority of females reported male involvement in each area as very important, but encouragement regarding specific medical protocols was most prioritized. Importance varied significantly in male interviews. Household chores, transport money and finding work were the most common themes male partners perceived to be health enhancing.

**Conclusions:** Results suggest that both men and women perceive male partner involvement as beneficial. Yet, differences by gender emerged regarding the most important forms of male involvement. Men seem to prioritize economic support, while women focused on encouragement. Future interventions should target these as acceptable ways to involve male partners in HIV-related maternal and child health care.
Healthy Hearts Education Training Assessment

Amy DeRosa
Preceptor: NaNet Jenkins MPH, MHSA
Site: Healthy Hearts

**Background:** Healthy Hearts is a rapidly growing school-based cholesterol and heart health screening and education program for students in fifth, seventh and tenth grades. To better garner consistent and usable data, training protocols used in the program need to be comprehensive and standardized.

**Methods:** I conducted a literature review of similar community based education programs to determine best practices, limitations and areas of improvement of the current training methods used by Healthy Hearts. I also interviewed eleven current Healthy Hearts workers to gain feedback about the current program and suggestions for improvement.

**Results:** Literature reviews support the need for additional peer and supervisor evaluation to ensure the program is effective during expansion. Many participants reported a need for more specific, detailed instruction with limited nuance in interpretation. While many reported a strong sense of teamwork and camaraderie, several non full-time employees reported a desire for more scheduled meetings and opportunities to connect outside of working shifts.

**Conclusions:** Moving forward, Healthy Hearts should implement a routine schedule of meetings in office to help build camaraderie, provide an opportunity for employees to raise concerns and share program changes with non full-time employees. Peer fidelity evaluation should be implemented on a regular basis with written feedback for both the employee and supervisors. Further expenditures on video and written documents are not recommended as employees reported far greater desire for and usage of peer interaction.
Regional Health Connector Core Competencies Assessment Tool

Lindsey Eierman
Preceptor: Rebecca Rapport
Site: Colorado Health Institute

**Background:** Regional Health Connectors (RHC) are a workforce improving health in Colorado by creating and fostering networks between clinics, public health departments, social services and other resources that help keep us healthy. The RHC program uses a core competencies checklist to determine how often RHCs practice specific skills to identify opportunities for trainings. Over the course of the program, the skills, knowledge and abilities needed of a successful RHC have changed. The purpose of this project is to update the core competencies checklist to reflect and assess the true role of the RHC.

**Methods:** A job analysis approach was used to determine the core competencies and tasks of the RHC position. This process involved 13 key informant interviews, and review of secondary data. A new task-centered survey tool was developed and administered to assess the importance, confidence and frequency of these tasks.

**Results:** Qualitative analysis of key informant interviews resulted in a total of 126 unique inductive codes which fell into 9 overarching themes, such as Cultural Humility. The new survey resulted in 56 different task statements related to the role of the RHC, which helped define the role of the RHC in each region.

**Conclusion:** The new survey tool will help assess the tasks most pertinent to the RHC role. Each RHC and their corresponding region has varying needs and this tool will allow program staff to tailor the services offered and inform the hiring of future RHCs, and package the program design for the next phase of funding.
HIV-Exposed, Uninfected Infant Health Outcomes in Southwestern Kenya: A Secondary Analysis of the MOTIVATE Study

Kira Elsbernd
Preceptor: Lisa Abuogi, MD, MS
Site: Motivate Study, Kisumu, Kenya

**Background:** With increasing availability of lifelong antiretroviral treatment for pregnant and breastfeeding women (Option B+) and mother-to-child transmission of HIV steadily decreasing, attention is turning to the outcomes of the estimated one million HIV-uninfected infants born to HIV+ mothers (HEU) in sub-Saharan Africa each year. Evidence suggests HEU infants experience higher rates of mortality, low birth weight, and suboptimal breastfeeding compared to the general population.

**Methods:** We conducted a retrospective cohort study with 1152 HEU infants from the MOTIVATE Study and 2847 infants from the 2014 Kenya Demographic and Health Survey. Multivariable logistic regression was used to evaluate odds of mortality and low birth weight in HEU compared to the general population.

**Results:** Mothers of HEU infants were significantly more likely to attend four or more antenatal care visits compared to the general population. After adjusting for number of antenatal care visits, HEU infants had decreased odds of 12-month mortality (aOR: 0.42; 95% CI: 0.20, 0.89; p=0.023) and low birth weight (aOR: 0.58; 95% CI: 0.38, 0.89; p=0.013) compared to the general population. 18-month mortality results also showed decreased odds among HEU children but did not reach statistical significance (aOR: 0.63; 95% CI: 0.36, 1.10; p=0.127).

**Conclusions:** Contrary to previous studies, this study shows HEU infants experience lower rates of mortality and low birth weight compared to the general population. Further studies with large cohorts of HEU children and appropriate comparison groups of HIV-unexposed infants in the post-ART era are needed to better understand the health outcomes of HEU children.
A Mixed Methods Evaluation of a Health Education and Lifestyle Change Program for Patients at Two Denver Health Clinics

Joanna Espinoza
Preceptor: Eric Peterson, MD
Site: Denver Health

Background: Poor lifestyle choices promote overweight and poor health. At Denver Health, health educators meet with patients who need help making lifestyle changes. Effects of this health education program on patient outcomes have never been evaluated for effectiveness or impact on patient outcomes.

Methods: We performed a mixed methods evaluation of the health education program by interviewing patients who had one or more visits (n=15), and used chart reviews (N= 133) to measure change in vitals or labs after meeting with the health educator. We did a thematic analysis on qualitative data. We assessed quantitative data using paired samples T test in SPSS.

Results: Qualitative analysis showed the overwhelming majority of patients were happy with the visits and would recommend them to others. Analysis of chart reviews showed a statistically significant difference in blood pressure after at least one visit (p<.05), and overall weight loss for overweight and obese patients.

Conclusions: This evaluation showed that patients find the health education and lifestyle change services valuable. The visits were effective at helping most patients make positive changes in weight and blood pressure control. A longitudinal study should be done to better identify longer term changes in A1C reduction and other abnormal labs. A better study design such as a randomized control trial or case control should be used to identify causality.
Training the Next Generation of Patient Advocates

Halley Flammer
Preceptor: Heather Cassidy, M.D.
Site: University of Colorado School of Medicine, Colorado Springs Branch

**Background:** The social determinates of health, such as income, food security, and housing, have a significant impact on the health of our patients. Health care providers are well positioned to have a more active role in alleviating the effects of these determinants by connecting their patients to community resources. We want to empower medical students in Colorado Springs, CO to explore the impact they can have in their community through a novel patient advocacy curriculum.

**Methods:** We surveyed two cohorts of third-year medical students at the Colorado Springs Branch (N=36) through self-assessment questionnaires regarding their interest in community advocacy. We developed a database of community resources and the second cohort of students were given access to the database. We encouraged them to 1) share any information with their patients and 2) contribute to the database.

**Results:** At baseline, 93% of responders wanted a patient advocacy curriculum integrated into their third-year didactics. The students self-reported accessing the database two or fewer times, rarely shared information with their patients, and added no new resources to the database.

**Conclusions:** We demonstrated that our students desire to have a patient advocacy curriculum integrated into the third year of medical school. Despite this, the students had minimal interaction with the database. While it is possible that the timing of when this curriculum is introduced, it is also possible that this role is too time consuming for advanced providers to perform effectively.
Background: Chronic kidney disease of unknown origin (CKDu) is an emerging epidemic in agricultural communities around the world that exists independent of traditional risk factors for chronic kidney disease (CKD). The San Luis Valley (SLV) is a rural agricultural community in south central Colorado with a high prevalence of CKD, a history of prolonged drought and a water supply contaminated by heavy metals. Due to these geographic, sociodemographic, and climate-change-related environmental risk factors, it is hypothesized that CKDu could be afflicting residents of the SLV.

Methods: We obtained pre-existing sociodemographic, clinical, and urine trace metal data for 1690 subjects from the San Luis Valley Diabetes Study (SLVDS) cohort. We restricted the study population to subjects with no history of diabetes or hypertension, age ≤ 60 years, and albumin-creatinine ratio < 30 (n = 620). Within this study population, 21 subjects met our case definition of CKDu. Subjects were analyzed by descriptive statistics, and targeted multiple logistic regression was performed to evaluate hypothesized risk factors for CKDu.

Results: Exceedance of the study population 95% ile urinary tungsten level was associated with CKDu (AOR = 5.48, 95% CI [1.67, 17.95], p = 0.005). CKDu was not independently associated with BMI, smoking status, education level, income, agricultural work, or physical exertion.

Conclusions: Our data suggest increased exposure to tungsten in individuals with CKDu. Further studies are needed to assess the relationship of urinary tungsten to longitudinal environmental data in the SLV, and to define a “safe” level of tungsten in the water supply.
Background: Mosquito-borne diseases are a global public health concern and are expected to increase in both the burden and risk for these diseases on a broader scale due to climate change. There has been a lack of research with a narrower focus looking at the microhabitat preferences of disease-carrying mosquitoes. Our pilot study aims to look at the microhabitat and temperature preference of the various mosquito species found in Weld County, Colorado.

Methods: We sampled mosquitoes via monthly CO2 traps and weekly aspiration methods from three types of microhabitats (open/grass, shade, and reeds) in four sites in Greeley and Milliken, Colorado for 11 weeks. Temperature and humidity were recorded at each site using DataPro loggers.

Results: Highest average and aspiration temperatures were found in the open/grass microhabitat and the lowest was in the shade microhabitat. In total, there were 210 mosquitoes identified from the aspiration collection method and 7984 mosquitoes from the CO2 trap method. *Culex pipiens* and *Culex tarsalis* were 2.14 times more and 2.20 more likely to be found in the shade microhabitat than the open/grass and reeds microhabitat, respectively, when collected via aspiration. Female *Culex tarsalis* and male *Aedes vexans* were found in cooler areas when ambient temperatures were high.

Conclusion: Although results were variable for most of the species collected, *Culex* mosquitoes tend to be found in shade microhabitat and prefer shaded areas more when the ambient temperatures was higher. This preference could be utilized to improve climate modelling for disease-carrying mosquitoes in Weld county, Colorado.
Evaluation and Revision of Sexual and Reproductive Health Trainings in Disaster-prone Districts of Rural Sri Lanka

Minuri Gamage, BA  
Preceptor: Dr. Novil Wijesekara, MD  
Site: Sri Lanka Ministry of Health

**Background:** In Sri Lanka, annual monsoons cause flooding which increases the prevalence and severity of landslides in rural districts of Kegalle, Ratnapura, Kalutara, Aranayaka, and Badulla, forcing populations of these districts into disaster relief camps. Government and Non-government organizations train local certified first responders (CFRs) in addressing sexual and reproductive health (SRH). Through evaluation with the Ministry of Health (MOH), it has been determined that the current training content and implementation needs modification to maximize effectiveness in improving SRH outcomes.

**Methods:** A two-part qualitative analysis of current SRH programs and trainings was conducted to identify weaknesses. We first interviewed key informants such as government officials, medical health officers, and displaced individuals in flood-impacted regions who were identified by the MOH. We then adapted the Transtheoretical Model (TTM) to determine the best intervention for improved SRH training and care, informed by the key informant interviews.

**Results:** The evaluation ultimately found modification needed in TTM components preparation, action, and maintenance for improved SRH outcomes in disaster prone regions. Weaknesses in these components lead to relapse in poor SRH conditions rather than termination via TTM. The primary conclusion was that for termination to occur, separate, specified trainings for CFRs and stakeholders are needed to replace the general training administered to everyone.

**Conclusions:** The next steps for this project include generating a new training module, pending approval from the MOH. Once the program has been implemented, success can be evaluated over time. Follow-up key informant interviews will take place periodically as implementation continues.
The Association of Health-Promoting Strategies Related to the Built Environment and Improved Employee Satisfaction and Well-Being

Cedra Goldman
Preceptor: Dr. Lee Newman
Site: Center for Health, Work and Environment

**Background:** The average office-based employee spends 36% of their lives in an office environment. Large companies are starting to allocate funding specifically targeted to creating health-promoting office environments. Small- and mid-sized businesses (1-500 full time employees) do not appear to be making similar improvements. This project determines whether health-promoting strategies at small- and mid-sized companies related to the built environment positively correlates to increased workplace satisfaction and a sense of well-being for employees.

**Methods:** The assessment was a cross sectional study that looked at how health-promoting strategies that are being implemented in office settings impact employee satisfaction and sense of well-being. A Built Environment Module (BEM) survey tool was created and given to leadership to determine what healthy built environment strategies each organization was implementing. The levels of employee satisfaction and well-being was determined by Employee Health and Comfort (HCS) Surveys. A total of 17 companies currently participating the SSWELL program were invited to participate in the study.

**Results:** The BEM Surveys and the HCS Surveys show that the relationship between the BEM score and HCS score is statistically significant. On average, every one point increase in BEM results in a 0.01 point increase in employee satisfaction (95% CI: 0.0008, 0.0099).

**Conclusions:** This study shows an association between companies that implement healthy built-environment strategies and improved satisfaction and well-being of employees. This provides support to the business case for small- and mid-sized businesses implementing healthy building strategies. Next steps include validating the survey tools and conducting a larger study.
A Framework for Understanding the Health Consequences of Breastfeeding at the Breast and Milk Expression

Katie Guthmiller
Preceptor: Laurence Grummer-Strawn, MPA, MA, PhD
Site: World Health Organization

**Background:** The number of women expressing breastmilk has increased over time with studies reporting up to 98% of women expressing milk at some point. Despite this, the consequences of feeding at the breast vs. feeding of expressed milk are not well-understood.

This study aimed to answer the following research questions:

1. Does the expression of milk improve breastfeeding rates?
2. What are the health impacts of the act of expressing milk on the mother and child?
3. What are the health impacts of feeding expressed milk to the child?
4. What are the impacts of milk expression and storage on the milk itself?

**Methods:** A literature search in PubMed, utilizing a snowball approach, was done to identify relevant articles. Thirty-nine articles were included in the review (August 2018 - February 2019).

**Results:** The review identified positive effects of milk expression on increasing breastfeeding rates, relieving pain/discomfort, and improving or maintaining milk supply. There was no difference between milk expression and direct feeding for bonding. There were negative effects of milk expression on the risk of overweight/obesity, swallowing/suckling problems, speech disorders, breathing problems, contamination, and others.

**Conclusions:** The overall evidence on the effects of milk expression are mixed. The literature on the health consequences of milk expression is limited, with many studies relying only on qualitative findings, small sample sizes, and low generalizability.
Background: Preexposure Prophylaxis (PrEP) for HIV was approved in the U.S. in 2012. Like many HIV prevention efforts, the focus was men who have sex with men (MSM). Yet, cisgender women accounted for one in five new HIV cases and were one in four people living with HIV. In the few studies examining knowledge of PrEP, only 20-30% of ciswomen knew about it. The objective of this pilot was to evaluate the impact of technology-driven, sexual health education-themed trivia and bingo games on college-age, ciswomen’s knowledge of PrEP.

Methods: This pilot utilized an electronic retrospective pre/post survey of eight students immediately after they participated in sexual education focused trivia and bingo games. Surveys were analyzed for participant’s knowledge of HIV and PrEP before and after playing as well as for basic demographic information.

Results: No statistical significance was found using a paired T-test in the pre/post survey. Small sample size likely hindered effectual statistical testing. However, knowledge was increased from pre-test to post-test in each of the five questions when frequencies were assessed. Four of the five tests indicated an increase in knowledge, while one question showed that four of eight people indicated an increase in knowledge.

Conclusions: While this is pilot saw many challenges, participant engagement and the frequency results could be promising. This approach to disseminating important sexual-health information presents an opportunity to consider prevention innovation that is centered on delivering education in an enjoyable, entertaining and interactive format.
**Effects of Testosterone on Executive Function in Adolescents with Klinefelter Syndrome**

Caroline Harrison  
Preceptor: Nicole Tartaglia, MD  
Site: Children’s Hospital Colorado

**Background:** Klinefelter Syndrome (KS) occurs in 1/650 male births and causes reduced testosterone production and executive function (EF) deficits. Prospective pilot studies, but no controlled trials to date, suggest benefits of exogenous testosterone treatment. This study examined the effect of testosterone on EF subdomains including attention, working memory, inhibition and planning/switching in KS adolescents.

**Methods:** A double-blinded placebo-controlled trial randomized 44 participants to apply testosterone or placebo gel daily for 12 months. Performance-based measures and parent questionnaires assessed EF at baseline and 1 year. Factor analysis allowed creation of composite EF scores. An independent-samples t-test compared baseline EF between treatment groups and a one-sample t-test compared the total cohort to standardized norms. A multivariable linear regression tested whether performance-based EF measures predict parent questionnaire EF scores. Repeated measures ANOVAs assessed treatment effect of testosterone. Effect sizes on difference scores were calculated.

**Results:** The study cohort showed EF deficits compared to norms, consistent with prior literature. None of the performance-based EF measures predicted parent questionnaire composite scores, so both were included in analyses. Testosterone neither worsened nor improved EF, regardless of testing modality, but small effect sizes were noted for inhibition (both modalities), planning/switching (direct-measure) and attention (questionnaire).

**Conclusions:** The effect sizes within particular EF subdomains support the need for multi-site replication with a larger cohort. While previous literature has also found discrepancies between performance-based measures and questionnaires, improved understanding of this relationship is required. Future directions include analysis of testosterone’s role in improving emotional/behavioral, physical and adaptive measures in KS.
Predictors of Mortality in Hospitalized Heart Failure Patients:
Insights from the Egyptian Cohort of the European Society of Cardiology Heart Failure Registry

Ahmed Hassanin, MD
Preceptor: Madiha Abdel-Maksoud, MD, PhD
Site: Alexandria University, Egypt

Background: Heart Failure (HF) is a form of cardiovascular disease, characterized by reduced ability of the heart to pump blood. Studies from Africa investigating the outcomes and predictors of mortality in HF are scarce. The goal of this study is to identify independent predictors of mortality in Egyptian HF patients.

Methods: Between 2011 and 2014, 1660 hospitalized Egyptian HF patients were enrolled to the European Society of Cardiology HF Registry. Cases (deceased patients) were compared to controls (survivals), to identify predictors of mortality during hospitalization and at one-year follow up. Demographic and clinical characteristics associated with mortality were investigated, using univariate and multivariable logistic regression models.

Results: At hospital discharge 5% of the patients were deceased. Independent predictors of mortality were systolic blood pressure (SBP) (OR=0.65; [95% CI: 0.57,0.74] for every 10 points increase), serum creatinine (OR=1.47; [95% CI: 1.23,1.74] for every point increase) and geographic region (OR of 2.38; [95% CI: 0.48,9.41] for Upper Egypt compared to the Delta region). At one-year follow up, 27% of patients were deceased. Independent predictors of mortality were age (OR=1.47; [95% CI: 1.23,1.75] for every 10 years increase), ejection fraction (OR=0.66 [95% CI: 0.59,0.73] for every 5 points increase), history of hepatic impairment (OR=3; [95% CI: 1.51,5.88]) or stroke (OR=3.2 [95% CI: 1.52,6.65]) and geographic region (OR=10.7; [95% CI: 2.18,53.71] for Upper Egypt compared to the Delta region).

Conclusions: several independent predictors of mortality were identified. The results of this study are likely to inform clinical care and help in patients’ risk stratification.
Association Between Self-Reported Sugar Intake and a Sugar Biomarker ($\delta^{13}C$) in Children at High Risk for Type 1 Diabetes

Martha Henze, MS, RDN
Preceptor: Jill Norris, MPH, PhD
Site: Colorado School of Public Health, Barbara Davis Center

Background: High sugar intakes have been associated with increased progression to type 1 diabetes in children positive for diabetes-related autoantibodies. In these studies, sugar intakes were self-reported through a food frequency questionnaire (FFQ). An objective biomarker of sugar intake that accurately reflects intake is needed to be able to monitor changes in dietary sugar intake.

Methods: We used samples obtained from 55 children between the ages of five and ten years old in the Diabetes Autoimmunity Study in the Young (DAISY), which is prospectively following children at increased risk for type 1 diabetes. We measured a unique sugar biomarker ($\delta^{13}C$) in erythrocyte membranes. As we had two or more measures on 39 children and one measure on 16 children, we used a general linear model (GLM) to examine association between added sugar intake, as measured by FFQ, and the biomarker, adjusting for a nitrogen biomarker. We also examined whether change in added sugar intake was associated with change in $\delta^{13}C$ in the 39 children with two visits, using GLM.

Results: Change in added sugar intake is associated with change in the biomarker, where for every unit increase in added sugar intake between the first and the last visit, there was an increase in the biomarker of 0.0067 ($p=0.0020$).

Conclusions: The $\delta^{13}C$ biomarker was associated with change in reported added sugar intake in young children, suggesting that this biomarker could be used as a measure of compliance in an intervention study in which the goal was to reduce sugar intake.
Looking Within: Assessing and Addressing Food Insecurity Among Children's Hospital Colorado Team Members

Rayna Hetlage
Preceptor: Katie O’Connor, MPH
Site: Children’s Hospital Colorado

Background: In Colorado, approximately 10% of adults and 16% of children are food insecure. Food insecurity is associated with obesity, diabetes, depression, teen suicide, and child behavioral problems. In this study, I sought to quantify the level of food insecurity among team members at Children's Hospital Colorado and develop program recommendations aimed at reducing food insecurity.

Methods: A survey adapted from the USDA Food Security Survey was administered to 80 team members from three departments within the hospital: Food Services, Environmental Services, and Security. Participants were selected using convenience sampling. The survey responses were coded following USDA guidelines and the results were analyzed in Excel. The level of food insecurity was compared by race/ethnicity, department, and whether or not households had children.

Results: Among surveyed team members (n=80), 35% of those with children reported some level of food insecurity and 10% of households without children were considered to be food insecure. Among those surveyed, 23% of African Americans, 21% of Hispanics, and 0% of Caucasians were food insecure. The high levels of food insecurity among the surveyed departments suggest a need for programs. Some potential programs include cafeteria vouchers, subsidized mini-market, and repackaging/distributing leftover food from the cafeteria.

Conclusions: My study results indicate that Children's Hospital Colorado's team members are experiencing food insecurity and programs aimed at reducing food insecurity are warranted. Programs should focus on addressing both hunger at home and at work while minimizing potential stigma and focusing on cultural competency.
Policy Analysis of Colorado’s Proposed Legislation to Tackle the Cost of Prescription Drugs

Allie Hoffman
Preceptor: Allie Morgan
Site: Colorado Health Institute

Background: This project examines legislation related to prescription drug access, evaluating its potential impact and summarizing key themes in a way that makes this complex issue understandable. During Colorado’s 2019 legislative session, legislators have proposed four bills to address the high cost of prescription drugs. The specific bills are: HB1131: Prescription Drug Cost Education; SB005: Import Prescription Drugs from Canada; HB1216: Reduce Insulin Prices; and HB1296: Prescription Drug Price Reduction Act.

Methods: Literature review and an environmental scan of policies from other states were conducted. I used the CDC Policy Analysis Key Questions as a framework for assessing Colorado’s proposed legislation. Other data was gathered from biweekly legislative monitoring meetings at the Colorado Health Institute, House and Senate hearings, and three key stakeholder interviews.

Results: During the 2019 legislative session, US states introduced 213 bills targeting prescription drug prices—four of these bills originated in Colorado’s state legislature. The most comprehensive bill is HB1296, and if it passes, Colorado will join eight other states who have enacted price transparency laws.

Conclusions: In addition to price transparency, states (including Colorado) have undertaken other efforts to control the price of prescription drugs, including passing measures allowing the import of drugs from Canada. Despite this, the Federal Government has yet to approve such importation programs. State-level regulation is a necessary step in addressing the rising cost of pharmaceuticals, though it’s unlikely states can control the cost without legislation at the federal level.
Background: Across the substance use field there is a growing focus on systems-building to address complex problems. Social network analysis (SNA) provides a means for Project Colorado Opioid Synergy-Larimer and Weld (CO-SLAW) to measure, visualize, and analyze relationships between providers and stakeholders within their opioid treatment network. The purpose of this study was to assess baseline social network connections between CO-SLAW partners using SNA to determine if collaborative activity increases over the lifespan of the grant.

Methods: The PARTNER online survey containing 10 relational, 8 organizational and 3 open-ended questions was used to assess community health provider and stakeholder connections within the network. The survey was distributed to 21 community health providers and stakeholders in Larimer and Weld counties in March 2019. Quantitative results were analyzed using descriptive statistics and PARTNER analytic software to examine network density and relationships.

Results: A total of 16 (76%) CO-SLAW partners responded to the survey. Partners believed there was strong trust (66%), low density of ties (24%), and moderate centrality (36%) between network members. There were a total of 147.63 non-redundant ties across the CO-SLAW network.

Conclusion: Survey results suggest CO-SLAW partners were part of a dense and diverse network of community providers and stakeholders, but that there is room to increase the number of connections between different types of organizations. Future work should focus on developing ties between providers, jails, and hospitals within CO-SLAW. This will help ensure quality opioid treatment is being provided to the Larimer and Weld population.
SSRI vs Non-SSRI Antidepressants: A Case-Control Study Comparing Their Impact on Suicidal Ideation in Cancer Patients Seeking Psychotherapy

Hunter Hudson
Preceptors: Emily Cox-Martin, PhD and Elissa Kolva, PhD
Site: University of Colorado Cancer Center

Background: Cancer patients are prescribed antidepressants at twice the rate of the US general population and see twice the rate of suicide. Suicidal ideation (SI) is commonly attributed to antidepressant use, although the reason for this is not well understood. There is research to suggest a difference in odds of SI when antidepressants are stratified by class, particularly the selective serotonin reuptake inhibitors (SSRIs). The purpose of this study is to determine if odds of SI differ between SSRIs and non-SSRIs.

Methods: This case-control study utilized data from a combination of electronic medical records and survey data on psychological and physiological measures. The outcome of interest was a binary indicator of SI as obtained from Suicidal Behaviors Questionnaire (SBQ-R) responses. A multivariable logistic regression model was formed with covariates defined a-priori by relevance to the research question (PHQ scores and class of antidepressant).

Results: PHQ scores and antidepressant use were both found to increase the odds of SI. The odds of SI was found to be greatest in those taking SSRIs when compared to those that do not take antidepressants (OR: 2.643, 0.617 to 11.315) as well as to those that take non-SSRI antidepressants (OR: 1.635, 0.345 to 7.720).

Conclusions: This study suggests an association between antidepressant drug class and SI in patients with cancer seeking psychological care. This finding, although not statistically significant, could inform future studies in identifying which antidepressant drug classes have greater association with increased SI, which would be beneficial for better informing antidepressant prescribing practices.
A Qualitative Evaluation of a Cervical Cancer Screening and Awareness Program in Rural South India

Alyssa Jeffers  
Preceptor: Purnima Madhivanan, MD, MPH  
Site: The Public Health Research Institute of India [PHRII]

Background: Cervical cancer is the second highest cause of cancer deaths among women in India. Early cervical cancer detection is challenging, as preventative health care and cervical cancer screening programs are not widely implemented in India. Understanding the effectiveness of existing screening programs and quality improvement opportunities may inform efforts to enhance programs and increase funding. The purpose of this project was to evaluate a cervical cancer screening program at a non-profit organization to help determine barriers, successes, and recommendations for change.

Methods: Semi-structured key informant interviews were completed with eight staff members and ten community women who had previously been screened for cervical cancer. Interviews ranged from 15-60 minutes in length. Community women were recruited by phone based on their screening outcome (normal Pap, biopsy, hysterectomy). A translator was used to translate English to Kannada. Interviews were audio-recorded and transcribed verbatim.

Results: Findings demonstrated the program was effective at increasing cervical cancer knowledge among participants. Community women reported high program satisfaction regarding quality of care, cost, and accessibility. These findings were supported by previous PHRII survey data. Recommendations included addressing patient barriers and perceived norms of preventative care, improving patient follow-up, and seeking increased program funding to increase access to screening.

Conclusions: High rates of cervical cancer morbidity and mortality in India may be attributed to the lack of cervical cancer screening programs available. Cervical cancer screening and awareness programs can be effective in increasing knowledge, normalizing preventative care, and providing screening to women in India who lack resources.
Evaluation of Community Benefit Programs Throughout Catholic Health Initiatives

Emilee Kaminski
Preceptor: Dr. Tamara Bourda, PhD, MPH
Site: Catholic Health Initiatives

Background: In 2008, the Internal Revenue Service (IRS) mandated all 501(c)(3), not-for-profit hospitals to report their community benefit practices for tax-exemption purposes. Community benefit programs are designed to help not-for-profit hospitals better serve their community through efforts to increase access to healthcare and to improve the community’s health. This review examines the community benefit programs throughout Catholic Health Initiatives (CHI) to identify areas of improvement.

Methods: An email-based survey with employees at various locations within CHI was conducted and analyzed. Employees were selected based off of purposive sampling. CHI management chose employees due to their involvement with the community benefit programs within their hospitals. Sixteen surveys were sent to employees within six different hospitals around the nation. Data was compiled and general themes of areas of weakness were obtained.

Results: Six surveys were received. Five surveys came from the employees in the Community Benefit department. Every division but one was represented. CHI employees reported the importance of further community benefit training and education. There was an inconsistency around community benefit training. Employees recognized the need for more dedicated staff. It was observed that many of the employees working on community benefit programs felt inadequately staffed. There is a need for greater collaboration with internal and external partners when conducting these programs.

Conclusions: CHI should standardize community benefit training and education for employees working with these programs. Further education will help address the collaboration issues the staff is facing. Finally, CHI organizations must increase community benefit staff.
Employee Ergonomic Evaluations: Prevalence of Back Discomfort at Children’s Hospital Colorado

Erika Karcher
Preceptor: Katherine O’Connor, MPH
Site: Children’s Hospital Colorado

**Background:** In 2002, 487,900 workdays were lost due to work-related musculoskeletal disorders (MSDs). MSDs were the most prevalent job-related illness/injury in the United States. Risk of MSD for employees working at a computer four or more hours a day was nine times greater than for one-hour users. The purpose of this study was to measure back discomfort prevalence and compare its relationship with hours spent working at a computer among Children’s Hospital Colorado (CHCO) employees.

**Methods:** A cross sectional study was conducted using a database of CHCO employee ergonomic evaluations to examine correlation between time spent at work on a computer and employee back discomfort. Back discomfort was calculated by combining both reported upper and lower back discomfort. Results were assessed using back discomfort prevalence and prevalence ratios. The sample size was n=108 CHCO employees who reported computer use at work and back discomfort status.

**Results:** Back discomfort was the most reported discomfort area with a 0.61 prevalence. The prevalence ratio of back discomfort for employees using a computer seven or more hours a day compared to those who spent less than seven hours was 0.95 (0.74, (0.71-1.23)).

**Conclusions:** Back discomfort was the most prevalent discomfort area reported by CHCO employee ergonomic evaluations; however, prevalence of back discomfort does not appear to be correlated with working at a computer seven or more hours a day. Appropriate follow-up should be to expand the demographic risk factor data, focus on consistent data reporting, and conduct more ergonomic evaluations.
Policy Statement on Adoption and Implementation of the Current US Food and Drug Administration Food Code

Audrey Keenan
Preceptor: Kaylan Celestin, MPH
Site: National Environmental Health Association

Background: The U.S. Food and Drug Administration Food Code is a set of guidelines for regulating the retail food industry (e.g., restaurants, grocery stores, schools, hospitals, convenience stores, etc.). Because implementation of these guidelines is not mandatory, there is a wide variety of food regulations in place across the country. The majority of states have not adopted the most recent version of the Food Code. We sought to develop a policy statement on the benefits of uniform adoption and implementation of the current Food Code by all states.

Methods: A literature review was conducted to identify lapses in safety in the retail food industry and ways in which the Food Code can address these issues. The literature review was supplemented with semi-structured group interviews with nine stakeholders from different sectors of the retail food industry.

Results: A policy statement was constructed based on three points identified in the literature review and input from stakeholders. The policy statement advocates for adoption and implementation of the current Food Code based on evidence that it provides the following benefits: reduction in foodborne illness risk factors, increased compliance with food safety measures, and implementation of a food safety management system.

Conclusions: Nationwide adoption and implementation of the current Food Code will standardize food regulations, improve food safety, and reduce costs associated with foodborne illness. The policy statement will be disseminated via online sources to educate policymakers and health agencies on the benefits of updating to the current version of the Food Code.
Preventing Recurrent Teen Pregnancies: Using an Inter-conception Screening Tool to Increase the Use of Long-Acting Reversible Contraceptives in Adolescents

Anna M Kelly, MD
Preceptor: Jeannelle Sheeder MSPH, PhD
Preceptor Site: The Children’s Hospital Young Mothers Clinic

Background: Risk of premature birth is substantially increased if a mother conceives again sooner than 18 months after delivery. Long-acting reversible contraceptives (LARC’s) are known to be more effective at increasing the inter-pregnancy interval than other contraceptive methods. The Young Mothers Clinic (YMC) at Children’s Hospital in Aurora, CO recently implemented IMPLICIT, an inter-conception screening tool that screens for four risk factors for preterm birth and low birth weight, including LARC use. We evaluated whether the rate of choosing a LARC increased when teens were screened with IMPLICIT.

Methods: We did a retrospective cohort study of electronic medical records and paper questionnaires from participants in the YMC. Mothers up to 18 weeks postpartum were screened with IMPLICIT between October 1, 2018 and February 28, 2019 (n= 148). We compared contraceptive use rates to a demographically similar group of teens who were seen in the clinic prior to implementation of IMPLICIT, from January to June, 2018 (n=145).

Results: In the pre-intervention group, 55.9% chose long-acting reversible contraceptives. In the post-intervention group, 55.4% chose LARC’s, thus no statistically significant difference.

Conclusions: The reason for no impact of this screening tool on teen use of long-acting contraceptives is likely that the rate of use prior to implementing this tool was already quite high, 55.9% compared to 30.5% elsewhere throughout the state. There may be better time periods, such as the immediate post-partum period in the hospital, which would result in further uptake in LARC methods.
**Healthcare Encounters in Pregnant Women with a Cannabis Diagnosis Code in Colorado, 2016-2017**

Matthew Klein  
Preceptor: Katelyn Hall  
Site: Colorado Department of Public Health and Environment

**Background:** Despite increased medical and recreational legalization, little is known about the health impact of cannabis exposure for pregnant women and their offspring. Our objective was to (1) examine healthcare encounters with co-occurring cannabis and pregnancy diagnosis codes in Colorado over time (2) describe the prevalence of primary diagnosis codes among pregnant women with a co-occurring cannabis code compared to those without a co-occurring cannabis code.

**Methods:** Statewide International Classification of Diseases, 10th Revision, Clinical Modification diagnosis codes from the Colorado Hospital Association were used to identify healthcare encounters where pregnancy was indicated. Prevalence ratios were calculated to compare primary diagnosis codes among pregnant women with a co-occurring cannabis code to those without a co-occurring cannabis code. Rates of the co-occurrence of pregnancy and cannabis diagnosis codes were examined over time.

**Results:** The statewide rate of healthcare encounters with co-occurring pregnancy and cannabis diagnosis codes significantly increased from 2016 to 2017 from 1088.52 to 1510.22 per 100,000. The prevalence of primary diagnosis of substance-related disorders, suicide and intentional self-inflicted injury, alcohol-related disorders, and other complications of birth or puerperium affecting management of the mother were significantly higher in visits with codes for pregnancy and cannabis compared to those only with pregnancy codes.

**Conclusions:** This project highlights the importance of screening for cannabis use during prenatal care in conjunction with counselling about the adverse health effects related to prenatal cannabis exposure. Future studies should further examine the impacts of prenatal cannabis exposure on developing children.
Background: Yearly Chlamydia (CT) screening is recommended for all sexually active women under the age of 25. Denver county has the highest CT incidence rate in Colorado at 908.7 per 100,000 in 2016. We analyzed CT screening rates for women 14 – 24 in Denver Health primary care clinics from 06/2017 to 05/2018.

Methods: We reviewed all primary care records from women age 14 to 24 with at least one visit to a Denver Health primary care clinic from June 1, 2017 to May 31, 2018 to determine CT screening rates. We used log-binomial regression to examine demographic and behavioral predictors of CT screening. We compared screening between clinic types using one-way ANOVA.

Results: 49,323 encounters for 14,324 individuals were analyzed. CT screening rates were 52% overall and 78% for sexually active women. Predictors of CT screening for sexually active women included Hispanic ethnicity (aPR 1.17, 95% CI 1.13 – 1.21), and Black race (aPR 1.14, 95% CI 1.1-1.19). For women with missing sexual activity documentation, women age 14-17 were significantly less likely (aPR 0.67, 95% CI 0.5-0.84) to be screened than those age 20-24. A screening opportunity was missed at 45% of adult medicine and 24% of women’s care clinic encounters.

Conclusions: While CT screening among sexually active women was high, documentation of sexual activity was low among younger adolescents and associated with lower rates of CT screening. Efforts to improve sexual history documentation are needed. Differences in CT screening rates by race and clinic type represent additional opportunities for improvement.
Factors Related to Alcohol and Other Drug Use in a Community College Student Population

Hannah LaDow
Preceptor: Jennifer Husum, MA
Site: Arapahoe Community College (ACC)

**Background:** Few studies have focused on alcohol and other drug (AOD) use in community college students. For this project, I analyzed data from ACC’s recent climate survey to identify factors related to students’ propensity to use AOD in order to inform program recommendations for the college.

**Methods:** All 5,911 current students received an email invitation to complete the survey, which was available in January and February 2019. We received 690 surveys back (response rate: 11.7%); I used 522 for analysis. I inductively coded all qualitative data to identify themes. I used chi-square tests to determine the most significant predictor variables, and I then used multinomial logistic regression to model the relationship between these predictor variables and respondents’ AOD use.

**Results:** Having other priorities was the most common reason for not using alcohol (32.5%) or other drugs (60.9%). Respondents’ alcohol, tobacco, marijuana, and other illicit drug use were all positively correlated with the perception that others use these substances often, compared to never (p<0.001, p=0.016, p=0.005, and p=0.036, respectively). Marijuana use was negatively correlated with relationship stress (p=0.007) and work stress (p=0.039). Other illicit drug use was positively correlated with often, compared to never, experiencing peer pressure to use drugs (p=0.004).

**Conclusions:** Respondents’ perceptions of others’ AOD use was strongly associated with their own AOD use, and having other priorities was a protective factor against AOD use. I recommend that ACC administration share survey findings with students and implement a campaign to shift students’ perceptions of others’ AOD use.
Dietary Sodium Intake and Cognitive Function in the Chronic Renal Insufficiency Cohort Data

Kelly Leach, MS
Preceptor: Kristen Nowak, PhD, MPH
Site: University of Colorado Anschutz School of Medicine

Background: Eight to 16% of the world population is afflicted with chronic kidney disease (CKD). The worsening of this condition is associated with cognitive decline. High sodium intake promotes vascular dysfunction and may promote cerebrovascular disease. The purpose of this project was to determine whether increased sodium in the diet of individuals with CKD predicts cognitive deficit.

Methods: We used data from the Chronic Renal Insufficiency Cohort study, which consists of information collected from 3612 individuals aged 21-74 with CKD who were recruited from seven clinical centers from 2003-2007. We performed a mixed model and a logistic regression. Cognition was the primary outcome as measured by the mini-mental state exam (3MS), with cognitive deficit defined as a score of less than 80. The primary explanatory variable was 24 hour urine sodium excretion as a quantitative reflection of dietary sodium. Glomerular filtration rate and history of cardiovascular disease, stroke, and diabetes, age, race, gender, education, and urine potassium, creatinine, and protein excretion were included in the models.

Results: Urine sodium excretion significantly predicted 3MS score in the mixed model: .006 (CI: .003-.009, p = .0001), and this effect was stronger over time: .005 (CI: .003-.006, p < .0001). Sodium excretion did not predict cognitive deficit in the logistic regression: OR = .999 (CI: .996-1.001, p = .244).

Conclusions: There is a small increase in cognitive function as dietary sodium increases, which contradicts our hypothesis; this could be due to individuals with higher rates of cognitive decline dropping out of the study.
Effect of Educational Messaging on Emergency Department Utilization

Chelsea Leiper, PharmD
Preceptor: Sarah Billups, PharmD
Site: CU Medicine

Background: Inappropriate emergency department (ED) use, defined as visits treatable in a non-emergency setting, or requiring immediate care but could be prevented with appropriate outpatient care, results in high costs for patients and healthcare systems. This study evaluated the effect of educational messaging on inappropriate ED use.

Methods: In this randomized control trial, patients with an ED visit in the past 6 months were randomly assigned to receive educational messaging through their preferred contact method or no materials. The message was a one-page letter discussing the benefits of calling the doctor’s office before visiting the ED and provided clinic address, phone, and hours. The primary outcome was the number of inappropriate ED visits per patient-month in the 90 days following expected receipt of the educational message.

Results: Of 1,023 patients with recent ED visits, 574 were randomized to no message and 574 received the message, 221 (38%) via letter, 207 of which were successfully delivered, and 353 (62%) via email, 209 of which were opened. The groups were similar in age (mean =48.3 +/- 18.5 and 47.5 +/-17.2, respectively, p=0.425), gender (34% versus 36% male, p=0.364), and mean number of ED visits in the previous 6 months (1.4 +/- 0.9 versus 1.4 +/- 0.8, respectively, p=0.900). After 90 days, there were 4 potentially preventable re-admissions per patient month in both groups (p=0.454).

Conclusions: This study showed a one-page letter had no effect on inappropriate ED utilization in this population. More intensive strategies may be required to reduce inappropriate ED use.
Cardiovascular Events and Multi-Well Unconventional Oil and Gas Development in Colorado

Kacy Lorber
Preceptor: Lisa McKenzie, PhD, MPH
Site: University of Colorado- Anschutz Medical Campus

Background: Multi-well unconventional oil and gas (UO&G) development emits noise and contributes to air pollution by releasing particulate matter of <2.5 microns (PM$_{2.5}$) into the atmosphere. Noise and PM$_{2.5}$ exposure is associated with increased cardiovascular morbidity. This study evaluates how proximity to development of a multi-well UO&G site affects cardiovascular health of nearby residents.

Methods: We employed a retrospective time series design to follow 3,562 individuals (18-109 years old) within the All Payers Claim Database Colorado (APCD CO) who had specific cardiovascular claims between 2009-2016 and lived within 1 mile of a multi-well UO&G site that was established between 2010-2015. Before, during, and after development phases of the multi-well UO&G site were found and rates of healthcare encounters for angina, heart attacks and heart failures were analyzed through a negative binomial regression model.

Results: The study population had a 46% increase of risk (95% CI: 1.25, 171) of a cardiovascular healthcare claim during the well development phase compared to before. Younger men (<65 years old) had an 89% increase of risk (95% CI: 1.01, 3.55). Individuals with <730 days in development period had a 39% increase of risk (95% CI: 1.16, 1.66) after development compared to before.

Conclusions: Sensitive populations living near well sites are at increased risks for cardiovascular events during and after well development periods. Individuals acted as their own control, which is an advantage of this study design. Analyzing cardiovascular health outcomes and proximity to well sites can give evidence-based results for policy action and setback distances.
Identifying & Responding to Concerns Among Stakeholders on African American Infant Mortality in Denver, CO

Carrington Lott
Preceptor: Virginia Visconti
Site: Community Action Network

Background: An African American woman in Denver is three times more likely to lose her baby to miscarriage or death in the first year of life compared to a non-Hispanic white woman. This disparity is not due to socioeconomic status and has been linked to stress associated with racism and an unjust system. This qualitative analysis examines stakeholder’s concerns to inform a recommendation of resources needed to decrease African American infant mortality rates.

Methods: Fifteen screenings of the Precious Loss documentary about infant mortality were conducted between 2016-2017 in the Denver Metropolitan area. After the screenings, 167 volunteers completed a survey developed by the Community Action Network. Survey responses were organized by venue and categorized into four stakeholder groups. Through inductive qualitative analysis, codes were identified in an iterative process and consolidated to form seven key themes. Findings were validated through member checking to verify accuracy.

Results: Themes were: 1-Importance of data/stories to evoke empathy, 2-need for education/awareness efforts, 3-inspired to be involved, 4-need for concrete action steps, 5-overwhelmed/unable to help, 6-need for policy changes, and 7-racism/lack of cultural competence. Themes were data generated and all except themes 5 and 6 manifest in every stakeholder group.

Conclusions: Results inform resources for a toolkit. The implication of these resources is to guide those directly involved on best practices to reduce infant mortality rates in the African American community.
The Determinants of Life Expectancy in the Colorado Metro Denver Area

Mindy Mach
Preceptor: Kate Watkins, MPH
Site: Jefferson County Public Health

Background: Life expectancy (LE) is an easily interpretable measurement of population health directly related to social determinants of health. Past studies on LE in Colorado, were based on large area estimates that underestimate disparities affecting LE. The purpose of this analysis is to find the most impactful determinants influencing LE in Colorado Metropolitan Denver (MD) area to allow targeted interventions and distribution of resources for areas experiencing higher disparities.

Methods: Forty-six covariates were considered potential determinates of LE from the Behavioral Risk Factor Surveillance System, American Community Survey 5-year estimates, and Colorado Vital Statistics leading causes of death. 578 LE census tracts estimates were used from the U.S. Small-area LE Estimates Project. Exploratory Regression was used as variable reduction method to find a statistically significant Ordinary Least Squares (OLS) model. Geographically Weighted Regression (GWR) was used to assess spatially varying relationships of the OLS model and for predictions of LE.

Results: The statistically significant OLS model (p<0.0000) included households spending 30% of income or more on housing costs (p=0.0042), receiving food stamps (p=0.0024), single parent (p=0.0069), unemployment rate (p=0.0281), current smokers rate (p=0.0072), and death by heart disease (p=0.0000), unintentional injury (p=0.0001), diabetes mellitus (p=0.0000), and chronic liver disease (p=0.0281). GWR predicted tracts within Denver county and northeast MD as areas LE could be most increased through improvement of these determinants.

Conclusions: Of the variables studied, nine variables were predictive of LE and could be used to help inform interventions and policies especially in Denver county and northeast MD.
**Background:** It is vital for health care organizations to maximize their reimbursement revenue from private and public insurers to ensure optimal financial performance. Having recently internalized their billing system, Critical Care Pulmonary and Sleep Associates (CCPSA), wants to know how Medicare Fee Schedule payments are impacting their reimbursement revenue. What percentage of CCPSA’s revenue would be lost or gained in the event that the only payer of a claim was Medicare?

**Methods:** Data was collected and condensed prior to analysis to include Charges YTD, Units, and MFS Non-Facility Payments, by CPT (current procedural terminology) Code. Calculations were done to figure out the proportion of Medicare payments and the money lost/gained if only Medicare paid. Data was then analyzed to determine which CPT codes were the most and least financially rewarding for CCPSA. A comparison of the internal billing system to the external system that was used previously.

**Results:** Analysis revealed that about 50% of revenue from reimbursements would be lost if Medicare was the only payer. Some CPT codes caused more financial loses than others. A comparison of the internal to external billing system showed collections from charges YTD have increased since the change.

**Conclusion:** CCPSA has seen an increase in the percentage of charges collected since internalizing their billing system. This increase is most likely due to an increase in payments from 3rd party payers and not from Medicare payments. There is an opportunity to improve on reimbursements for several CPT codes that could further increase revenue.
Promoting Physical Activity in Schools Through Healthy Public Policy

Emily Martin
Preceptor: Ashley Brooks-Russell, PhD, MPH
Site: University of Colorado – Anschutz Medical Campus

Background: In 2011, Colorado passed HB11-1069 which required elementary schools to provide a minimum of 600 minutes a month of physical activity for students. In 2017, 51.6% of high schoolers and 36.7% of middle schoolers in Colorado reported meeting the CDC recommendation of 60 minutes of physical activity a day. The purpose of this research project was to analyze the Colorado physical activity policy and use Smart Source data to evaluate school compliance to the policy.

Methods: State policies regarding physical activity in schools were reviewed. Thirty-nine states have formal policies requiring physical education in elementary schools but only 19 of those states have specified time requirements for physical activity. Descriptive analysis was performed on data from the Smart Source survey from 2015-2016 and 2017-2018. Data was analyzed to better understand what schools are doing to promote physical activity.

Results: Since the 2015-2016 school year, 66% of elementary schools in Colorado have created a Comprehensive School Physical Activity Program. The majority of elementary and secondary schools reported having a general wellness policy in place during the 2017-2018 school year but only 50% of elementary and 39% of secondary schools reported implementing all activities and strategies related to physical activity stated in the wellness policy.

Conclusions: Policies have the ability to impact large groups of people and create permanent change. Research has shown students are more physically active in schools with policies requiring daily physical activity. Colorado’s physical activity policy can be strengthened by requiring daily physical activity for all students.
Background: During hurricane Katrina, 44% of people who did not evacuate stayed out of concern for their companion animals. The most common natural disasters in CO are wildfires. There were 5,720 fire incidents in CO in 2018. While significant strides have been made in emergency preparedness for people, Intermountain Humane Society (IMHS) lacked an effective disaster response plan. Located in Bailey, Colorado, a high-risk wildfire area, IMHS can house up to 60 cats and 15 dogs.

Methods: A tabletop exercise was developed to train the IMHS staff and volunteers how to transport animals to a safe alternate site, while also ensuring staff and volunteer safety. The Incident Command System (ICS) was used as the framework for the evacuation plan. A Federal Emergency Management Association (FEMA) training scenario was adapted to simulate a potential fire in the IMHS evacuation area. Feedback obtained during the drill was incorporated into the plan.

Results: Through the exercise, the team was able to learn the ICS structure and basic FEMA guidelines. The training enabled them to execute their evacuation plan, provide feedback on ways to improve the plan, and determine future training needs.

Conclusions: Despite the growing need for animal shelters to develop disaster plans, some lack the experience to do so. I was able to adapt the training principles utilized in community disaster response training and effectively apply them in an animal welfare setting. This project demonstrates that tabletop exercises are a very effective tool for training animal shelter teams in disaster response.
Spatial Analysis of Cancer Incidence in Populations Living Near Nuclear Power Plants in Angra dos Reis, Brazil Between 2007-2012

Claire McFadyen
Preceptor: Donna Goldstein, PhD
Site: CU Boulder/Angra dos Reis, Brazil

Background: Nuclear energy is an important energy source for Brazil, providing 3 percent of its energy. The effects of long term, low-dose radiation exposure on human populations has long been debated. Some research suggests there could be increased cancers in populations living within 5km of active nuclear power plants. By mapping cancer incidence in the municipality of Angra dos Reis, we aim to add to the body of literature regarding low-dose ionizing radiation exposure through investigating cancer incidence within 5km or 15km of the Brazilian nuclear power plants.

Methods: Using ArcGIS and 2007-2012 cancer incidence data from the Angra dos Reis Population Cancer Registry, we analyzed statistical significance of cancer incidence in relation to proximity to the Brazilian nuclear power plants. Using SatScan, and standardized incidence ratios comparing to the general Angra municipal population, we aimed to determine if cancer incidence is higher in barrios located within 5km or 15km of the nuclear power plants.

Results: We found no statistically significant clustering of cancer incidence within 5km of the nuclear power plants. We did not find increased incidence of any types of cancer within 5km or 15km of the power plants.

Conclusions: This analysis does not support the hypothesis of increased cancer incidence in populations living near nuclear power plants. Significant limitations in the data could have impacted the results. More robust cancer surveillance and increased private health facility participation in registries is necessary to be able to understand relationships between cancer incidence and low-dose radiation exposure.
StartSmart™ Beta Testing: Acceptability, Feasibility and Refinement Analysis of an mHealth Screening Tool

Noel Metcalf
Preceptor: Bonnie Gance-Cleveland, PhD, RNC, PNP, FAAN
Site: CU College of Nursing, Aurora, Colorado and The University Nurse Midwives Faculty Practice, Anschutz Outpatient Pavilion, Aurora Colorado

Background: Pregnancy health risks such as substance use, chronic diseases, and mental health conditions are linked to poor perinatal outcomes. Evidence suggests that technology can facilitate clinical decision making and has the potential to improve healthy behaviors. This study evaluated the usability, accessibility and feasibility of StartSmart™, a pre-existing mobile health (mHealth) tool, in screening expectant women for known risk and protective factors to improve perinatal and maternal health outcomes.

Methods: This mixed methods study included interviews with expectant women (N=15), a provider survey (N=28) and patient risk profiles (N=19). Qualitative data were analyzed using a modified constant comparative method. Usability and acceptability were calculated as the proportion of positive comments/negative themes and suggestions for improvement. Using descriptive statistics, the proportion of new patients screened/total eligible patients, quantitative survey responses, and patient risk profiles were examined to establish feasibility.

Results: Usability and acceptability of StartSmart™ was ranked highly by expectant mothers and providers. The ratio of positive to negative comments was 3.5:1 and two of 30 question strings were identified as needing revision. Workflow challenges led to dissatisfaction for providers. Of 76 instances of patient risk, there were 11 high, 29 medium and 36 low.

Conclusions: StartSmart™ was viewed as acceptable, and usable by the majority of mothers and providers. Following minor revisions, future utilization of the tool is warranted. Integrating mHealth technology into prenatal care is likely to improve perinatal and maternal health outcomes and change delivery of care, especially in rural and developing areas of the world.
A Mixed Methods Evaluation of Community Health Worker Knowledge Retention After a Health Education Training in the Loreto Region Of Peru

MacKenzie Mixer
Preceptor: Shelby Kemper, PhD, PharmD
Site: CU Peru

**Background:** Villages in the Loreto region of the Amazon typically have little access to medical services and heavily rely on a minimally trained volunteer Community Health Workers (CHW). The purpose of this project was to measure the long-term knowledge gained from an educational training and explore factors trainees believe impact knowledge retention over time.

**Methods:** Knowledge retention in CHWs was measured by administering the same post-test used at the January 2018 training to 20 returning CHWs at the January 2019 training. To better understand the perceived efficacy of the current training process, two focus groups, each consisting of 10 CHWs, were conducted. The focus group transcripts were coded by two coders to establish intercoder reliability for qualitative data analysis.

**Results:** The 2019 post-test scores were equal to or higher 2018 post-test scores ($t=-7.33$, $df=18$, $p=.473$). The high 2019 score coupled with the non-significant t-test provides support that CHW’s are retaining knowledge from the trainings. While focus group participants expressed the training was appropriate, they identified the need to provide hands-on practice and discussion during training sessions, relevant topics that incorporate a mix of theory and application, a preference for native Spanish speaking trainers, and the need for lodging to be provided during the training.

**Conclusions:** CHW’s attending CU Peru’s trainings are retaining knowledge. This is the first evaluation of CU Peru and provides future direction for how to prepare and conduct trainings. This evaluation impacts other global educational trainings that use CHW’s by providing key elements and cultural considerations needed to foster learning and increase knowledge retention.

Madeleine Monroe
Preceptor: Dr. Heather Young
Site: Denver Health

Background: Research following the 2014 Ebola Outbreak revealed that inconsistent regulatory guidelines for personal protective equipment (PPE), specifically doffing procedures, could potentially put healthcare workers at risk of self-contamination. The purpose of this study was to evaluate the use of PPE and proper hand hygiene (HH) among healthcare workers at Denver Health.

Methods: We used a cross-sectional study design to determine the prevalence of proper PPE use and hand hygiene though personal observation of healthcare workers at Denver Health. Healthcare workers were observed twice a week for one month (N=105). Subsequently, a voluntary survey was administered via email to further assess adherence to protocols, training, issues with PPE, and perceptions of HH practices (N=349).

Results: Washing with soap and water accounted for only 34% of post-HH observations for Contact Plus (C+) rooms. The prevalence of not washing hands with soap and water following a C+ room was 0.83 times higher for doctors and doctor teams, and 0.87 times higher for other healthcare workers compared to nurses (95% CI: 0.50-1.37 and 0.47-1.59, respectively). The prevalence of incorrectly donning and doffing PPE was higher among physicians and other healthcare workers compared to nurses. Additionally, the survey identified various barriers to proper PPE and HH use (i.e. sink placement, empty soap dispenser).

Conclusions: This study established a baseline for the design and implementation of targeted interventions. Recommended target areas to improve PPE use and HH practices include: post-HH for C+ rooms, training on doffing procedures, and use of personal devices in patient rooms.
Impact of a Community-Based Childhood Obesity Intervention on Weight-Related Quality of Life

Jaime Moore, MD
Preceptor: Richard Boles, PhD
Site: University of Colorado School of Medicine, Dpt of Pediatrics, Section of Nutrition

Background: Weight-related quality of life (WRQOL) in youth reflects self and parental perceptions of daily functioning in relation to physical size. The purpose of this study was to determine whether participation in the Healthy Living Program (HeLP) was associated with a change in WRQOL among low income, predominantly Hispanic children age 2-18 in the Denver, Colorado metropolitan area.

Methods: Validated Sizing Me Up© (child-report) and Sizing Them Up© (parent-report) were used to measure WRQOL within HeLP, a 6-week (12 two-hour sessions), family-oriented weight management intervention delivered in community recreation centers. Intervention components included parenting skills, behavior change, nutrition, cooking, and fitness. Total and subdomain WRQOL scores were calculated at baseline and 6 weeks. Paired t-tests were used to determine statistically significant changes in WRQOL.

Results: Among participants with WRQOL data (n=348), mean age was 11, 71% had a parent whose preferred language was Spanish, and 37% were below the federal poverty level. Mean baseline total WRQOL score for Sizing Me Up was 69 (0-100) and increased 7.4 points at 6 weeks (p<0.0001), and for Sizing Them Up was 82 (0-100) and increased 1.3 points at 6 weeks (p=0.17). Youth also reported significant improvements in emotional, physical, and social avoidance subdomains (all p<0.01). Only the teasing/marginalization subdomain significantly improved by parent report (p=0.02).

Conclusions: Underrepresented youth who participated in a brief, but intense weight management intervention that emphasized practical knowledge, hands-on skill building, and positive peer interactions in a family-inclusive environment was associated with significant improvements in youth-reported WRQOL.
Kansas Foodborne Complaint Surveillance System Evaluation, Kansas, 2009-2017

Atisha Morrison, REHS
Preceptor: Rachel Jervis, MPH
Site: Colorado Department of Public Health and Environment

Background: In Kansas, the Department of Health and Environment (KDHE) and Department of Agriculture (KDA) investigate complaints and outbreaks of foodborne illnesses. A public-facing online survey, FoodSafetyKansas.org, was enacted in January 2017 to assist Kansans in reporting illness complaints. The project aimed to conduct a surveillance system evaluation for complaint data between 2009-2017 and assess the reduction of anonymous complaints due to FoodSafetyKansas.org.

Methods: Data sets included outbreaks 2015-2017 from KDHE, retail food establishments 2015-2017 from KDA, complaint database 2015-2017 from KDA (which includes the FoodSafetyKansas.org complaint data entered by KDHE), and a previously matched and merged outbreak and complaint dataset from 2009-2014 from KDHE. Statistical analysis consisted of Chi-Square, Mann Whitney test and multivariable logistic regression. SAS statistical software version 9.4 was utilized for descriptive and statistical analysis.

Results: Overall rates of complaints increased from 4.36 per 100,000 in 2009 to 12.56 in 2017. Rate of anonymous complaints per 100,000 declined significantly after survey implementation (3.88 vs. 1.34, p<0.0001). Adjusting for anonymity and year reported, rural population group had 1.90 higher odds of calling in a complaint versus reporting online (95% CI 1.25-2.89, p=0.003). Timeliness of outbreak detection pre and post survey decreased from 2 days to 1 day, however, was not statistically significant. (p=0.42).

Conclusions: FoodSafetyKansas.org added to the robustness of surveillance data by reducing the amount of anonymous complaints and giving investigators more data about potential illnesses. Challenges with the evaluation included dual data entry by KDHE and lack of ill person food histories in complaint data.
An Estimate of the Effect of Pharmacotherapy Adherence on Work Disability Incidence for Patients with Major Depressive Disorder

Joshua W. Morrison
Preceptor: Fraser W. Gaspar, PhD, MPH

BACKGROUND. Depression is the greatest contributor to worldwide disability. However, limited research exists on how pharmacotherapy influences future work disability for patients with major depressive disorder (MDD).

METHODS. Claims from two IBM® Watson™ MarketScan® databases were analyzed. Nearly 29,000 patients with a major depressive disorder diagnosis were identified in these databases. Antidepressant adherence after the MDD diagnosis was calculated using proportion of days covered (PDC) in the acute phase of treatment (114 days following diagnosis). Patients with a PDC greater than 80% were considered “adherent” to their pharmacotherapy. A doubly-robust inverse probability of treatment (IPT) weighted Cox proportional-hazards model was used to test the difference in incidence of work disability in the two years following MDD diagnosis by antidepressant treatment regimen.

RESULTS. About 57% of patients had no pharmacotherapy in the acute phase. Only 13% of all patients were adherent to their medication. IPT weighting successfully balanced all of the confounding variables we considered. Results from the IPT-weighted Cox proportional-hazards model suggest that adherent patients are 6% less likely to have a work disability leave in their follow-up time.

CONCLUSIONS. This analysis suggests that non-adherent patients were more likely to have a work disability leave in their follow-up time. Employers and clinicians should continue to promote the benefit of adherence to pharmacotherapy when antidepressant treatment is initiated.
Layers of Love: A Comprehensive Sexual Health Education Series for Disadvantaged Women in Denver

Meredith Morrison
Preceptor: Julie Kiehl, JD
Host site: The Empowerment Program (TEP)

Background: Women involved with the justice system are at a heightened risk for detrimental sexual health outcomes. TEP provides empowerment courses and resources for women who have been previously incarcerated. While current efforts at TEP aim to enhance women’s health, there is a need for a comprehensive sexual health education model.

Methods: Women (n=8) from TEP self-selected to participate in a four-course series that covered topics of self-care, intimate partner communication, sexual health, and body positivity. Each course was 90 minutes and occurred bi-weekly in January and February 2019. Constructs of knowledge, skills, and beliefs about sexual health were assessed with a perception of change matrix and free response questions; change was evaluated using a paired t-test. Each session evaluation included three to nine questions.

Results: Analysis of the evaluation demonstrated significant change (p>0.05) in all items assessed except three. The three items that did not show significant change were confidence in one's ability to: explain the differences between complaining and criticizing (t(4)=2.667, p=0.056), define “sex” as always including consent (t(6)=-1.686, p=0.143), and explain sexual consent (t(5)=-2.000, p= 0.102). The most common responses to “why did you take this course?” were “I want to learn more about the topic” (n=27), “the topic sounds interesting” (n=15).

Conclusion: Our findings suggest a comprehensive approach to sexual health education is beneficial for this population and there is a need for this kind of program. In the future, we recommend replicating the pilot and re-evaluating the program with a larger sample size.
Formative Evaluation of a Global Newborn Care Curriculum

Molly Moss
Preceptor: Susan Niermeyer, MD, MPH, FAAP
Sites: University of Colorado Anschutz Medical Campus, Aurora, Colorado and Muhimbili National Hospital, Dar-es-Salaam, Tanzania

Background: Globally, neonatal mortality accounts for 46% of under-five child mortality. The World Health Organization (WHO) has adopted and adapted an existing educational curriculum to become the new standard for Essential Newborn Care (ENC). This curriculum aims to decrease preventable neonatal deaths by increasing healthcare provider knowledge and practical skills.

Methods: Formative evaluation of WHO’s ENC included external review by subject matter experts (n=51), and a field-test with program end-users in Dar-es-Salaam, Tanzania (n=39). The external review survey collected expert feedback on course materials using Google Forms. 38 rating questions (10-point Likert scale) and 18 open-ended questions assessed acceptability of instructional methodology, scientific accuracy, and usability of training materials. The field-test participants’ knowledge was assessed with pre/post quizzes. Participants’ perceptions were assessed using course evaluations and focus group discussions.

Results: Survey results indicate a high level of program acceptability, with 80% of reviewers rating materials 7 or higher on every survey item. Coded qualitative responses yielded endorsements and constructive suggestions. In the field-test, pre/post quiz scores improved 8.5% (83.8% to 92.3%), which was statistically significant (p<0.0001). Early analyses of qualitative field-test data indicate high acceptability and usability for end-users. Participants provided recommendations for written materials, teaching methods, and implementation strategies.

Conclusion: Subject matter experts and field-test participants agree that the scope, methods, and content of the curriculum is acceptable for most global settings. The user-friendliness of materials and the participatory, simulation-based teaching methods were identified as strengths. Clarifying clinical decision-making processes will further strengthen this curriculum prior to global implementation.
A Case Study of the Colorado Medical-Legal Partnership at Children’s Hospital Colorado Using a Mixed Methods Approach for Quality Improvement

Bertha Moua
Preceptor: Susan Hallenberger
Site: Children’s Hospital Colorado

Background: The Colorado Medical-Legal Partnership (MLP) began at Children’s Hospital Colorado in 2009 and ended in 2013. It restarted in 2014 and transformed into the Guardianship Clinic. The MLPs original intent was to provide services to address multiple social determinants of children’s health and well-being. The purpose of this case study is to document the MLPs benefits and limitations to assist key players in re-implementing the program and to determine relevant barriers preventing Children’s from running a successful program.

Methods: A scope of the relevant literature identified MLPs best practices. Encounter data (2010-2014) was pulled from REDCap to understand what MLP program metrics were recorded. Psychosocial screener data (2015-2019) was extracted from EPIC to determine positive responses and patient needs. Guardianship Clinic data and attendance sheets were also pulled. Semi-structured interviews were conducted with key informants (n=5) to identify MLPs strengths, barriers, and opportunities.

Results: Successful MLPs have eight core components and two additional concepts to consider. The semi-structured interviews identified staffing, uncertainty, missing pieces, and program needs as key barriers. Encounter data characterized target population needs, yet data quality limitations (i.e., lack of consistent outcomes measurement) precluded estimating the correlation between need and outcomes. Program participation declined following funding constraints and lack of support.

Conclusions: The results suggest that in order to have a successful MLP when re-implementing the program, Children’s Hospital Colorado must address a mixture of the eight core components and strengthen relevant electronic data capture.
Approaches to Skin Cancer Prevention Among Coloradans Experiencing Homelessness

Jack Murphy
Preceptor: Robert Dellavalle, MD, PhD, MSPH
Preceptor Site: Colorado Cancer Coalition Skin Cancer Task Force

Background: The population of people experiencing homelessness carries a disproportionate burden of skin cancer. The Colorado Skin Cancer Task Force lacks any policies specifically aimed at reducing cancer in this population. The goal of this project was to develop evidence-based recommendations for expanding the Task Force’s Action Plan to adequately address this population.

Methods: In order to develop a basis for policy recommendations, a literature review was conducted. This review identified policy approaches geared toward skin cancer prevention in the homeless population, other effective health interventions in this population, and general skin cancer prevention. These findings were evaluated based on applicability to this specific policy aim, as well as quality and quantity of evidence available, to generate policy recommendations.

Results: A total of 37 relevant articles were identified. Interventions were broadly classed into categories of medical, educational, and provision of protective supplies. Medical interventions focused on conducting skin screenings at all points of contact. Educational interventions focused on teaching safer behaviors such as use of protective supplies as well as self-screening. Provision of protective supplies could be further divided into consumables such as sunscreen, and durable goods such as protective clothing.

Conclusions: Although education was effective in other populations, the homeless population was often difficult to reach, and studies indicated that the majority would use protective supplies if available. There appeared to be a desire for protective supplies, but limited access. Interventions to provide these, and in particular, durable goods which provide more long-term protection, should be prioritized.
Infusion Related Reactions in Multiple Sclerosis Patients Receiving Differing Premedication Before an Ocrelizumab Infusion

Monica Murray
Preceptor: Enrique Alvarez, MD PhD
Site: University of Colorado Hospital Aurora – Rocky Mountain Multiple Sclerosis Center

Background: Clinicians treating patients with Multiple Sclerosis (MS) aim to establish consistent treatment. Tolerability issues can lead to early discontinuation of treatment, resulting in increased risk of disease disability. The most commonly reported tolerability issues for patients receiving ocrelizumab are infusion-related reactions (IRRs). The objective of this study is to identify whether receiving differing premedication, used as prophylaxis, before receiving ocrelizumab have different risks for IRRs.

Methods: 320 patients with MS at the University of Colorado Hospital (UCH) were enrolled into this retrospective cohort study. A chart review was conducted to identify participants that where diagnosed with any form of MS, seen by the Rocky Mountain Multiple Sclerosis Clinic at UCH, and had received an ocrelizumab infusion between 2017 and 2019. Descriptive statistics were used to summarize the demographics of the population. Logistic regression modeling was employed to find the risk ratios.

Results: After excluding infusions with missing premedication data, 14.42% (n = 45) of the infusions reported an IRR. Premedication type, hydrocortisone versus methylprednisolone, was not a significant predictor of an IRR with a RR of 1.22 (95% CI: 0.73,2.05). After adjusting for age, disease duration, provider, diagnosis, sex, BMI, number of previous treatments and infusion number premedication type was still not a significant predictor of an IRR (adjRR=1.19; 95% CI 0.17, 2.01).

Conclusions: This study provides critical information on the most commonly reported adverse event of IRRs in patients receiving ocrelizumab. The type of premedication administered prior to an ocrelizumab infusion was not a predictor for an IRR.
Aurora Together: Community Collaboration to Address Health Inequities

Jimmy Naccaratto
Preceptor: Antonio Olmos, PhD
Site: Aurora Mental Health Center

Background: “Aurora Together,” a community coalition in Aurora, Colorado, received a multi-year grant to address health disparities. They are addressing poverty as a social determinant of health in specified immigrant and refugee populations. The purpose of this project is to assess the coalition through the Socio-Ecological Model to aid in informing long-term system change in accordance with the Colorado Office of Health Equity’s Health Disparities Grant Program’s requirements.

Methods: The project required retrospective analysis of the grant development process and review of all subsequent grant-related activities, including quarterly reports, evaluation plans, and data compiled through surveys distributed at community meetings. Literature reviews and additional demographic, economic, and public policy research was conducted to provide context and fill any gaps in knowledge.

Results: Data from a survey distributed at community meetings in 2018 showed that issues of culture, family, personal health, education and language, technology, transportation, knowledge of employment laws and rights, and high levels of stress are identified barriers to employment. As of April 2019, 327 unique persons attended at least one community meeting to learn about the grant program, and 70 unique persons have been connected to vocational services. Research found additional community connections and potential partnerships that can supplement the coalition’s efforts by providing services and resources to the immigrant and refugee populations served through the grant funding.

Conclusions: This project showed that the “Aurora Together” coalition is well-positioned within the Socio-Ecological framework to meet grant requirements and can effectively address barriers to employment within the designated communities.
Evaluating the Need for Maternal and Child Health Curricula for Public Health Professionals in Canada

Madeline Siggaard Nealis
Preceptor: Elizabeth Greenwell, ScD
Site: Colorado School of Public Health

Background: Master of Public Health (MPH) programs in Canada do not provide substantial curricula on maternal and child health (MCH) issues. Consequently, this creates a gap in necessary education and training for public health professionals. The purpose of this project was two-fold: to assess the need for MCH curricula in graduate public health programs across Canada and to provide recommendations for curriculum development.

Methods: We conducted nine semi-structured key informant interviews by telephone with Canadian public health professionals in July and August of 2018. The interviews queried participants on their overall public health education, training and professional experience. Participants were then asked about their opinions of MCH public health education and training in Canada. Interviews were analyzed for emerging themes using constant comparison analysis and data were triangulated with document review of syllabi across five public health programs.

Results: Three major themes emerged from the interviews: knowledge acquisition; competent care; and increasing opportunity for education and training. A corresponding document review revealed that MCH public health education and training at the graduate level is lacking at Canadian academic institutions.

Conclusions: Enhanced MCH education and training for public health professionals is required to provide sufficient capacity and capabilities to respond to emerging public health issues. This research demonstrates a need for dedicated MCH education and training in MPH programs in Canada. We recommend engaging the workforce in discussions surrounding public health curricula development, establishing standardized curricula development processes within academic institutions, and incorporating MCH content into public health curricula in Canada.
After-Care Counseling for Women Undergoing Pregnancy Termination – Quality Assessment Initiative

Melissa Nguyen
Preceptor: Aaron Lazorwitz, MD
Site: Comprehensive Women Health Center (CWHC)

Background: Patients undergoing dilation and curettage (D&C) procedures are counseled to abstain from sexual intercourse for 2 weeks post-procedure. This recommendation is based on expert opinion alone regarding potential increased infection risk. We set out to better understand patient adherence to these abstinence recommendations and patient attitudes towards this restriction.

Methods: We conducted a retrospective, cross-sectional phone survey of patients who underwent a surgical abortion at our academic, Family Planning clinic from 08/2018-01/2019. We surveyed participants on resumption of intercourse post-procedure, recall of after-care counseling, and attitudes regarding the 2-week abstinence recommendation. We abstracted demographic and pregnancy characteristics from patient chart.

Results: We surveyed 51 patients out of 219 contacted. All participants had undergone surgical abortion for non-medical indications with a median age of 28 years (range 17-43) and median gestational age of 7.6 weeks (range 5-21.4). Patients waited a median of 4.29 weeks (range 0.29-12.86) before resuming sexual intercourse. The vast majority of patients (94.1%) adhered to their abstinence counseling with 43% recalling infection risk as the reason to wait. No participant felt that waiting 2-weeks to resume sexual intercourse was restrictive and only 1 participant would have resumed sooner. Some participants expressed that waiting at least 2 weeks allowed them time to heal physically and emotionally unrelated to our counseling.

Conclusions: As over 99% of participants would wait at least 2 weeks to resume sexual intercourse regardless of our counseling, patients do not view this recommendation as restrictive and endorse personal wellness and health benefits with post-D&C abstinence.
The Association Between Vegetation Density and Property Crime in Two Distinct Colorado Counties

Lindsay Nichols
Preceptor: Kelsey Barton, MPH
Site: Colorado School of Public Health

**Background:** It is unclear if the rates of property crime increase in areas with dense vegetation. Some researchers argue natural surveillance exists with more vegetation, decreasing crime while others claim vegetation hides criminal acts, increasing crime. The objective of this study is to determine if the amount of vegetation in a given county has an influence on the rates of property crime.

**Methods:** Occurrences of property crime, classified in this study as: burglary, mischief, theft, trespassing, arson and property crime, in Boulder and Denver Counties were collected from the Colorado Open Records Request between 2014 and 2017. Normalized Difference Vegetation Index (NDVI) values, a quantitative measure of greenness, were obtained via USGS satellite imagery. The assessment included covariables of proportion non-white, population density, and median household income by census tract. Linear regression using STATA analyzed the comparison between NDVI and crime rates per county.

**Results:** When viewing total property crime between Boulder and Denver Counties, there is a negative correlation between vegetation density and crime statistics. The results demonstrate a correlation coefficient of -0.3 and a p-value of <0.001. Further research is needed to determine if these results translate when analyzing types of crime individually and with larger sample sizes.

**Conclusions:** Property crime occurs more frequently in locations that have more sparse vegetation. This information may be useful to land developers when deciding the amount of vegetation to plant in a developing neighborhood, and may sway communities with high rates of crime to reassess vegetation in existing neighborhoods.
Background: Environmental factors associated with global climate change have and will continue to exacerbate chronic health conditions in humans. These acute-on-chronic episodes lead to increased morbidity and mortality for chronically-ill patients. This study investigates the relationship between climate factors and acute exacerbations of chronic disease in a rural population in the San Luis Valley of Colorado.

Methods: This is a retrospective cohort study with a time-series analysis of climate factors (air quality, humidity, and temperature) and associated adult urgent care/emergency room visits (UC/ER) at healthcare facilities in Alamosa, Colorado. Individuals over 18 years, diagnosed with myocardial infarction (MI), stroke, exacerbation of chronic heart failure (CHF), or urolithiasis who visited these facilities from 2013-2017 were included. Linear models with cubic splines and general estimating equations were employed for analysis.

Results: 1311 patients presented to UC/ER for complaints including MI (388), stroke (270), CHF (653), and urolithiasis (927). Maximum daily temperature (MDT) was associated with a significant increased risk of MI (OR 1.01 per degree C, 95% CI: 1.00-1.02) and risk of urolithiasis (OR 1.01 per degree C, 95% CI: 1.01-1.02). Increased humidity was associated with an increased risk of urolithiasis (OR 1.08 per 10%, 95% CI: 1.01-1.15).

Conclusion: There is an increased risk of MI and urolithiasis with increasing MDT despite the mild mean temperature of the region. This may be indicative of relative heat extremes rather than absolute thresholds due to local acclimatization. Outcomes such as MI are of particular concern in a rural population with delayed access to care.
Bullying and Use of Electronic Cigarettes in the 2017 Healthy Kids Colorado Survey (HKCS) Cohort

Ngozi Obi, MBBS
Preceptor: Arnold Levinson, PhD
Site: University of Colorado Cancer Center

**Background:** Bullying is linked to adverse health outcomes, violence and risky behaviors in victims. Bullying could be experienced in-person or electronically. It affects 40-80% of school-age children in the United States, while 14.9% of middle and high school students in the 2017 HKCS reported electronic bullying. In 2017, the prevalence of current vaping among Colorado youth was 27%, more than double the national average of 13.2%. This study examined the association between being bullied and current vaping, the protective effect of access to adult support and its impact on susceptibility to vaping.

**Method:** A cross-sectional study using the 2017 HKCS (Module A) data (n=23,634), provided by the Community Epidemiology and Program Evaluation Group (CEPEG) in University of Colorado. HKCS is a biennial, survey of randomly selected middle and high school students in Colorado to obtain information on health determinants. Chi-squared tests and multivariable logistic regression were used for data analysis.

**Results:** The odds of being a current vaper among bullied students is 1.8 times that of students that were not bullied (95% CI:1.642, 1.955), but bullied females have a higher odds of current vaping (aOR=2.061, p<0.0001) compared to males (aOR=1.570, p<0.0001). Bullied students that know an adult in or out of school to talk to or to help them during a serious problem were less susceptible to vaping, OR=0.678 (CI:0.603, 0.762).

**Conclusion:** Bullied females have a higher odds of current vaping and susceptibility to vaping. Access to adult support for bullied students may lower current vaping and susceptibility to vaping.
Evaluation of Sun Protection Education using the Reveal Imager Photo-aging and the SPA Questionnaire (ESPERISQ)

Moses Ongalo
Preceptor: Dr. Robert Dellavalle
Site: Colorado Skin Cancer Task Force

**Background:** In 2015, the latest year for which incidence data are available, 80,442 new cases of Melanomas of the skin were reported in the U.S. In 2019, it’s estimated that there will be 1,830 new cases of Melanoma of the Skin in CO. We sought to show that viewing the UV facial photos will raise awareness of the impact of cumulative sun damage to the skin.

**Methods:** We conducted a longitudinal study on participants recruited at community events in Metropolitan Denver area from 05/2018-03/2019 under the banner of Colorado Skin Cancer Task Force. Informed consent was obtained prior to exposure to the UV-Reveal Camera followed by completion of Sun Protection Avoidance questionnaires. A baseline survey was completed followed by the capture of facial images and results interpreted. An immediate post-image survey was obtained and consent for 12-week follow up by email or phone call. McNemar’s test was used to compare tanning perception pre and post exposure to UV Reveal image.

**Results:** 322 participants were enrolled into the study. 81% of those surveyed immediately post being shown photo aged images of their face reported seeing the image influenced them to change their skin protection behavior. Perception on tanning was also compared pre and post exposure to the UV-Reveal camera.

**Conclusions:** As incidence rate of Melanoma of the skin is on the rise in CO, use of UV-Reveal Camera as a tool to enhance behavior change relative to sun exposure can be broadened to a larger population to effect behavior change.

Kaylee Ortega
Preceptor: April Hille, DNP, RN
Site: Jefferson County Public Health

Background: Adelante is a network of stakeholders seeking to increase the participation of Latinx communities in developing solutions for service delivery and cultural competency. Through a 90-day action plan, Adelante will support organizational cultural transformation, improving services for Latinx Spanish-speaking families. The purpose of this qualitative study was to identify the barriers experienced by Jefferson County community agencies implementing CLR practices and create recommendations for the 90-day action plan.

Methods: The researcher conducted one focus group with 16 participants and 11 key informant interviews (KII’s). Focus group data guided the development of interview questions designed to explore themes further. Questions focused on CLR emphasized understanding, perceived ability, organizational policies, and support and barriers in providing equitable services. Deductive and inductive coding methods were used to analyze the qualitative data. Themes from the focus group and KII’s were developed and triangulated.

Results: KII findings revealed barriers with phone interpreters, workforce diversity and isolated resources. Triangulation of the identified barriers with the focus group themes indicated a partial agreement. Overall, participants expressed a desire to learn about CLR, their knowledge gaps and its necessity to improve service delivery for Latinx Spanish-speaking families.

Conclusions: CLR implementation requires all levels of an organization to understand CLR and their vital role in providing equitable health services. Moving forward, Adelante should stipulate the pooling of resources and CLR knowledge across community organizations and a multidisciplinary approach to provide relevant and competent care. Lastly, CLR learning opportunities should be maintained throughout the length of employment.
Patient and System Predictors of Adherence to Turner Syndrome Cardiometabolic Screening Guidelines in a Tertiary Care Children’s Hospital

Brooke Palay
Preceptor: Shanlee Davis, MD, MSCS
Site: Children’s Hospital Colorado

**Background:** Turner syndrome (TS) is a genetic condition among females and is associated with cardiometabolic disease. Guidelines for routine cardiometabolic screenings exist (HbA1c and liver enzyme annually starting at age 10, at least one lipid panel and lifestyle counseling), however the uptake and impact of these screenings are unknown. This study aimed to determine 1) adherence of routine screenings in a tertiary hospital and identify patient and system factors associated with being screened and 2) if screenings lead to a change of care.

**Methods:** A chart review of 189 patients with TS >10 years seen at outpatient clinics in the past 5 years was performed to determine adherence to screening guidelines. Logistic regression was used to examine patient and system factors that predicted screening adherence. Screening adherence rates and proportion of screenings resulting in a change of care were calculated.

**Results:** Only 14% of girls received cardiometabolic screening per guidelines. Patient and system predictors of adherence to the guidelines included being seen since the most recent guidelines were published (OR= 5.11, 95%CI 1.47-17.78) and receipt of care in the TS multidisciplinary clinic (OR= 12.83, 95%CI 4.52-36.42); Non-Hispanic patients were less likely to be screened (OR= 0.29, 95%CI (0.12-0.68). Screening for diabetes resulted in a change of care in 9% of patients, liver function screening in 8%, and lipid screening in 24%.

**Conclusions:** The majority of girls with TS at a tertiary hospital have not been screened per the guidelines; however, screenings resulted in a change of care when implemented.
Program Evaluation of an Onsite Annual Physical Pilot Program at Denver Fire Department

Brandon Penix D.O.
Preceptor: Alisa Koval, MD, MPH, MHSA
Site: Denver Health

Background: Denver Fire Department (DFD) like many fire departments across the United States has a voluntary medical surveillance program. Despite the availability of a no-cost physical, participation has been less than 35% over the past three years. With rising cancer rates and cardiovascular events in the fire service, medical surveillance is paramount to early identification in this vulnerable occupational population. The purpose of this project is to establish a feasible model of delivery of an onsite format for conducting annual physicals of firefighters.

Methods: We conducted 120 NFPA 1582 compliant physicals onsite at a variety of DFD facilities as a pilot program to assess feasibility and provide a sample program in a large metropolitan fire department. We conducted a qualitative analysis of the logistics and cost considerations for Denver Health as well as the implications for the DFD. Following the physical, participants were provided an exit survey to determine participant satisfaction and future program development opportunities.

Results: 86% of participants reported an extremely good experience with the onsite physical program and 95% were extremely likely to tell a coworker about the program. Qualitative analysis of long-term feasibility demonstrated net profitability and low operating costs.

Conclusions: Long-term feasibility of an onsite model of delivery for an annual medical surveillance program at DFD was demonstrated. Logistical and cost considerations should be evaluated in other departments looking to establish better compliance within their fire departments. Ongoing evaluation of this partnership will continue as DFD seeks to become a leader in Firefighter Health Promotion.
Associated Factors in Emergency Hospital Services and Prescription Opioid Use: Modeling Using a Claims Database

Mario J Perez, MD
Preceptor: JK Costello, MD, MPH
Site: The Steadman Group, LLC.

**Background:** Prescription opioid (PO) abuse is a critical public health problem in Colorado. Claims data offer a wealth of information that could identify individuals at risk for hospitalization from PO abuse. The objective of this study is to describe any associations between PO use and utilization of emergency hospital services (EHS).

**Methods:** This retrospective cohort study uses deidentified claims data from members of Rocky Mountain Health Plans, which included 200 members with PO use and 200 members without from seven lines of business for a total of 2555 members. We compared individuals who utilized EHS for any reason in 2018 with individuals who did not, using multivariable regression to identify associations between independent PO use characteristics and EHS use.

**Results:** Over one-quarter (n=751, 29.4%) of participants visited the emergency room (ER) with the majority (n=452, 78.0%) indicating PO use (RR 1.69). Over one-tenth (n=282, 11.1%) of the participants had an acute inpatient admission (AIA) with the majority (n=180, 62.6%) indicating PO use (RR 1.96). In multivariable analyses, opioid risk score (ORS), number of opioid prescriptions and prescribers are associated with increased odds of visiting the ER (OR 1.41; 1.15; 1.39); number of PO prescribers and daily PO used are associated with increased odds of AIA (OR 1.18; 1.71).

**Conclusions:** These findings demonstrate that PO use and independent use characteristics are associated with EHS utilization. Given the observed associations, protocols could be implemented to identify and help individuals with these characteristics before they need to go to the hospital.
Changing Epidemiology of Shigellosis: Trends in Demographics and Hospitalization in Colorado

Katelyn Pruett
Preceptor: Elaine Scallan, PhD
Site: Colorado School of Public Health

Background: Shigellosis is a diarrheal disease causing an estimated 500,000 illnesses in the U.S. annually. While higher incidence rates have been documented in children, recent data suggest increased incidence in adult males and minority populations. We describe epidemiological trends of shigellosis in Colorado from 2009-2018.

Methods: Data on laboratory-confirmed Shigella infections were obtained from the Foodborne Diseases Active Surveillance Network (FoodNet). Crude incidence rates were calculated by year, sex, and age. A negative binomial regression was used to calculate relative risks by year, sex, and age. Associations between hospitalization and demographics were examined using a logistic regression model.

Results: From 2009-2018, 1395 cases of shigellosis were reported. The annual incidence increased from 3.73/100,000 in 2009 to 7.45/100,000 in 2018. This increase was more pronounced among adults, males, and non-Hispanic whites. The relative risk of shigellosis was 1.90 (95% CI: 1.33, 2.72) times higher in males compared with females. Overall, 22% of cases were hospitalized. The odds of hospitalization were higher among people infected with S. Flexneri (OR 2.62, 95% CI: 1.89, 3.64), Hispanics (OR: 1.60, 95% CI: 1.13, 2.26), non-Hispanic blacks (OR 1.95, 95% CI: 1.26, 3.61), and adults ≥30 years (OR 2.30, 95% CI: 1.41, 2.93).

Conclusions: Shigellosis incidence in Colorado has significantly increased over time and among adult males. These trends give insight into the distribution of shigellosis in Colorado and can direct prevention efforts.
Background: Despite the availability of effective treatment for over 60 years, tuberculosis (TB) has persisted as the leading infectious cause of death worldwide. Eradication of this disease is a goal of the WHO, CDC, and CDPHE. However, unlike active TB, latent tuberculosis infection (LTBI) has very little data around incidence, nor are there robust mechanisms to ensure treatment. Postpartum women are a particularly high risk group, as the mandatory period between delivery and treatment initiation increases the likelihood of being lost to follow-up.

Methods: We conducted a chart review of pregnant patients with positive TB tests from 2017-2018 to establish the baseline rate of treatment non-completion. We then developed a patient registry to track women through the antepartum and into the postpartum period. Two Care Navigators at Denver Health’s Lowry Family Health Center were trained on registry management and tools for patient outreach in the antepartum and postpartum periods.

Results: 100 patient charts were reviewed and showed a 39% failure rate in initiation of postpartum treatment. Since initiation of the patient navigator driven registry, 24 patients have been served, 5 are awaiting delivery and linkage to care, and none of the newly identified currently pregnant patients have been lost to follow-up.

Conclusions: This inquiry validated clinician suspicions that postpartum women are often lost to definitive LTBI follow-up treatment. We also demonstrated that patient navigators can be trained to manage the complexities of a LTBI patient registry. Future work should focus on expanding this intervention to the clinic population at large.
Motherhood in the Workplace: Examining Quality and Access to Lactation Rooms at the Children’s Hospital Colorado

Carolina Ramirez
Preceptor: Katie O’Connor, MPH
Site: Children’s Hospital Colorado

Background: Women who seek to breastfeed their child rely on a lactation support program and rooms provided by the hospital, but current service utilization is unknown. The purpose of this study was to assess behavior and attitudes toward a lactation support program among employees who currently, or plan to, breastfeed at the Children’s Hospital Colorado.

Methods: We administered an online employee wellness survey to hospital team members to assess knowledge and attitudes about lactation support resources across all Children’s Hospital Colorado sites. We included additional questions to measure expected and realized breastfeeding goals. Lastly, we compared individual responses for breastfeeding duration and thematically coded program feedback for all locations.

Results: A majority of survey respondents indicated that they are aware of program services and felt supported by their supervisor. Approximately 59% of respondents indicated that they were able to meet their breastfeeding goal, 30% were not able to meet their expectations, and only 10% exceeded their expectations for breastfeeding duration. Program feedback highlighted issues with lack of time, professionalism, stress, and health impacts.

Conclusions: The survey revealed an uneven distribution of support throughout the hospital and network of care sites. Clinical staff experienced difficulties such as finding time to pump and searching for an available lactation room while caring for patients. There is a need for improved peer support and a reduction in breastfeeding stigma in the workplace. Lastly, a standard of care for lactation rooms across the Children’s Hospital Colorado and the network of care sites should be developed.
Evaluation of Double Up Food Bucks Participating Farmers’ Markets in Colorado

Victoria Ramirez
Preceptor: Amy Nelms, MSW
Site: LiveWell Colorado

Background: The Supplemental Nutrition Assistance Program (SNAP) was designed to increase food security for low-income residents. While this program provides a service to reduce hunger, purchases may not always increase healthier food purchases. Double Up Food Bucks (DUFB) is a USDA grant-funded program that provides up to $20 per visit in nutrition incentives to SNAP recipients to purchase Colorado-grown produce at farmers’ markets and stores. Vouchers are given in a $1:$1 ratio for each SNAP dollar distributed. The aim of this project was to evaluate and assess opportunities to maximize the farmers’ market environment in order to increase redemption of DUFB.

Methods: This mixed methods evaluation includes data from three sources: 1) market manager surveys, that provide information about their organization, and the impact of LiveWell Colorado DUFB support (n=30); 2) customer surveys that measure participants’ fruit and vegetable consumption during the 2017 (n=212) and 2018 (n=218) farmers’ market season while participating in the DUFB program, behavior changes towards healthy food purchases, and how they learned of the program; 3) Financial reports from each market on DUFB distribution and redemption.

Results: Market managers reported that LiveWell Colorado provided effective support and training to run the DUFB program. DUFB program has resulted in customers reporting more fruit and vegetable consumption. Most markets redeem 80% of DUFB vouchers distributed.

Conclusion: The DUFB program addresses a component of nutrition by providing greater access to SNAP recipients. Increasing knowledge of DUFB may help increase participation and greater redemption of DUFB vouchers.
Background: Schistosomiasis causes liver fibrosis, anemia, and impairs child growth and development. It has reemerged and persists in some areas throughout China. Many studies have hypothesized bovines are driving human infection, so if an association exists, reduction in bovine schistosomiasis would decrease human infection. Currently, we do not know much about bovine infection.

Methods: We conducted a retrospective cohort study of 866 bovines in Sichuan, China. We performed a univariate analysis to describe bovine mobility and did a chi-squared analysis on categorical variables to estimate risk ratios. We then used a multivariable logistic regression analysis to estimate odds ratios, then performed the same analysis adjusting for year.

Results: The bovine mobility survey results showed us that bovines are typically confined to their owner’s land (93%) and do not move between different groups or villages. However, the majority of bovines wander every day (80%). After adjusting for year, we found a strong protective association between households that get water from a pond or irrigation ditch for bovine infection (OR, 0.60 (0.37,0.97)) and a strong association between a household planting corn with a higher odds of bovine infection (OR, 2.59 (1.21,5.57).

Conclusions: Households that planted corn has a statistically significant higher odds of having an infected bovine than households that did not plant corn. Households that get water from a pond or irrigation ditch had a strong protective factor against bovine infection.
Community Provider Training and Support for Early Diagnosis of Autism Spectrum Disorders

Dannah Raz, MD
Preceptor: Ann Reynolds, MD
Site: Children’s Hospital Colorado

Background: There is a need for early diagnosis of autism spectrum disorders (ASD), however, specialists cannot keep up with the need. Our goal is to improve comfort level in the healthcare community in making ASD diagnoses in young children from underserved populations using the Screening Tool for Autism in Toddlers and Young Children (STAT).

Methods: We identified 14 healthcare providers in Colorado who were interested in participating in an ASD conference on November 16, 2018 and STAT online training. The STAT is a second line screening tool for ASD. A survey was administered via SurveyMonkey to gauge comfort level of diagnosing and managing a patient with ASD. Each provider received a pre-training survey prior to the conference and two post-training surveys (1 and 4 months). Results were analyzed using descriptive statistics.

Results: Fourteen providers participated in the pre-training survey and 7 in both post training surveys. About 70% of providers had used the STAT four months after training. Providers demonstrated variability in comfort level making an ASD diagnosis after training, despite increasing comfort in discussing the diagnosis with families. There were only minimal increases in rates of diagnosis of ASD after training.

Conclusions: This study shows that there continues to be a need to train community practice providers in the screening, diagnosis, and management of children with ASD. Families of children with ASD should be able to look to their primary care providers as a medical home for their child.
Denver Tech Center Pulmonary Outpatient Clinic Expansion

Austin Reed
Preceptor: Matthew Dyer
Site: Critical Care Pulmonary Sleep Associates

**Background:** Expanding the access of services is a complicated process that involves a variety of risks. An organization must understand the market it is entering, be realistic in the projections of patient volume, and prepare for both best- and worst-case scenarios. These factors are impacted by competitors in the area, changing costs, and the demand for the services.

**Methods:** Starting with historical data from the four established pulmonary clinics, using charge per visit, expected number of patients per physician, cost of supplies, renovation and staff we created a budget broken down by month for the first year. A breakeven analysis was completed using different projections to create a best- and worst-case scenario. A market analysis was also completed to identify competitors.

**Results:** To recoup the costs of opening the new clinic it will require 35 patient visits/day at the average charge of $194/visit. After the one-time costs are paid the clinic could cover its operating cost with only 25 patients per day. In the best-case scenario the clinic can average 48 patients/day reaching a gross margin of 50.5% and nearly $93,000 in profits per month. The worst-case scenario is 20 patients/day producing a deficit of over $100,000 per month.

**Conclusions:** The results of this business plan will provide the organization with crucial information for the decision of opening a new clinic. The business plan projects profitability within the first year, in addition to the organizations financial stability and prior success opening clinics it shows the benefits outweigh the risks.
Identifying Predictors of Anemia and Evaluating Treatment Outcomes in Children aged 0-5 in the Trifinio Region of Southwest Guatemala

Gabriela Reyes  
Preceptor: Molly Lamb, PhD  
Site: Center for Global Health

**Background:** Anemia is a condition characterized by a lack of red blood cells and hemoglobin. Iron deficiency is the most common cause of anemia globally, and disproportionately impacts children under six. The purpose of this project was to conduct a secondary data analysis to identify predictors of anemia and evaluate treatment outcomes in children aged 0-5 in the Trifinio region of Southwest Guatemala.

**Methods:** The researcher performed a secondary data analysis of two retrospective cohort studies. The target population included children under six with hematocrit test results between August 2018- March 2019. The researcher examined child age, gender, maternal age at childbirth, urban and rural communities, chronic malnutrition, and acute malnutrition in association with mild, moderate, or severe anemia. Descriptive statistics were used to evaluate treatment and follow-up outcomes.

**Results:** Covariates of interest were tested for independent significance. Acute malnutrition was a statistically significant risk factor of anemia (P-value: 0.0148; 95% CI: 0.11- 0.98). After adjusting for gender and child age, acute malnutrition was still a statistically significant risk factor of anemia (P-value: 0.0213; 95% CI: 0.08-0.99). Among children diagnosed with anemia, 100% were given treatment. Among children who needed a follow-up, 22% had a follow-up. Among children who had a follow-up, 17% were still anemic.

**Conclusions:** The study found evidence that acute malnutrition is a risk factor of anemia among the target population. The evaluation of treatment outcomes showed that all children were given treatment after anemia diagnosis, but there was a low follow-up rate among these children.
Nourished Futures: Leveraging the Role of Children’s Hospital Colorado as an Anchor Institution in Promoting a Sustainable Food Landscape

Elle Rich
Preceptor: Katherine O’Connor, MPH
Site: Children’s Hospital Colorado

Background: Access to nutritious, affordable food is a health equity issue that plays a critical role in the effective treatment and prevention of diet-related health outcomes. The anchor institute model leverages the role of healthcare to address place-based social, economic, and environmental barriers to food access while promoting environmental stewardship. The purpose of this environmental scan was to develop an integrated framework that utilizes the anchor institute model to increase food security for low-income patients and families while simultaneously promoting sustainable food systems development within Children’s Hospital Colorado (CHC).

Methods: The researcher conducted a literature review of sustainable food practices in healthcare, in addition to internal document review of CHC strategic food policies, proposals, and community health assessments. Twelve semi-structured interviews were conducted with CHC staff and healthcare professionals, anchor institute experts, and members of the Colorado Food Policy Network. Field work included participation at the 2018 Pike’s Peak Food Shed Forum and shadowing a clinical nutritionist at the CHC Lifestyle Medicine Clinic.

Results: A strategic framework was created to address: a) food access for low-income patients and families; b) improvement of diet quality; and c) the advancement of a sustainable food system.

Conclusions: The project galvanized efforts to advance healthy food access through multisectoral collaboration on behalf of Children’s Hospital Colorado and the Colorado Food Policy Network (COFPN). Recommendations for framework implementation include building trust and capacity for collective decision-making within the COFPN Food and Health Collaborative working group; incorporating community voices; and developing a collective impact model.
Improving Developmental Screening and Referral for Non-English Non-Spanish Speaking/Refugee Children

Joy Richards, RN, BSN
Preceptor: Kristine Rodrigues MD, MPH
Site: Denver Health Medical Center

Background: In the United States, refugees with limited English proficiency have lower rates of developmental screening for their children and therefore lower rates of assistance from early intervention services (EIS). Culturally and linguistically competent navigators working with the refugee family may lessen the disparities of this population. We are evaluating the effect of Non-English Non-Spanish Speaking (NENS) focused patient navigators on developmental screening, referral, and EIS for NENS Children.

Methods: A retrospective cohort study was performed at Denver Health Medical Center. Participants included 808 NENS children ages 8-48 months who attended well child visits from 4/1/2018 to 12/31/2018. A chart review was implemented to identify three outcome measures related to assistance from patient navigators: (1) a developmental screening ever, (2) referral to EIS, and (3) receipt of EIS.

Results: After adjusting for age and language the odds of an ASQ completed was 9.08 times higher for NENS refugee children who got assistance from a navigator compared to NENS children who did not get assistance. Both Referral to EIS and Receipt of EIS were found to have small sample sizes and lacked power to meet significance. Refugee families, if offered help by a navigator, 95% had an ASQ completed, if not offered help during this time frame, only 66% had an ASQ completed. Navigators also assisted or offered assistance to 86.7% of patients one time and 13.3% two or more times.

Conclusions: Culturally sensitive patient navigators increase the likelihood that NENS children will receive at least one developmental screening test.
Early Perspectives on Social Determinants of Health Screening and Referral Implementation

Kaitlin Delaney Roach
Preceptor: Cheryl Kelly, PhD,MPH
Site: Kaiser Permanente Colorado, PiER Center

**Background:** Seven grantees were funded through the Cancer, Cardiovascular Disease, and Chronic Pulmonary Disease Grants Program at the Colorado Department of Public Health and Environment to provide programs to reduce the prevalence of cardiovascular disease. The grantees also implemented processes to screen participants for social determinants of health and refer them to social services. The purpose of this study was to assess grantees’ perspectives on the planning and implementation of the new social determinants of health screening and referral process.

**Methods:** The research team conducted qualitative, semi-structured, 1-hour interviews with individuals at each of the seven grantee agencies and analyzed using inductive thematic analysis. Questions focused on the implementation process, facilitators and barriers to implementation, and the impact of implementation on organizations, partners, and participants.

**Results:** Grantees shared that while leadership support, dedicated staff, and existing partnerships support implementation, limited referral resources, participant resistance, internal capacity, and lost class time are barriers to implementation. Programs are working to develop strategies to overcome barriers and ensure that program fidelity and service delivery are not compromised.

**Conclusions:** This study suggests that programs need significant time and resources to develop implementation strategies, ensure staff time and financial resources are available. Prior to implementing a screening and referral process, funders should provide sufficient time for referral partner establishment, assessment of internal capacity, and recognition of contextual factors related to the setting and population served. Funders can support grantee success through clearly communicating required screening and referral components as well as opportunities for site-level adjustments.
Improving Health Equity in Colorado: A Case Study Examining Multiple Organizations’ Approaches to Increasing Access to Health Care Services

Arianna Roberts, MS
Preceptor: Benjamin L. Bynum, MD, MPH, MBA
Sites: The Colorado Health Foundation & Colorado School of Public Health

**Background:** Systemic barriers impact the ability of low-income populations to access quality healthcare. The Colorado Health Foundation, Mind Springs Health, and Every Child Pediatrics are three local organizations that are working to eliminate these inequities, and thereby improve health equity for populations utilizing Colorado’s Safety Net services across the state. The objective of this research is to examine how the organizations are working to improve access to healthcare services by studying their current strategic approaches and recent initiatives.

**Methods:** Primary data from key informant interviews was triangulated with secondary data from documents, media and peer-reviewed literature. The “Rapid Identification of Themes from Audio Recordings” method was used to code the interviews for relevant themes identified by both inductive and deductive approaches. Lastly, member-checking was conducted by sharing the findings with key informants and asking them for feedback and agreement.

**Results:** The results reveal that the organizations share a common “upstream approach,” which focuses on increasing access to healthcare services by addressing social determinants of health. Furthermore, they share a common perception that collaborative strategies with communities and partners create more effective solutions. Lastly, they share persistent goals to reduce barriers, create novel care models, and use technology innovations to improve patient care.

**Conclusions:** This case study explores strategies local organizations are using to increase access to healthcare services and improve health equity for low-income populations in Colorado. Many shared approaches and initiatives were identified, and public health practitioners can use these learnings to inform priorities for future programs and policies.
**Educate and Inoculate: How Inoculation Theory in Health Communication Can Build Stalwart Support for Tobacco Price Increases**

Thomas Rotering  
Preceptor: Arnold Levinson, PhD, MJ  
Site: Community Epidemiology and Program Evaluation Group

**Background:** A 2016 Colorado ballot initiative to increase tobacco taxes, initially popular among polled voters, was defeated when tobacco-funded counter-campaigns presented unrelated arguments that undermined voters’ held beliefs. A communication technique called Inoculation Theory (IT) has been studied as an effective way to protect held beliefs, but no research has applied IT in the context of tobacco price increases. This study evaluated the theoretical utilization of Inoculation Theory in Colorado tobacco tax advocacy.

**Methods:** We conducted in-depth, semi-structured interviews with a snowball sample of five IT experts in March 2019. Through emailed survey, we gathered seminal literature from these communication experts to produce domains related to IT and/or tobacco and iteratively refined this summary throughout the interview process. The IT experts were asked to evaluate IT domains and message crafting dynamics. We then triangulated interview data with academic research to produce a guide for how Inoculation can be used in this context and what challenges exist in its use.

**Results:** Inoculation can confer long-lasting resistance to future counter-campaigns through motivational threat and counterarguing. Interviewees enthusiastically endorsed delivering Inoculation messages preemptively in the context of tobacco price increase policies. Interviewees recommended attacking the sources of misinformation, harnessing perceived threats to freedom, and testing messages before delivery.

**Conclusions:** Given the robust evidence base supporting this strategy, we recommend that Inoculation Theory play an elevated role in Colorado tobacco policy education. Further research should evaluate the capacity of public health coalitions to field specific messages and their reception by constituents.
Investigation of Variants in Vitamin D Pathway Genes (*VDR, CYP24A1, CYP2R1, GC, and DHCR7/NADSYN1*) and Rheumatoid Arthritis-Related Autoimmunity

Craig Rothfuss  
Preceptor: Jill Norris, PhD  
Site: Anschutz

**Background:** Rheumatoid arthritis (RA) is an autoimmune disease characterized by the presence of RA-related autoantibodies prior to the development of clinical disease. Vitamin D may be a candidate protective factor for RA as it has been associated with other autoimmune diseases. Identifying genetic factors related to vitamin D that are associated with the development of RA-related autoimmunity may provide evidence that vitamin D is involved in the early etiology of RA.

**Methods:** The study population was derived from the Studies of the Etiology of RA, a prospective study of 1776 unaffected first-degree relatives of RA probands who are being followed for the appearance of RA-related autoimmunity, defined as the presence of either CCP or RF autoantibodies in the blood. In a case-control study of 192 cases and 184 controls, we examined associations between 39 single nucleotide polymorphisms (SNPs) in vitamin D genes and presence of RA-related autoimmunity. Using logistic regression, we adjusted for age and sex, while treating the number of SNP minor alleles as a continuous variable.

**Results:** The presence of minor alleles in CYP24A1_rs1570669 (OR: 0.70 CI:0.51, 0.96) and CYP2R1_rs7129781 (OR: 2.33, CI: 1.23, 4.42), was significantly associated with RA-related autoimmunity. Reported vitamin D supplement use modified the association between RA-related autoimmunity and CYP27A1_rs11677711 (pinteraction=0.027), GC_rs222016 (pinteraction=0.049) and NADSYN_rs3829251 (pinteraction=0.04).

**Conclusions:** SNPs in vitamin D genes CYP24A1, CYP2R1, CYP27A1, GC and NADSYN are associated with RA-related autoimmunity, suggesting that vitamin D should be explored as a potential factor in the prevention of RA.
Improving Health Promotion and Protection Strategies in Western Miners

Dymond Ruybal
Preceptors: Cecile Rose, MD, MPH, Bibi Gottschall, MD, MSPH, Lauren Zell-Baran, MPH
Site: National Jewish Health

Background: Miners are at risk for cardiorespiratory diseases (including pneumoconiosis, cancer, heart attack, stroke) due to workplace exposure to dusts and noise. Additional risk factors include smoking, age, gender, obesity, blood pressure, diet, and physical inactivity. This study evaluates the prevalence of abnormalities associated with adverse cardiorespiratory health outcomes in miners to identify opportunities for health promotion/protection.

Methods: With institutional review board approval and informed consent, we analyzed cross-sectional data from 1815 Western miners for prevalence of 6 risk factors (blood pressure >130/80, smoking, body mass index (BMI) > 25, age > 60, lung obstruction, hearing loss) associated with cardiorespiratory disease. We compared these risk factors in a subset of miners to Colorado males from 2017 Behavioral Risk Factors Surveillance System data (both age > 60) and assessed differences via Chi-square, ANOVA and Cochran-Mantel-Haenszel tests using SAS v9.4.

Results: Miners were predominantly male (95%), with mean age 63 (57% > age 60). Mean mining tenure was 20 years, 54% were coal miners, and 61% worked underground. Miners had higher prevalences of elevated blood pressure and overweight/obese BMI ($p \leq 0.001$ for both) compared to the Colorado population. Miners were less likely to smoke ($p \leq 0.001$), probably because 23% were Navajo (a population with low smoking rates). No difference was observed between lung obstruction prevalences, however miners had higher rates of hearing loss ($p \leq 0.001$).

Conclusion: Health promotion for miners should focus on blood pressure and weight loss, and health protection on hearing conservation. Lung cancer screening and smoking cessation should focus on underground miners with exposure to silica/radon who are current/former smokers.
Determining Effectiveness of Workplace Wellness Programs at Denver Health Using Leave of Absence (LOA) Data

Pamela Salapong  
Preceptor: Tracy Shea, MS  
Site: Denver Health

**Background:** Workplace health and safety programs can be beneficial to addressing employee health conditions. Yet, there has been no analysis of Denver Health Leave of Absence (LOA) data and Denver Health wellness programs since the implementation in 2015. This study aimed to assess LOA data to measure effectiveness of Denver Health wellness programs.

**Methods:** Denver Health LOA data from 2014-2018 was obtained for the 7,200 Denver Health employees. This analysis included: reason for leave, duration of leave, and health condition. The data was categorized into two time points, pre and post wellness program implementation. Trends in diagnosed health conditions were compared between the two time points to determine if the programs improved employee health conditions.

**Results:** The LOA analysis demonstrated that the number of employee health conditions had rose over the four years, from 386 in 2014 to 447 in 2018. The duration of LOA rose from 29,865 days to 64,331 days (x_{pre} = 2.59 # days/employee, SD=0.13; x_{post} = 3.06 # days/employee, SD=.07 p=.012). Paramedics, Environmental Services, and Med/Surg had consistently high numbers of LOA, with the main diagnoses as musculoskeletal disorders, surgery, and illnesses.

**Conclusions:** Trends in the data showed a decrease in the duration of leave, which was statistically significant. This analysis also provided insight on the top health conditions causing an absence from work. Tailored workplace wellness programs addressing these health conditions can improve employee health and wellness. Annual analysis of LOA data can serve as a reliable indicator of the effectiveness and impact of implemented workplace wellness programs.
Background: Depression is one of the most common mental illnesses, and leading cause of disability and premature death in the United States. This study utilized data from electronic health records to explore trends of depression in Denver County between 2015-2017 and the overall prevalence of the disease.

Methods: Aggregated data from healthcare facilities participating in the Colorado Health Observation Regional Data Service (CHORDS) were utilized. Denver County adults with a healthcare encounter between January 1, 2015 and December 31, 2017, were included. Persons with diagnosed depression were identified using International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9 CM) and Tenth Revision (ICD-10 CM) codes. Trends from 2015-2017 by select demographic variables and geographic locations were analyzed. Depression prevalence maps were overlaid with mental health partners using ArcGIS.

Results: Between 2015-2017 diagnosed depression among those seeking care decreased by 5.1% (11.7% to 11.1%). Lower prevalence was seen in northeast Denver and there was variability in the locations of mental health partners. Prevalence of depression was highest among adults aged 45 and older, females, and non-Hispanic American Indian/Alaska Native.

Conclusion: Overall, depression has decreased in Denver yet still affects adults across all demographic characteristics and geographic locations. Mental health partners need to continue serving all individuals with depression, but services should be expanded across Denver to ensure all residents have access to care.
Optimizing Family Engagement in Pediatric Research

Alissa L. Scharpen
Preceptor: Christopher J. Stille, MD, MPH
Site: ACCORDS

Background: Patient and family stakeholder engaged research has been steadily increasing as a common practice across many research settings since the passage of the Affordable Care Act in 2010. However, the progression of clear standards, protocols, and measures for engagement have not evolved at the same rate. This study seeks to examine the domains of meaningful engagement in order to focus on the characteristics that result in satisfaction and sustainability.

Methods: A cross-sectional survey using a REDCap questionnaire was designed and distributed over listserv and email. Invitations were sent to 300 pediatric principal investigators and family stakeholder partners from three national pediatric research networks. Data were analyzed for descriptive patterns, and associations between engagement processes and partnership outcomes were examined using Excel and SPSS.

Results: 36 total respondents (11 family partners and 25 investigators) completed questionnaires. We examined domains of engagement for association to satisfaction and agreement with a Pearson’s Chi-squared test. Potentially significant findings included training for family partners (p=0.056), and integration of family partners on to at least ¾ of project phases (p=0.166). Satisfaction with the experience was significantly associated with perceived sustainability of the research partnership (p=0.048 for family partners, and p=0.005 for investigators).

Conclusions: Sustainability of research partnerships and partner satisfaction between parents and pediatric investigators are closely associated, suggesting a need to track this as strategies for patient and family engaged research continue to develop. Future studies will need to be done to explore characteristics of meaningful engagement and its relation to satisfaction.
Don’t Go Breaking My Heart:  
Training Health Professionals on Self-Measured Blood Pressure,  
An Evidenced-Based Intervention for Cardiovascular Disease

Kaysie Schmidt  
Preceptor: Kim Grimsley, MA  
Site: Otero Junior College

**Background:** Otero Junior College (OJC) trains a health professions workforce to meet the needs of tomorrow’s health care system, including addressing the most pressing health problem in the US and Colorado: cardiovascular disease. The purpose of this project was to create a curriculum to train health profession students in the Colorado Community College System (CCCS) on self-measured blood pressure (SMBP), an evidence-based intervention for cardiovascular disease.

**Methods:** The training curriculum was crafted through four phases of curriculum development: planning, content and methods, implementation, and evaluation and reporting. In 2018-2019, a steering committee was formed to define the issue and to assess, analyze, and prioritize the needs. Also, research of current best practices in SMBP, existing training resources, and guidance from the American Heart Association and the Colorado Department of Public Health and Environment guided the curriculum development.

**Results:** Research and collaboration with partners resulted in a comprehensive curriculum that incorporates: specified intended outcomes or educational objectives, content (including scope and sequence), and learning experiences (activities). Once produced, the curriculum product was tested and revised. Training for faculty ensured consistent delivery of curriculum when implemented with students at OJC.

**Conclusions:** This project resulted in OJC having a curriculum and a set of course learning outcomes from which to develop evaluation strategies. This curriculum will help OJC to train a health professions workforce on SMBP for future internships and employment. Furthermore, once adopted by OJC and approved by CCCS, any of CCCS’s thirteen colleges can utilize the curriculum to train health students.
Background: In the United States there is a disparity in health outcomes between people of color and their white counterparts. Minorities tend to have higher incidence of chronic disease, worse follow-up, more advanced stage of disease, lower life expectancy and higher incidence of infant mortality. These factors are due to multiple complex issues. Among them are experiences of racism in health care, mistrust of health care and lack of communication between patients and providers.

Project Description: Through 2040 Partners for Health and their C-STAHR program this project addresses some of the misunderstandings that occur in a health care setting and offers communication tools that patients and providers can use to improve health outcomes. This information is delivered via audio narration in videos on the YouTube website, available to the general public for educational purposes.

Methods: This project uses previously collected accounts of experiences from people of color and discusses the patient perspective. A single coder, grounded theory method was used to evaluate qualitative data. Factors like standard of care, as assessed by physicians and medical students was used to assess quality of care in addition to outcome and emotional experience of the patient. Codes and themes were used as the basis for the scripts and background illustrations.

Conclusions: This serves to increase public awareness of bias in medicine and methods to protect themselves from its consequences. This also was an opportunity to expand medical education to compliment the knowledge gained in medical school.
Evaluation of Self-Reported Substance Use by Expecting Mothers Participating in the Nurse Family Partnership

Colleen Sherry
Preceptor: Dr. Bill Thorland, PhD
Site: Nurse Family Partnership

**Background:** The Nurse Family Partnership (NFP) is a national evidence-based program which pairs nurses with low-income first time mothers to improve health outcomes of the baby and increase stability and success for the new family. The purpose of this study is to analyze the self-reported substance use trends of women participating in the NFP.

**Methods:** The 136,000 case dataset was provided by the NFP and encompassed demographic and substance use information from participants residing across the US. All substance use data was self-reported during pregnancy at intake and 36 weeks, as well as 12 months after birth. Various bivariate analyses were performed using SPSS on the aggregate dataset. Maps were created using GIS.

**Results:** There is a statistically significant difference in self-reported substance use between timepoints for alcohol, tobacco, and cannabis (p-value<0.05). Age, ethnicity/race, region, and education were observed to have an association with substance use at intake and 36 weeks (p-value<0.05). California, Colorado, Washington, and Nevada have legalized recreational cannabis and had a significant increase in the proportion of mothers who reported using cannabis after legalization (p-value<0.05). When examining the impact of age on substance use, it is apparent age alone cannot predict e-cigarette or cannabis use. After comparing 2017 tobacco use rates to national data, there were significant changes between the two time points (p-value<0.05).

**Conclusions:** Statistically significant results pertaining to demographics and political events demonstrate that there are important trends of substance use of NFP clients. It should serve as a basis for future evaluations and programs.
**Background:** Latent Tuberculosis Infection (LTBI) treatment is a crucial component of tuberculosis (TB) control. Refugees have a higher prevalence of LTBI and are at a higher risk of TB reactivation. This study will determine the prevalence of LTBI among refugees treated at Colorado Refugee Wellness Center (CoRWC) and treatment compliance.

**Methodology:** A Retrospective cohort study of 2241 refugees screened at CoRWC from 4/1/2016-4/1/2018, and 303 were diagnosed with LTBI. A positive Quantiferon assay or Tuberculin Skin Test was used to identify LTBI cases, and treatment was provided at Denver Health TB Clinic. Data analysis was done using T-test, Chi-squared test, univariate descriptive statistics with frequencies and multivariate logistic regression.

**Results:** The overall prevalence of LTBI was 13.5%, the highest proportion of cases was among refugees from Asia (48%). Of the 303 refugees with LTBI who were offered treatment, 267 (88%) initiated LTBI treatment. Sub-Saharan Africa and Asian refugees were less likely to initiate therapy than refugees from the Middle East. Among those who initiated therapy, 170 (65%) completed treatment. Refugees from Sub-Saharan African had the highest completion rate (46%) (n=78). Smokers were less likely to complete therapy (P< 0.032). There was no significant association health navigator outreach and completion of LTBI treatment at CoRWC (OR 0.8; P<0.3946).

**Conclusion:** Despite massive screening protocols, initiation and completion rates for LTBI treatment were suboptimal and varied by birth region. Treatment is essential for global TB control, and thus refugees with LTBI who do not complete treatment contribute to the preservation of Tuberculosis reservoir.
Background: Centers for Medicare and Medicaid services (CMS) have implemented measures to assess hospitals’ quality of care, which impact Medicare reimbursement rates. One measure is the Hospital Consumer Assessment of Healthcare Providers and Systems, or HCAHPS, survey, a national survey sent to a random sample of patients to assess hospital experience. This study examines which patient-level and hospital-level factors are associated with top box HCAHPS scores across University of Colorado Hospitals.

Methods: We took patient-level variables from the patient health record and hospital-level variables from data provided by UC hospitals and linked them to HCAHPS scores to determine if there was a significant association between these variables and top box HCAHPS scores across UC hospitals, using multi-variable logistic regression modeling.

Results: Three outcomes derived from the HCAHPS survey were modeled: nurse composite, doctor composite, and hospital score. After adjusting for patient mix adjustment factors outlined by CMS, certain patient-level variables were found to be significant. For doctor composite and hospital score, two variables found to be significant were length of time in ER and number of unique physicians caring for patient. For nurse composite, receiving opioid medication and number of unique physicians caring for patient were both found to be significant. No hospital-level predictors were found to be significant for our outcomes.

Conclusions: These results indicate that there are certain patient-level factors that are associated with patient experience in hospital settings. Examining these patient-level factors might be useful in informing ways to improve hospitals’ quality of care to patients.
Cluster Analysis of Cannabinoids and Terpenes as a Classification Method for Cannabis Varietals in Colorado

Chelsey Thibodeaux
Preceptor: Greg Kinney, PhD, MPH
Site: PhytaTech Labs

**Background:** Recent legalization of Cannabis in many states has opened the door for research, including Epidemiological studies on exposure and health outcomes. However, such studies are hampered by a lack of taxonomic status, and the current subclasses of Cannabis (Sativa, Indica and Ruderalis) are highly debated. It is well that THC is the principal psychoactive component in Cannabis, but recent research provides evidence for at least 90 other active constituents including cannabinoids such as CBD and terpenes such as Limonene. Each active compound of Cannabis can be present in different quantities depending on the varietal.

**Methods:** Colorado State law mandates that each plant sold be tested for Cannabinoid and Terpene content in a state licensed lab. Cannabinoids and Terpenes are tested using High Performance Liquid Chromatography (HPLC). K-menas Cluster Analysis was conducted using SAS version 9.4 on a dataset (N=722) based on concentration of four Terpenes (Humulene, Myrcene, Alpha Pinene, Beta Caryophyllene) and five Cannabinoids (CBGA, CBNA, CBCA, CBDA, THCA).

**Results:** Cluster analysis of a cleaned data set of 722 unique samples showed a significant distinction between plants based on phytochemical profile, whereby four distinct clusters formed. Moreover, potency trends revealed a breeding selection for Cannabis Varietals high in Myrcene and Beta Caryophyllene, over the terpenes alpha_pinene and Humulene.

**Conclusions:** Classification based on the full chemical profile may be a more valid and reliable method for clinical researcher. Currently a systematic method that takes into account major psychoactive and physiological components of Cannabis has yet to be developed.
**Sulfur Dioxide Exposure Assessment of the 2018 Lower East Rift Zone Eruption Event on Hawaii Island**

Taylor Tomita  
Preceptor: Diana Felton, MD  
Site: Hawaii State Department of Health

**Background:** Kilauea volcano located on Hawaii Island has been erupting since 1983. Volcanic emission exposures can induce respiratory reactions including bronchoconstriction and asthma attacks. Previous studies have shown that differences in topography and climatic factors result in varying volcanic emission exposures. This project evaluated and characterized sulfur dioxide (SO₂) exposures across Hawaii Island during the Lower East Rift Zone eruption event (May 4th-August 17th, 2018).

**Methods:** Hawaii Department of Health data were obtained for 5 locations on Hawaii Island (May 4th-August 17th, 2018). Daily SO₂ concentrations were averaged on 3 timescales and compared to the following ambient air quality standards: Environmental Protection Agency’s (EPA) primary 1-hour 75 parts per billion (ppb), EPA’s secondary 3-hour 0.5 parts per million (ppm), and Hawaii 24-hour 0.14 ppm standard. A temporal analysis of 15-minute average SO₂ concentrations was conducted using the days exceeding the state standard.

**Results:** The 1-hour standard was exceeded in all 5 study locations, averaging 149 exceedances over the study period. The 24-hour standard was exceeded in Pahala (5 days) and Ocean View (4 days). Additionally, the 3-hour standard was surpassed in Pahala (2 exceedances) and Ocean View (3 exceedances). Temporal trends included peak early morning concentrations (6am-7am) and midday lows (12pm-2pm).

**Conclusions:** The results support the need to prioritize areas like Ocean View and Pahala for future interventions aimed at increasing community resiliency (i.e. medical screenings). Based on the temporal trends of early morning peak concentrations of SO₂, residents should be advised to use precautionary measures during those hours.
Understanding Donor Milk Recipients’ Breastfeeding Practices in Colorado and the United Kingdom

Austin Leah Van Grack
Preceptor: Laraine Lockhart Borman IBCLC
Site: Mothers’ Milk Bank

Background: Human donor milk provides the nutritional content, protective factors and benefits of breastfeeding to families with insufficient breastmilk supply. Milk bank research has primarily focused on the health benefits of breastmilk as compared to formula, but little research examines infant feeding practices using donor milk. This study sought to understand the relationship between donor milk use and infant feeding practices in two milk banks in Denver, CO and the UK.

Methods: Drawing on current donor milk literature and subject matter experts, an online survey was developed and distributed to 170 randomly selected women who received donor milk from the Denver bank between January 2018 - December 2018. Only 25 surveys were completed from this site. Data analysis included cross-tabulations and chi square tests for significance. The UK survey is awaiting ethics board approval for distribution.

Results: The majority of participants (63%) felt grateful and expressed acceptance of use of donor milk to feed their infants. Over half (56%) of women reported using donor milk for less than a month, of which, 64% exclusively breastfed following donor milk use. The association between length of donor milk use and feeding practice (exclusively breastfeeding, breastfeeding and formula, exclusively formula) post donor milk use was significant (p = 0.000).

Conclusions: More education and awareness about donor milk use is needed. Understanding the association between the length of donor milk use and infant feeding practices following donor milk use is important to encourage exclusive breastfeeding practices for the first six months of life.
Lyme Disease Activities Conducted by Jurisdictions Funded by the Centers for Disease Control & Prevention (CDC), 2018-2019

Christine VanTubbergen
Preceptor: Grace Marx, MD
Site: Bacterial Diseases Branch, Division of Vector-Borne Diseases, CDC

**Background:** Lyme disease (LD) is the most common vector-borne disease in the U.S. Public health departments can apply for annual funding through CDC’s Epidemiology and Laboratory Capacity (ELC) Cooperative Agreement to support the prevention and control of infectious diseases, including LD. The objectives were to systematically abstract information from ELC applications related to LD activities; summarize LD activities, public health system characteristics, and LD burden; and examine the relationship between LD incidence and funding awarded.

**Methods:** A standardized tool was created to collect information regarding each applicant. Data were abstracted from applications and entered into this tool. LD burden was obtained from CDC surveillance data. An ambispective cohort study was performed of the applicants that requested funding for LD activities during 2018-2019. Descriptive statistics and an ordinal logistic regression analysis were performed to summarize findings and examine the relationship between the 3-year average LD incidence (2015-2017) and level of funding awarded (categorized into high, medium, and low tertiles).

**Results:** The thirty-two applicants reported a variety of LD activities including outreach, external collaborations, tick surveillance and pathogen testing, case estimation methods, and syndromic surveillance. The median 3-year average LD incidence was 11.2 cases per 100,000 and the median awarded funding was $79,087. For every 10 cases per 100,000 increase in the 3-year average LD incidence, the odds of funding in the highest tertile was 1.67 (95% CI: 1.15-2.43) times greater compared to the lower tertiles.

**Conclusions:** Jurisdictions with higher LD incidence are more likely to receive larger ELC funding awards.
Background: John Snow Inc. (JSI) has identified that technological advancements specifically within telehealth and telemedicine contributes to a patient-centered healthcare system, which is one of their healthcare transformation goals. Therefore, the Team-Based Care Initiative within JSI seeks to understand which aspects of telehealth and telemedicine programs contribute to an improvement in access to care and decrease in cost.

Methods: A literature review was conducted on telehealth and telemedicine. Developed a well-curated excel document that included differences between telehealth and telemedicine—along with benefits, utilization, equipment—reimbursement, funding, and partnership. Eight key informant interviews were conducted and documented in excel. Results include program challenges, gaps, successes, funding, improvements, and partnerships.

Results: Programs in states without telehealth parity laws expressed how reimbursement is their biggest challenge—key informant interviews within those states also reinforced this finding. Another challenge documented in the literature and key informant interviews was acquiring appropriate equipment, training staff, and changing the perceptions of the patients and the healthcare system on services delivered by telehealth. The array of specialties that utilize telehealth, the lack of bandwidth inclusivity, and lack of formal evaluation processes are gaps. Telehealth programs are successful because they improve access to care by serving underserved populations and decreasing costs.

Conclusion: The rapid rise in the use of telehealth as a healthcare delivery mechanism has proven that there is a need for uniformity amongst specialties. Telehealth and telemedicine programs are beneficial but there are challenges and gaps that need to be addressed.
Youth Access to Tobacco Products: Neighborhood Characteristic Predictability of Tobacco Retailer Compliance Failure and At-Risk Community Indicator Analysis in the Seven-County Denver Metro Region

Lindsey G. Whittington
Preceptor: Adam Anderson, MURP, MPH
Site: Tri-County Health Department, Greenwood Village, CO

Background: National studies have shown that neighborhoods with higher percentages of Latino, African-American, and impoverished individuals had a significantly higher risk of failure on FDA tobacco compliance checks. Knowledge of these effects at the local level in Colorado have yet to be elucidated. Neighborhood characteristics will be assessed to determine likelihood of FDA compliance check failure within Denver Metro Region neighborhoods.

Methods: Census track-level demographic estimates from the American Community Survey were aggregated to neighborhood boundaries throughout the Denver Metro Region. FDA compliance checks from the Colorado TRAC System were used to investigate the impact of neighborhood demographic characteristics on the probability of compliance check failure through a logistic modelling approach.

Results: After adjustment, percentage of individuals between the ages of 5 and 17 was negatively associated with the likelihood of a sale to minor violation by a tobacco retailer. On average, the odds of failing a compliance check changed by 0.90 times (95% CI: 0.83 to 0.97) for every 1-unit increase in the age percentage (p = 0.0064). Percentage African-American, Hispanic or Latino, and living in poverty were not statistically associated.

Conclusions: Age is a predictor of likelihood of sale to minors by tobacco retailers, acting as a protective effect in neighborhoods with tobacco retailers. This relationship supports previous findings of inequities in sale to minor violations by age characteristics of neighborhoods. Strategies should be investigated to address inequities to reduce potential discrepancies in the burden of disease by tobacco use on specific populations within the Denver Metro Region.
The Meaning Behind Menthol: A Qualitative Inquiry into the Attitudes Surrounding Tobacco Use in Denver’s Black Community

Johnny Williams
Preceptor: Terri Richardson, M.D.
Site: Colorado Black Health Collaborative

**Background:** Menthol cigarettes are highly addictive and are the preferred cigarette for the majority of black smokers according to the CDC. United States Cancer Statistics data shows that black men in Colorado are 31% more likely than white men to develop lung cancer despite having higher rates of attempting to quit. This study examined the attitudes and perceptions about menthol cigarettes among smokers and nonsmokers in Denver’s Black Community.

**Methods:** Attitudes surrounding the use of menthol cigarettes and tobacco use were explored by conducting focus groups and interviews with Non-smokers (N=10) and Mixed Smoker/Non-Smokers (N=12) (N=3). All data were transcribed verbatim and codes were developed a priori based on the questions. Transcripts were coded and themes were developed. Findings were triangulated with existing literature and interview participants for concordance.

**Results:** Overarching themes found were 1) Spirituality and self-efficacy were protective factors against tobacco use. 2) Tobacco use plays a role in alleviating the pain caused from racism/historical injustices. 3) Lack of awareness surrounding the health effects of menthol cigarettes and being targeted with advertisements. Triangulation and member checking resulted in concordance. Increasing non-familial support was listed as a solution to address tobacco use.

**Conclusion/Recommendations:** This qualitative inquiry highlights the influence of targeted marketing as well as the role self-efficacy plays in the decision to use tobacco. Based on analysis the creation of a non-familial support system to address the risk factors for tobacco use would be beneficial in addressing this health disparity for this population.
Nutrition in Older People Living with HIV Receiving ART: Impact of Food Insecurity and Undernutrition on Frailty and Physical Functioning

Brianna Wolford
Preceptor: Kristine Erlandson, MD, MS
Site: University of Colorado School of Medicine

Background: The relationship between aging and frailty in people living with HIV (PLWH) is well-documented, however, little is known about the impact of food insecurity and undernutrition. We aimed to determine if food insecurity and undernutrition were associated with higher odds of frailty or low physical functioning, in PLWH over the age of 50.

Methods: Using a cross-sectional design, self-report, physical, and lab measurements were obtained from PLWH (n=48) in Aurora, Colorado. Linear and logistic regression were used to determine odds ratios and point estimates of frailty and physical function from food insecurity and undernutrition.

Results: The average age of participants was 58.6 (SD 6.3) years, 83% were male, 44% were food insecure, and 75% were undernourished. Food insecurity was associated with greater odds of frailty (OR 3.3; 95% CI 0.90, 12.1, p=0.07) and low physical function (OR 2.2; 95% CI 0.62, 7.8, p=0.22) but did not reach statistical significance. Participants who were food insecure had a 2.69 second (SE 0.75) longer time to complete one chair rise (p=0.0008). Undernutrition was associated with greater odds of frailty (OR 2.5; 95% CI 0.39,15.4, p=0.34) and low physical function (OR 2.6; 95% CI 0.68, 9.99, p=0.16) but did not reach statistical significance. Participants who were undernourished had a 10.7 kg (SD 3.9) weaker grip strength (p=0.009).

Conclusions: In this pilot study, we found evidence of a relationship between food insecurity, undernutrition, frailty and physical function impairment among PLWH. Further research should examine these relationships in a larger, more diverse population of PLWH.
**Evaluation of Children’s Hospital Colorado 2018 Urgent Care Restructure**

Christie Woodruff  
Preceptor: Mike Maughlin  
Site: Children’s Hospital Colorado

**Background:** Children’s Hospital Colorado operates a system of pediatric Urgent Cares. In 2018, the Urgent Care Restructure project made changes to the system’s scope of practice, hours of operation, and staffing models. This evaluation seeks to understand how the changes have affected operations, finances, and patient satisfaction and costs at the Uptown and Wheat Ridge locations.

**Methods:** Data was extracted from EPIC, NRC Health, the Children’s Patient Advocates Database, and Essbase. Summary measures were calculated for Cost per Unit of Service (CPUOS), Worked Hours per Unit of Service (WHPUOS), and Procedure Charges and were compared year over year. Pre-post differences were tested on Door-To-Provider times (DTP), Patient Satisfaction Scores (PSS), and Patient Complaints using a Mann-Whitney hypothesis test for continuous non-normal data and the two proportions test for dichotomous data.

**Results:** DTP times significantly decreased by 17.7% (p<0.001) at Uptown and 19.7% (p<0.001) at Wheat Ridge. There were no statistically significant changes in Patient Complaints and PSS for either location. While CPUOS increased at Uptown by 13.6%, it decreased at Wheat Ridge by 4.2%. WHPUOS and Procedure Charges increased at both locations.

**Conclusions:** This project had significant positive impacts on operations, specifically a decrease in DTP times. Increased patient revenue through Procedure Charges improved the system’s financial viability, outweighing negative financial impacts on metrics like WHPUOS and CPUOS. The increased patient costs do not appear to have affected patient satisfaction. Recommendations include an optimization project to further increase provider productivity and realize reduced CPUOS and WHPUOS with patient volume growth.
Health After Lock-Up: An Assessment of Physician Attitudes Towards Patients Recently Released from Incarceration

Christina Yebuah
Preceptors: Anna Munoa, M.D., Rebecca Hanratty, M.D., Christine Welles, M.D.
Site: Denver Health

Background: Denver Health (DH) is creating a Corrections Transitions Clinic, which provides immediate health services to people who have been recently released from incarceration. Although research shows clinics of this nature are effective in increasing access to care, few studies have identified physicians’ perception of this population. The purpose of this study is to identify physicians’ attitudes towards patients who have been recently released from jail or prison.

Methods: A survey with a series of demographic questions, Likert scales, and open-ended questions was disseminated through SurveyMonkey to a listserv of 156 primary care physicians in the Denver Health network. Descriptive statistics were calculated for the Likert scales. The open-ended responses were coded, and emerging themes were identified.

Results: Eighty physicians responded. About 78.2% of physicians agreed with the statement, “I feel confident assessing the health of a person who has been released from jail or prison within the last 30 days.” From the open-ended questions, major challenges were identified, particularly around attainment of medical records, social barriers, medication, and consistency of care. Physicians reported they needed training and resources that would improve their knowledge on this population as well as establish best practices.

Conclusions: This study indicates that trainings and resources should be offered to physicians to assure they understand the context of this population as well as best practices for care. These findings can be used to develop relevant curricula that will educate and enable physicians to serve those who have been recently released from jail or prison.
The Relationship Between Social Determinants and Self-Reported Health Status of Refugees Resettled in the Denver-Metro Area

Kate Ytell
Preceptor: Kate Boyd, MPH, DrPHc
Site: ACCORDS

**Background:** Refugees experience disproportionately poorer health outcomes compared to non-refugees. Understanding how social determinants affect the self-reported health of refugees is an important step in identifying areas where interventions or programming may improve refugee health. The purpose of this project is to understand the relationship between social determinants and self-reported health of refugees in the Denver-metro area.

**Methods:** Data collected by Kate Boyd from refugees in the Denver-metro area (n=149) was compared to the Behavioral Risk Factor Surveillance Survey data set for the Denver-metro statistical area (n=4,677). Each data set was analyzed using ordinal regression to determine the relationship between self-reported health and various social determinants. Qualitative data collected as part of the Improving Health by Engaging Refugees in Denver project was thematically analyzed to explain and add depth to quantitative findings.

**Results:** In the refugee population, being female, over age 54, and having spent less than 6 years in the U.S. were found to increase the odds of reporting lower health status (all p<0.05). Qualitative results showed that cost of housing and healthcare, language barriers, finding culturally appropriate care, and adjusting to a new country are factors that can make it challenging for refugees to achieve health.

**Conclusions:** Connecting refugees in the Denver-metro area to financial assistance resources, interpretation services, educational opportunities including English language classes, assistance navigating healthcare and insurance systems, and culturally competent healthcare providers, as well as identifying the best ways to support refugees upon resettlement are measures that may improve the health of this community.
Assessing the Usability and Acceptability of an Education Program for Clinical Providers at the Trifinio Center for Human Development

Natalia Zamboni Vergara
Preceptor: Amy Nacht, DNP, CNM, MPH, FACNM
Site: Center for Global Health: Trifinio Project

Background: The Trifinio region in the southwest of Guatemala experiences high rates of maternal mortality and morbidity. To decrease these rates, the University of Colorado Center for Global Health developed maternal health programs and trained local clinicians using onsite training and distance education. Initial distance education programs received positive feedback, but more evaluation was needed to develop a sustainable distance program. The aim of this project was two-fold: to evaluate the acceptability and usability of a one-month distance education program designed to orient clinical staff to the management of intrapartum care and to assess the knowledge acquisition of the program participants at the Trifinio Center for Human Development.

Methods: We evaluated usability and acceptability through pre/post interviews and an evaluation survey. We assessed knowledge acquisition through pre/post knowledge tests. We analyzed the interviews utilizing inductive coding. We analyzed the evaluation survey using descriptive statistics and compared the pre/post knowledge tests scores using a t-test.

Results: Both usability and acceptability mean scores were high. Pre/post interviews revealed three common themes related to the program’s usability and acceptability: class participation and technology, modalities usability, and suggested changes. No statistical difference was found between the pre/post knowledge tests.

Conclusions: Overall, the participants assessed the program as highly acceptable and usable. The participants recommended strategies to encourage class participation, improve technology infrastructure, and develop a hybrid course integrating lectures with practice-based learning. Incorporating participants’ suggestions into the distance education program will enhance their learning experience and build upon their competencies as skilled health personnel.