Public Health Forum
Spring 2017

Friday, May 12, 2017
Anschutz Medical Campus - Education 2 South Building and Education 2 North Student Community Bridge

11:30 AM - 12:00 PM  MPH Public Health Forum Opening Session
                       Education 2 North Room 2104

12:00 PM - 4:00 PM   MPH Oral Presentations - Education 2 North Building
                       (see schedule)

4:00 PM - 5:15PM     Poster Presentations and Reception
                       Education 2 North Student Community 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.
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<tr>
<th>TIME</th>
<th>OPENING SESSION</th>
<th>ED2 NORTH ROOM 2104</th>
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<tbody>
<tr>
<td></td>
<td>Maureen Dechico - CBHS</td>
<td>Recommendations to Increase Trauma-Informed Support for Lesbian, Gay, Bisexual, and Transgender (LGBT) Adolescents</td>
</tr>
<tr>
<td>12:00 PM</td>
<td>Hanna Mortimer - CBHS</td>
<td>Making Logic Out of Stakeholder Engagement: Developing the Basis for an Evaluation Plan</td>
</tr>
<tr>
<td>12:15 PM</td>
<td>Stacey Quesada-CBHS</td>
<td>Straight Up or With Ice? Plain Language Recommendations for the Identification of Adult Survivors of Childhood Sexual Abuse</td>
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<tr>
<td>12:30 PM</td>
<td>Xian Brooks-CBHS</td>
<td>HPV and Guys Like Me: Cervical cancer knowledge and risks of transmasculine and masculine presenting gender non-conforming individuals in the Southeastern United States</td>
</tr>
<tr>
<td>12:45 PM</td>
<td>Joy Waughtal-CBHS</td>
<td>Social Determinants of Health Screening in the Special Care Clinic of Children’s Hospital Colorado</td>
</tr>
<tr>
<td>1:00 PM</td>
<td>Anowara Begum -CBHS</td>
<td>Designing an appropriate survey for refugee population to assess the community-based patient navigation provided by Project SHINE</td>
</tr>
<tr>
<td>1:15 PM</td>
<td>Zar Phy -CBHS</td>
<td>The use of Sunscreen, Protective Gear, and Avoidance (SPA) Questionnaire to provide tailored skin protection counseling for patients at the Denver Veterans Affairs Eastern Colorado Health Care System</td>
</tr>
<tr>
<td>1:30 PM</td>
<td>Kameron Black -CBHS</td>
<td>Informing the Creation of a Modified Diabetes Prevention Program through a Community Health Assessment of Low Socioeconomic Status Residents in North Denver, Colorado</td>
</tr>
<tr>
<td>1:45 PM</td>
<td>Caitlin Felder-Heim-CBHS</td>
<td>Quality of Diabetes and Hypertension Care at the DAWN Clinic</td>
</tr>
<tr>
<td>2:00 PM</td>
<td>Kacie Warner -CHE</td>
<td>Healthy Beverage Partnership: Nutrition Environment Assessments at Denver Public Venues</td>
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<tr>
<td>2:15-2:30 PM</td>
<td>Allison Preza -CHE</td>
<td>Colorado Comprehensive Sexual Health Education: Policy Analysis and Recommendations</td>
</tr>
<tr>
<td>2:30 PM</td>
<td>Eve Audley-CHE</td>
<td>Memory Café Curriculum</td>
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<tr>
<td>3:00 PM</td>
<td>Linda Saxton-CHE</td>
<td>Northeast Colorado Health Department Quality Improvement Plan Development</td>
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<tr>
<td>3:15 PM</td>
<td>Amanda LaLonde -CHE</td>
<td>Assessment of Campus Recreation Programming and Services</td>
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<tr>
<td>4:00-4:35 PM</td>
<td>Poster Session &amp; Reception, Group A Presenting - Education 2 North Student Community Bridge</td>
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<tr>
<td>4:40-5:15 PM</td>
<td>Poster Session &amp; Reception, Group B Presenting - Education 2 North Student Community Bridge</td>
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<th>TIME</th>
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<th>SPEAKER</th>
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<tbody>
<tr>
<td>11:30 AM</td>
<td>OPENING SESSION  ED2 NORTH ROOM 2104</td>
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<tr>
<td>11:30 AM-12:00 PM</td>
<td><strong>TIME</strong></td>
<td><strong>Ed 2 North - ROOM 1206</strong> Facilitator: Elizabeth Brooks, PhD</td>
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<tr>
<td>12:00 PM</td>
<td>An Evaluation of Maternal Depression Screening and Referral Practices at Denver Health Pediatric Clinics</td>
<td>Claire Ulrickson-CBHS</td>
<td></td>
</tr>
<tr>
<td>12:15 PM</td>
<td>Cell Phone Access and Health Seeking Behaviors in Homeless Youth: A Health Service Utilization Framework Informed Study</td>
<td>Sarah Ballard-CBHS</td>
<td></td>
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<tr>
<td>12:30 PM</td>
<td>Talking about sex evaluating Aurora Public School sexual health education and clinic linkage programming with Colorado Youth Matter</td>
<td>Grace Undis-CBHS</td>
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</tr>
<tr>
<td>12:45 PM</td>
<td>HPV Vaccination in Correctional Care: Knowledge, Attitudes, and Barriers Among Female Inmates</td>
<td>Alia Moore, MD-CBHS</td>
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<tr>
<td>1:00 PM</td>
<td>Evaluation of Educational Materials for the Prevention of Aedes aegypti Transmitted Diseases in Ecuador</td>
<td>Reese Garcia - CBHS</td>
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<tr>
<td>1:15 PM</td>
<td>An Investigation of Teacher Wellness and its Impact at Denver Public Schools</td>
<td>Laura Assenheimer-CBHS</td>
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<tr>
<td>1:30 PM</td>
<td>The Impact of Scheduling Recess Before Lunch on Meal Consumption in Greeley-Evans Elementary Students</td>
<td>Casey Hammes-CBHS</td>
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<tr>
<td>1:45 PM</td>
<td>Students Seeking Mental Health Services at School Based Health Centers: Characteristics and Utilization Patterns</td>
<td>Hilary Stempel, MD-CBHS</td>
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<td>2:00 PM</td>
<td>The SNAP-Ed Census: A National Profile of SNAP-Ed Program Activity and Evaluation Indicators</td>
<td>Max Young-CBHS</td>
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<td>2:15 – 2:30 PM</td>
<td>Break</td>
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<td>2:30 PM</td>
<td>Community Based Participatory Research: Best Practices for Engaging Youth</td>
<td>Kari Mader, MD-CBHS</td>
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<tr>
<td>2:45 PM</td>
<td>From ‘what’s wrong with you’ to ‘what happened to you’: Examining Perceptions of Trauma in Delta County to Establish a Resilient School Community</td>
<td>Nicole S. Miller - CBHS</td>
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<tr>
<td>3:00 PM</td>
<td>Factors that Predict Initiation and Continuation of Breastfeeding for Adolescent Mothers in the Colorado Adolescent Maternity Program</td>
<td>Rachel Karban-MCH</td>
<td></td>
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<tr>
<td>3:15 PM</td>
<td>Stunting and Dietary Intake of 12- to 24-month-old Children in Rural Guatemala: A Pilot Study</td>
<td>Roberto Delgado Zapata, MD-MCH</td>
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<tr>
<th>TIME</th>
<th>Individual Oral Presentations</th>
<th>Ed 2 North - ROOM 1308</th>
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<tbody>
<tr>
<td>11:30 AM-12:00 PM</td>
<td><strong>OPENING SESSION  ED2 NORTH ROOM 2104</strong></td>
<td>Facilitator: Madiha Abdel-Maksoud, MD, PhD</td>
</tr>
<tr>
<td>12:00 PM</td>
<td>Jacob Alexander, DO - EPID</td>
<td><em>Chronic Disease and Mental Illness Prevalence of Refugees by Birth Country within a Safety Net Hospital System</em></td>
</tr>
<tr>
<td>12:15 PM</td>
<td>Susanna Carter, MD-EPID</td>
<td><em>Decisions About Exercise: A Comparison Between Women With Breast Cancer and Controls</em></td>
</tr>
<tr>
<td>12:30 PM</td>
<td>Talia Pindyck, MD-EPID</td>
<td><em>Validation of an Electronic Flagging Tool for Triaging Surgical Site Infection Surveillance</em></td>
</tr>
<tr>
<td>12:45 PM</td>
<td>Steven Krager, MD-EPID</td>
<td><em>Knowledge of Norovirus and Attitudes towards a Potential Norovirus Vaccine in Rural Guatemala: A Cross Sectional Survey</em></td>
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<tr>
<td>1:00 PM</td>
<td>Chelsea Cook-EPID</td>
<td><em>Evaluation of Quality Control in Clinical Cases of Enteric Disease</em></td>
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<tr>
<td>1:15 PM</td>
<td>Nirmala Day-EPID</td>
<td><em>Evaluation of Prediction of Tularemia in Various Counties of Colorado</em></td>
</tr>
<tr>
<td>1:30 PM</td>
<td>Nicole Dee-EPID</td>
<td><em>Characteristics of Housing and Development in Mexico and their effect on Aedes Aegypti Mosquito Populations</em></td>
</tr>
<tr>
<td>1:45 PM</td>
<td>Lisa Diaz-EPID</td>
<td><em>Examining the association between a gay-straight alliance and mental and emotional health outcomes in Colorado high schools</em></td>
</tr>
<tr>
<td>2:00 PM</td>
<td>Matthew Estes-EPID</td>
<td><em>Trends and Factors of Invasive Streptococcus pyogenes Subtypes in the Denver Metro Area, 2010-2015</em></td>
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<td>2:15 – 2:30 PM</td>
<td>Break</td>
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<tr>
<td>2:30 PM</td>
<td>Jessica Filley-EPID</td>
<td><em>Maternal depressive symptoms and the risk of abnormal developmental screening results within the first year of life</em></td>
</tr>
<tr>
<td>2:45 PM</td>
<td>Samantha Hoss-EPID</td>
<td><em>An Analysis of the Relationship Between Inflammation and Increased Insulin Resistance in Women With Type 1 Diabetes</em></td>
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<td>3:00 PM</td>
<td>Brian Hixon-EPID-BIOS</td>
<td><em>Exercise, Sleep, and the Aging HIV Population</em></td>
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<tr>
<td>3:15 PM</td>
<td>Anthony Hopf- EPID</td>
<td><em>The Impact Barriers have when accessing healthcare in Regards to Individuals with Chronic Conditions</em></td>
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<tr>
<td>3:30 PM</td>
<td>Mitchell Keener-EPID</td>
<td><em>Factors Contributing to Restaurant-Associated Foodborne Outbreaks in Colorado</em></td>
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<tr>
<td>12:00 PM</td>
<td>Harry Smith – BIOS</td>
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<td>Using a systems genetic analysis in rat to decipher the role of brown adipose tissue in metabolic syndrome</td>
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<tr>
<td>12:15 PM</td>
<td>Holly Weeks - BIOS</td>
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<td>Modeling Rare Mutations in Cell Populations with Boolean Modeling</td>
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<tr>
<td>12:30 PM</td>
<td>Alexandria Erkenbeck-BIOS-EPID</td>
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<td>The Applicability of the Social Vulnerability Index to High School Football Concussion Rates</td>
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<tr>
<td>12:45 PM</td>
<td>Annika Jones-EPID</td>
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<td>Social Determinants of Community Acquired Clostridium difficile Infection in Colorado</td>
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<tr>
<td>1:00 PM</td>
<td>Amber Vaughn-EPID-BIOS</td>
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<td>Chronic Kidney Disease within Arid/Semi-arid Climates: a view nationally and within the San Luis Valley, CO.</td>
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<td>1:15 PM</td>
<td>Caroline Ledbetter-BIOS-EPID</td>
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<td>The Association Between Food Insecurity and Metabolic Syndrome in NHANES Participants 1999-2014</td>
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<tr>
<td>1:30 PM</td>
<td>Melissa Lindt-EPID</td>
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<td>Graves’ Disease and Refractive Errors after Cataract Surgery</td>
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<tr>
<td>1:45 PM</td>
<td>Rachael Sawaya -EPID</td>
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<td>Association between genetic variants and the presence of Rheumatoid Arthritis-related autoimmunity and progression to Rheumatoid Arthritis in an at-risk population</td>
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<td>2:00 PM</td>
<td>Shannon Gallagher-EPID</td>
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<td>Bacterial Comparison of Oropharyngeal Swabs and Tracheal Aspirates in Mechanically-Ventilated Children</td>
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<td>2:15 – 2:30 PM</td>
<td>Break</td>
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<tr>
<td>2:30 PM</td>
<td>Chantel Urban-EPID</td>
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<td>Emergency Department Patients with Suicide Risk: Impact of Alcohol Intoxication</td>
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<td>2:45 PM</td>
<td>Sasha Mintz- EPID</td>
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<td>Suicide Among Healthcare Practitioners and Technicians in Colorado: An Epidemiological Study</td>
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<td>3:00 PM</td>
<td>David Ross-EPID</td>
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<td>An Update on Hypertension Prevalence, Treatment, and Control in Type 1 Diabetes: Analysis from The Coronary Artery Calcification in Type 1 Diabetes (CACTI) Study</td>
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<td>3:15 PM</td>
<td>Marc Schweizer, EPID</td>
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<td>Reevaluation of the Advanced Maternal Age Associated with Increased Risk of Maternal and Neonatal Morbidity</td>
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<td>3:30 PM</td>
<td>Jordan Sciandra-EPID</td>
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<td>Diagnosing Newborn Genetic Disorders: A Nationwide Analysis of Newborn Screening Timeliness</td>
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</table>
| 12:00 PM | Kelsey Brown-EHOH  
  *Improving Public Health Communication: Website Redesign for the Colorado Department of Public Health and Environment’s Air Pollution Control Division* |
| 12:15 PM | Zachary Byrne- EHOH  
  *An Ergonomic Evaluation of Marijuana Trimming and Packaging at a Marijuana Cultivation Facility: A Pilot Project* |
| 12:30 PM | Gabriel Pepper, MD-EHOH  
  *Use of Military Occupational Codes to Estimate Inhalational Exposures in Military Deployers* |
| 12:45 PM | Lauren Zell-Baran-EHOH  
  *Blood Lead Screening in Colorado among High Risk Children* |
| 1:00 PM | Keith Suter-EHOH  
  *The Relationship Between Water Quality and Conflict* |
| 1:15 PM | Shea Swickle, EHOH  
  *The Population at Risk from Living Near Toxic Release Inventory Sites and Concentrated Animal Feeding Operations in Weld County* |
| 1:30 PM | Brendan Sisombath-EHOH  
  *Analysis of Pinnacol Assurance’s Risk Management Alliance Program: Determining the Association Between Industry and the Type of Safety Recommendation Given* |
| 1:45 PM | Allison Moravec-Rice-EHOH  
  *Measuring Success: Developing an Evaluation Tool for a Superfund Five Year Review Training Program* |
| 2:00 PM | Tamara Lhungay  
  *Evaluating Outcomes of a Three-Tiered Orientation System in Matching Surgical Technicians to Cases Based on Skill* |
| 2:15 - 2:30 PM | Break |
| 2:30 PM | Andrew Stahly – EPID  
  *Cadmium and Cancer: Examining the relationship of chronic cadmium exposure and cancer incidence in the San Luis Valley Diabetes Study* |
| 2:45 PM | Andrea Nederveld -LPHP  
  *“This is My Gym: A program encouraging children and their families to be active through play and interaction with the built and natural environment in Mesa County.”* |
| 3:00 PM | Sara Reese, PhD – LPHP  
  *Evaluation of staff perception of high risk flagging suicide prevention program at the U.S. Department of Veteran Affairs* |
| 3:15 PM | Douglas Overbey- LPHP  
  *Improving Length of Stay for Acute Limb Ischemia: A Mixed Methods Continuous Quality Improvement Initiative* |
| 3:30 PM |  |
| 4:00-4:35 PM | Poster Session & Reception, Group A Presenting - Education 2 North Student Community Bridge |
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<td>Stephanie Badeaux, MBA-HSMP</td>
<td>Implications of Medicaid Federal Funding Caps on Medicaid Delivery</td>
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<td>12:15 PM</td>
<td>Candace Chiapusio- HSMP</td>
<td>Cost-Effectiveness of Screening Children (Ages 5-17) for Type 1 Diabetes using a Hypothetical Markov Model</td>
</tr>
<tr>
<td>12:30 PM</td>
<td>Kaitlin Galonska-HSMP</td>
<td>Evaluating the Effectiveness of the Be a Better YOU Program for Centura Health’s Employee Population</td>
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<tr>
<td>12:45 PM</td>
<td>Amy Kleinman -HSMP</td>
<td>A Multiple Policy Case Study: Colorado Food Systems Digital Hub Utilization in the Colorado Food Policy Network</td>
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<td>Jia Lin-HSMP</td>
<td>Testing the Statistical Agreement of Automated NeuroQuant Volumetric Analysis to Validated Research Across Multiple MRI Scanner Manufacturers and Field Strengths</td>
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<td>1:15 PM</td>
<td>Nichole Shaw-HSMP</td>
<td>The Millennial Physician: Addressing Challenges with Information Access in an Orthopaedic Residency Program</td>
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<td>1:30 PM</td>
<td>Lauren Smith-HSMP</td>
<td>A Quantitative Analysis of Hospital Acquired Pressure Ulcer Mitigation Methods</td>
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<td>Brenda Grabb-HSMP</td>
<td>Are Professional Educational Modules an Effective Means to Help Radiologists Decrease Patient Fluoroscopy Dose?</td>
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<tr>
<td>2:00 PM</td>
<td>Almas Jabeen- HSMP</td>
<td>The Health and Wellness Program for Refugees at Grace Apartment</td>
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<td>2:30 PM</td>
<td>Truc Pham, HSMP</td>
<td>Boulder County Immunization Coalition: a quality assurance and relaunching project</td>
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<tr>
<td>2:45 PM</td>
<td>Ilyssa Collier-simons, HSMP</td>
<td>Vaccine Exemption Rates and HB-1288: A Quality Improvement Analysis</td>
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<td>3:00 PM</td>
<td>Wivine Ngongo -CBHS</td>
<td>Ketamine infusion as an analgesic adjunct in the management of severe pain in patients with sickle cell disease</td>
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<td>3:15 PM</td>
<td>Sydney Lawrence-CBHS</td>
<td>Assisting Public Health Practitioners and Partners with Data Interpretation and Utilization via Development of Non-Technical Data Source Factsheets</td>
</tr>
<tr>
<td>3:30 PM</td>
<td>Victorialyn Marsh-EPID</td>
<td>Operation Rabbit Fever: Creation of a Public Health Emergency Management Tabletop Exercise for a Francisella tularensis Bioterrorism Event</td>
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<tbody>
<tr>
<td>Andrea Nederveld - LPHP</td>
<td>Victorialyn Marsh - EPID</td>
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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.

Fall 2016 MPH Capstone Faculty

Elizabeth Brooks, PhD

Teresa Sharp, PhD

Madiha Abdel-Maksoud, MD, PhD

Meredith Fort, PhD

Rosemary Rochford, PhD

Amanda Allshouse, MS

Teaching Assistant: Nicole Tuitt, MPH
**Chronic Disease and Mental Illness Prevalence of Refugees by Birth Country within a Safety Net System**

Jacob Alexander  
Preceptor: Rachel Everhart, PhD  
Site: Denver Health

**Background:** The United States has admitted over 3 million refugees for resettlement since 1975. These refugees make up a medically fragile population due to experiencing high rates of torture, separation from family members, and lack of basic medical care. Despite having a substantial burden of disease, there is a lack of research on prevalence of chronic diseases and mental health disorders by refugee birth country.

**Methods:** We performed a cross-sectional analysis on 201 refugees undergoing initial health screening and divided them into 5 main birth countries (Iraq, Bhutan, Somalia, Afghanistan, Burma) and an other category. Their outpatient visits and diagnoses at one safety net healthcare system were tracked for one year. Percentages of chronic disease and mental illness were calculated. Logistic regression was also performed to look for associations between birth country and mental illness, as well as between birth country and chronic disease.

**Results:** Iraqi refugees had an odds ratio (OR) of 3.24 (95% Confidence Interval (CI) 1.66-6.34) compared to the remaining refugee population. Somali refugees had an OR of 0.10 (CI 0.02-0.46). The remaining countries did not reveal significant results. Logistic regression comparing presence of chronic disease by birth country did not reveal any significant associations.

**Conclusions:** Refugees are a medically fragile group. This study demonstrates the importance of considering the unique medical needs of refugees by birth country, as well as understanding their unique utilization patterns. Further study should seek to understand if the utilization of health care by refugees is adequate for their needs.
An Investigation of Teacher Wellness and its Impact at Denver Public Schools

Laura Assenheimer
Preceptor: Colleen Grandis and Adam Barnett
Site: Denver Public Schools

Background: Teaching is considered to be one of the most stressful occupations in the US. High stress effects teacher health and wellbeing, and consequently employee and student performance. The purpose of this study is to determine the impact of teacher wellness on employee performance, retention, and school performance at Denver Public Schools (DPS).

Methods: Twenty DPS elementary schools were randomly selected for this cross-sectional study. Data came from a teacher survey and DPS records collected in 2015-16. Four components of teacher wellness were assessed: number of sick days, social support and cohesion, job satisfaction and commitment, and positive organizational culture. Linear regressions were conducted to examine the correlation between each component of teacher wellness and each school outcome variable: staff retention, employee performance, and school performance. The unit of analysis was the school.

Results: No significant relationships were found between the four teacher wellness components and the three school outcomes. Despite this, weak relationships were found between number of teacher sick days and school performance ($r = -.41, p = .08$) as well as relationship and team support and three outcome variables: retention ($r = .37, p = .11$), employee performance ($r = .31, p = .19$), and school performance ($r = .32, p = .17$).

Conclusions: DPS should continue to focus its wellness efforts on reducing the number of sick days. Additionally, strategies to bolster social support and cohesion should be considered, as this seems to align with essential school outcomes. Future evaluations of DPS teacher wellness should incorporate theoretical frameworks, including measures on all wellness components: physical, social, emotional, intellectual, spiritual, occupational, and environmental. This approach will allow DPS to better understand the impact of teacher wellness on schools.
Memory Café Curriculum

Evelyn Audley
Preceptor: Cyndy Luzinksi
Site: Dementia Friendly Communities of Northern Colorado

Background: The number of older adults with dementia is expected to increase with the aging population of “baby-boomers”. The need for support groups for those with dementia and their care partners will increase. Even as an individual’s dementia progresses, maintaining social support and connection is important for their overall mental health and wellbeing. A Memory Café acts as a form of support for individuals with mild to moderate symptoms of dementia and their care partners so that they are able to socialize, and engage with others in a supportive meeting place. The organization “Dementia Friendly Communities of Northern Colorado”, hosts Memory Café’s on a monthly basis and currently does not have a curriculum that future facilitators could follow if they wished to start their own group. The purpose is to describe the needs and components included in a curriculum for facilitating Memory Cafés.

Methods: A literature review and program interviews informed a comprehensive guide on how to form a Memory Café and how to ensure provision of safe and supportive spaces for participants.

Results: The curriculum that was developed provides evidence-based activities such as sensory activities, trivia, music, and reminiscing. It also includes information regarding the best practices of facilitation as well as an evaluation form to measure the satisfaction of participants of Memory Cafés.

Conclusions: Promoting positive social interactions is important for the health of both an individual with dementia and for their care partner. Memory Cafés allow a supportive place for participants to socialize and receive support.
Implications of Medicaid Federal Funding Caps on Medicaid Delivery

Stephanie Badeaux, MBA
Preceptor: Jenifer Levinson, VP Healthcare Economics & Policy

Background: Medicaid provides healthcare benefits to the country’s most vulnerable population, covering 70 million beneficiaries with expenditures of $554 billion in 2015. The federal government funds 63% of the yearly Medicaid costs. Recent proposals have been made to restructure federal funding from a matching percentage to capped funding in either the form of a block grant or per capita allotment.

Methods: A grey literature search was conducted to assess potential Medicaid program delivery implications. A forward looking analysis was completed that compared future federal Medicaid spending under current law vs. the alternative funding proposals. A historical simulation on how states would have fared if both proposals would have been implemented beginning in 2001 was also completed.

Results: The block grant proposal would reduce federal transfers to states over an eight year period by $329B, whereas the per capita proposal would reduce federal transfers by $144B. The mean spend per aged and disabled enrollee would be lower under the per capita proposal vs. current law by $2,884 and $3,997, respectively. The states would need to be granted the ability to address eligibility, benefits, service delivery, and payment in order to manage the reduction in federal assistance.

Conclusions: This analysis showed a change to a fixed-funding formula dramatically reduced federal spending. Those most vulnerable of the Medicaid population, aged and disabled, would see a greater reduction in aggregate per head spending than other enrollee types. The states would need to take actions that could impact access to care and restrict utilization.
Cell Phone Access and Health Seeking Behaviors in Homeless Youth: A Health Service Utilization Framework Informed Study

Sarah Ballard  
Preceptor: Anamika Barman-Adhikari, PhD  
Site: University of Denver Graduate School of Social Work

Background: Homeless youth are at an increased risk for poor health outcomes. One way to improve health outcomes is to provide cell phones to reach out and engage homeless youth in services designed to promote better health outcomes. However, research regarding cell phone access and the relationship to health seeking behaviors is limited. Utilizing a modified health service utilization framework, this study seeks to understand if there is an association between cell phone access and health seeking behaviors among this hard-to-reach population.

Methods: 648 homeless youth from Los Angeles, California completed surveys between 2012 and 2013. A modified health service utilization framework was used to identify questions for analysis for this study: constructs included predisposing factors, enabling resources, need, and health service utilization. Logistic multivariate analysis was used to determine significant relationships between cell phone use and health service utilization.

Results: The following variables were found to be significantly associated with HIV testing: sexual orientation, identifying as African American, and communicating with social network members, specifically service providers, street peers, and sexual partners via cell phones. The following variables were found to be significantly associated with STI testing: employment, contacting service providers via cell phones, and HIV susceptibility.

Conclusions: These findings indicate that rather than just having access to a cell phone, it was whom youth communicated with via these mobile devices that influenced service use. Therefore, future public health interventions should not solely focus on homeless youth’s cell phone access, but rather whom they connect with via a cell phone.
HPV and Guys Like Me: Cervical Cancer Knowledge and Risks of Transmasculine and Masculine Presenting Gender Non-conforming (GNC) Individuals in the Southeastern United States

Xian Brooks
Preceptor: Sheana Bull, PhD
Site: Colorado School of Public Health

Background: Cervical cancer has declined over the past 60 years, due to Pap tests. Underscreening is a major risk factor. More than half of new cervical cancers are found in those under-screened and not screened. Forty percent of transmasculine men report irregular lower body screening due to social discomfort from gender identity. The disparity can be linked to access to adequate and culturally sensitive health care providers. Objective: To develop culturally sensitive data collection tool for transmasculine and GNC reproductive health to determine gaps in education and screening practices.

Methods: Seventy-eight self-identified transmasculine men and masculine presenting GNC individuals, 18+ years, living in the Southeast Region completed a thirty-eight item, self-administered electronic survey. The survey measured risk factors related to HPV and cervical cancer. Data were stored in in the HPV and Guys Like Me database, in Research Electronic Data Capture. Seventy-four completed surveys, using frequency and crosstabs analyses, in SPSS, with Chi square test on categorical variables.

Results: Participants had a high perception of cervical cancer risk. Majority of the population participated in regular screening (66.2%), and 32.5% are under-screened. Discrimination experience did not influence regular screening. Despite discomfort with doctors, participants overwhelmingly participated in screening more than those that experienced discomfort and did not participate in screening. Seeing a doctor that participants feel understand their bodies would encourage more regular screening.

Conclusions: Transmasculine and masculine presenting GNC population experienced discrimination and discomfort in healthcare. Lack of culturally competent providers and administrative staff affect cues to action for regular reproductive health screening.
Designing an appropriate survey for refugee population to assess the community-based patient navigation provided by Project SHINE

Anowara Begum
Preceptor: Brandy Kramer, MA
Site: Project SHINE, Colorado

**Backgrounds:** Patient navigation promotes access to timely diagnosis and treatment of diseases by eliminating barriers to care among underserved population. Project SHINE works with refugees from Burma, Bhutan and Iraq to help them navigating health services. Currently, the project does not document the impact of the navigation program. The purpose of this project was to develop a survey to document how the patient navigation program impacted participant’s self-efficacy, actual use of health services and overall satisfaction.

**Methods:** We conducted a literature review (20 articles) to locate culturally-appropriate patient navigation surveys. We also reviewed data from interviews (n=3) to understand how the patient navigation program helped refugees learning about services and utilize them. Themes were extracted from both literature reviews and interviews to develop the patient navigation survey. 12 participants tested the survey for readability, timing, and face validity.

**Results:** The themes extracted were perceived barriers, treatment adherence, self-efficacy, actual use of service, health outcomes and overall satisfaction of the participants. The final survey included participants’ demographic characteristics, self-efficacy, actual use of service and overall satisfaction. It consisted 15 questions with an administering time of 5-7 minutes. The readability score of questionnaire was 5th-6th grade level. It will be administered in-person.

**Conclusions:** This survey will be used for the future evaluation of the patient navigation program by Project SHINE. The development process of this survey will also help other projects that work with refugee population as they face challenges to measure health outcomes due to language barriers and limited literacy.
Informing the Creation of a Modified Diabetes Prevention Program through a Community Health Assessment of Low Socioeconomic Status Residents in North Denver, Colorado

Kameron Black
Co-Preceptors: Tracy Nelson, Ph.D., M.P.H. and Elena Thomas-Faulkner, MA
Site: Clínica Tepeyac

Background: Many low-income, medically underserved individuals struggle with diabetes at disproportionate levels. Clínica Tepeyac provides culturally competent healthcare for underserved Colorado residents including those in the Globeville, Elyria and Swansea (GES) neighborhoods. The project objective was to create a community health assessment (CHA) to inform the development of a modified diabetes prevention program (DPP) for residents of the GES neighborhoods.

Methods: Survey questions were developed and used in a pilot health assessment in Fall 2016 that surveyed the health needs and behaviors of GES residents. Afterward, a literature review was conducted to inform the development of two focus groups with adult residents of GES, that took place in Spring 2017. The focus group data was coded using qualitative content analysis and the survey was analyzed for themes. A report was then constructed to inform creation of the larger CHA. The literature review, analysis of focus group data, and pilot health assessment helped define priorities for a CHA survey to inform development of a modified DPP.

Results: A 37-question survey was developed to capture residents’ health concerns and behaviors including topic areas such as dietary and exercise habits, mental health, and healthcare utilization. Novel findings from previous research were incorporated including specific barriers to physical activity and healthy eating. The CHA was mailed to 3,904 residents in the GES community in April as well as offered on-line.

Conclusions: The results of the CHA will be analyzed and used to create more informed health programs for the residents of GES, particularly related to diabetes prevention.
Improving Public Health Communication: Website Redesign for the Colorado Department of Public Health and Environment’s Air Pollution Control Division

Kelsey Brown

**Background:** Information and communication technology accessibility has a strong association with effective delivery of public health. Ease of access to information within the Colorado Department of Public Health and Environment’s (CDPHE) website is imperative to the public’s health.

**Methods:** Pages within the CDPHE’s website that contained the word "air" or "oil" were analyzed. Data between 2/8/2016-2/8/2017 were collected, including page views, bounce rates, and search terms using the CDPHE search tool. To further assess the end-user perspective, a quantitative pre-intervention survey of current members of the CDPHE Air Pollution Control Division using 1-5 Likert scales was performed.

**Results:** Most accessed the website via Google search and “forms” was the most frequent air quality related search term. Many pages were found that had low total page views but high bounce rates. For example, the “State and Local Air Contacts” page had the second fewest total page views (1,668) but the highest bounce rate (78.7%). Survey results demonstrated that the website performed poorly in ability to meet users needs (average score 2.56/5) and in ease of finding desired content (average score 2.31/5).

**Conclusion:** Satisfaction with the CDPHE Air Pollution Control Division Oil and Gas Unit’s website was low and navigation was commonly identified as a significant barrier towards accessing desired information. These findings support the need for major website redesign efforts to improve public health communication.
An Ergonomic Evaluation of Marijuana Trimming and Packaging at a Marijuana Cultivation Facility: A Pilot Project

Zachary Byrne
Preceptor: Roberta Smith, RN, MSPH, CIC, CIH
Colorado Department of Public Health and Environment
Site: Kind Love

Background: In Colorado there is limited workplace injury data from the marijuana cultivation industry. Trimming and packaging of the marijuana plant are necessary steps in the cultivation process, which require stationary periods consisting of fine motor movements of the upper extremities. Remaining stationary and repeatedly performing fine motor movements for extended periods of time place employees at increased risk for cumulative trauma disorders (CTD), which are an accumulation of small ergonomic stressors to the musculoskeletal system that can result in a larger injury over time if left unaddressed. The goal was to identify points of potential CTD related injury during the trimming and packaging process.

Methods: Two observers independently evaluated thirteen employees utilizing two ergonomic assessment tools and compared results for validation. A survey was administered focusing on employee discomfort related to workplace duties. Three separate tasks were evaluated: marijuana weighing and packaging, marijuana trimming, and preparation and weighing of pre-rolled marijuana filled paper cones.

Results: Observed adverse movements were noted to be upper arm abduction, raised shoulder, reaching across midline, end of range wrist flexion and twisting, and neck position. Some employees reported experiencing pain and stiffness to the lower back, neck, shoulders, hands, and fingers in varying amounts of time surrounding the workday, which may be attributed to the adverse movements observed.

Conclusions: Proposed solutions included utilizing a sit/stand workstation, providing foot support, utilizing chair arm rests, upright scale display, and setting up the workstation to minimize reaching across midline.
Background: The benefits of physical activity for breast cancer survivors, including lower all-cause mortality, have been well studied. Less is known about survivors’ decisions to exercise and if they differ from women without breast cancer. Using a validated decisional balance scale, this study is the first to assess quantitatively the pros and cons for exercise among women with breast cancer and compare them to those of controls.

Methods: This is a cross-sectional study of decisional balance scores for exercise among breast cancer cases and population-matched controls in Hispanic and Non-Hispanic white women who previously participated in the SHINE 4-Corners Study in 2004 and the follow-up SUNSHINE study in 2008. Scores were computed for 360 cases and 300 controls. The distribution of scores was compared between groups, adjusting for the effect of demographic and other risk factors. Backward elimination regression was used to identify predictors of the decision to exercise.

Results: Cases reported a higher mean score (3.69) compared to controls (3.59), however this difference was not significant (p = 0.405). Charlson co-morbidity index (p = 0.0013), education level (p = 0.0064), and physical activity level (p = 0.014) were found to be significant predictors of decisional balance score.

Conclusions: Decisions about exercise do not differ between breast cancer survivors and controls. Women with fewer co-morbidities, more education and higher baseline physical activity were more likely to perceive the benefits of exercise. Survivorship plans should emphasize and facilitate regular exercise, especially among women with less education and more chronic disease.
Cost-Effectiveness of Screening Children for Type 1 Diabetes Using a Markov Model

Candace Chiapusio, PMP
Preceptor: Marcelo Perraillon, PhD
Site: Colorado School of Public Health

**Background:** Type 1 diabetes affects approximately 1% of children in the United States. Of these children, as many as 50% may develop life-threatening diabetic ketoacidosis. Screening children for islet autoantibodies that increase the risk of disease development may save lives and decrease incidence of diabetic ketoacidosis. Screening is currently available on a limited basis.

**Methods:** A Markov model was used to evaluate the incremental cost-effectiveness of screening all children aged 5-17 for risk factors associated with type 1 diabetes. The parameter estimates were obtained from a review of the literature. The model included the costs from the perspective of healthcare system. The time horizon was 20 years and lifespan (80 years). Benefits were measured using Quality Adjusted Life Years (QALY) over the lifespan. Uncertainty was accounted for with univariate and probabilistic sensitivity analyses. Costs and effects were discounted at 3% and 5%.

**Results:** The Incremental Cost-Effectiveness Ratio (ICER) for the 20-year time horizon was -$170.96 and -$556.96 for the lifespan model. Sensitivity analyses showed that the cost per QALY remained cost-saving. Cost-effectiveness estimates were most sensitive to the incidence of disease, cost of screening, and cost of treating diabetic ketoacidosis.

**Conclusions:** Screening children for type 1 diabetes risk factors may be cost-saving. Early detection of diabetic risk factors may decrease incidence of diabetic ketoacidosis reducing the associated morbidity and mortality.
Evaluation of Quality Control in Clinical Cases of Enteric Disease

Chelsea S. Cook
Preceptor: Elizabeth Carlton, PhD, MPH
Site: Anschutz Medical Campus

**Introduction**: Globally, diarrheal diseases are the second leading cause of death among children under five, so there is significant rationale for reducing the number of deaths attributed to enteric disease. This study performed a quality control on clinical data of enteric disease cases from the Global Enteric Multicenter Study (GEMS) to assess true diarrheal incidence within the study population of interest.

**Methods**: In a 3-year, prospective, age-stratified, case-control study of moderate-to-severe diarrhea (MSD) in children ages 0-59 months living in populations at four sites in Africa and three in Asia, study investigators enrolled children with MSD seeking care at clinic sites. The biweekly caseload of children between fortnights was compared at each of the clinic sites to determine whether case counts differed in weeks where the study enrollment quota was met. A Poisson regression model was utilized for statistical analysis.

**Results**: Among the 14,753 clinical cases captured, adjusting for children who met eligibility and enrollment criteria, on average, the number of case enrollment for week two was 15.5% lower than enrollment for week one (P <.0001; 95% CI: 12.1% - 18.9%). Site-specific differences were of additional statistical significance.

**Conclusions**: Secondary data analysis indicated an overall significant difference between clinical cases of MSD of participants enrolled in week one versus week two. Performing quality control on these data assists researchers in future exploration of true enteric disease incidence and its impact. Improved health outcomes can be achieved by capturing the definitive burden of MSD and employing appropriate interventions.
Evaluation of Prediction of Tularemia in Various Counties of Colorado

Nirmala Day
Preceptor: Justin Nucci, MSPH
Site: Colorado Department of Public Health and Environment

Background: Tularemia is a highly infectious zoonotic disease caused by bacteria *Francisella tularensis*. Increases of tularemia in humans have been reported by the Center of Disease Control and Prevention in the last two decades. The objective is to assess whether infected terrestrial animals serve as an effective proxy for surveillance of tularemia in the human population.

Methods: Polymerization Chain Reaction (PCR) results of human and animal cases from 2012 to 2016 were collected for this study. We hypothesized that there were no significant differences in humans and animal infection status by county and year. Univariate analysis was done to describe human and animal infection status type. Chi square tests helped to test for differences on infection status. An overall chi-square was performed to assess the significant difference in infection between human and animal species.

Results: Infection status differed significantly for Denver, Jefferson, Larimer, Routt and Weld Counties but not for Adams, Arapahoe, Boulder, Mesa and Pueblo Counties. No significant difference was found for animals and humans in 2013, 2014 and 2015; in 2016, infection status varied significantly by species. Overall Chi-square test showed that there was no significant difference in infection in animal and human species from 2012 to 2016.

Conclusion: Future studies should obtain infection data on humans based on county where they were infected rather than the county they were treated. Doing so eliminates report bias and allows for a more accurate representation of tularemia infection in humans.
Recommendations to Increase Trauma-Informed Support for Lesbian, Gay, Bisexual, and Transgender (LGBT) Adolescents

Maureen Dechico
Preceptor: Stephanie Cole, MPH
Site: Resilient School Communities (Colorado Association for School-Based Health Care)

Background: Resilient School Communities (RSC) is a quality improvement project that aims to build a trauma-informed continuum of care between schools and school-based health centers (SBHC). SBHCs are health care facilities located on school grounds that provide medical and behavioral health care. RSC aims to implement a trauma-informed approach to primary substance use prevention by acknowledging the impact of adversities on health and increasing community resiliency. Correlated exposure to trauma, Lesbian, Gay, Bisexual, and Transgender (LGBT) adolescents have high rates of substance abuse, risky sexual behavior, and poor mental health. The purpose of this study is to identify how SBHC and school staff can increase trauma-informed supports for LGBT high school students.

Methods: Content analysis of Fall 2016 key informant interviews (n=5) with SBHC staff and March 2017 focus group (n=4) with a gay-straight alliance club was conducted to identify similarities and gaps between staff and student knowledge. Descriptive statistics of the 2015 Healthy Kids Colorado Survey (HKCS) (n=15970) was completed using SAS to understand the impact of trauma on health.

Results: In regards to marijuana use, all interviewed staff mentioned marijuana as the most common substance used among adolescents. Focus group and HKCS data validated this. Trauma, such as dating violence and unwanted sex, nearly doubles the risk of marijuana use. Among LGB students, teacher support decreases the risk of marijuana use by 11%.

Conclusion: Encouraging SBHC staff to screen for and address common traumas, as well as developing positive teacher student relationships are recommended to increase trauma-informed support.
Characteristics of Housing and Development in Mexico and Their Effect on *Aedes aegypti* Mosquito Populations

Nicole Dee  
Preceptor: Andrew Monaghan  
Site: National Center for Atmospheric Research

**Background:** The *Aedes (Ae.) aegypti* mosquito transmits dengue, yellow fever, chikungunya and Zika viruses to humans and lives in or near human dwellings. Little is known about the presence or abundance of water-filled artificial containers adjacent to homes that serve as habitats for the immature stages of *Ae aegypti*, hindering surveillance and control efforts. This study examines household-level associations between water-filled containers and physical indicators visible in satellite imagery, with the aim of eventually using remote sensing satellite imaging to more accurately track mosquito populations.

**Methods:** We conducted a cross-sectional regression analysis of data collected from household properties in Orizaba, Mexico in 2013 (n=295). Characteristics including roof type, lot area, number of trees and presence of a tinaco (large water storage unit) were assessed as indicators for both presence and abundance of breeding containers on each property. Outcome variables were reported using prevalence ratios (PRs).

**Results:** Presence of a tinaco and concrete roof were significantly associated with presence of at least one water-filled container with PRs of 2.98 (95% CI 1.12, 7.93) and 3.84 (95% CI 1.14, 12.93), respectively. Lot area and trees positively associated with number of containers with PRs of 6.29 (95% CI 3.44, 11.49) and 2.97 (95% CI 1.99, 4.42).

**Conclusions:** These data suggest that both presence and abundance of water-filled containers can be estimated at the household-level using indicators acquired from satellite imagery. Such information can improve human- and computer-based surveillance of *Aedes* populations in support of local efforts to control and reduce virus transmission risk.
Evaluation of Dietary Intake of 12- to 24-month-old Children in Rural Guatemala: A Pilot Study

Roberto Delgado-Zapata, MD
Preceptor: Maureen Cunningham, MD, MPH & Traci Bekelman, PhD, MPH
Site: Center for Global Health

**Background:** The prevalence of chronic malnutrition, defined as stunting or short height-for-age, in children under five years in Guatemala is 47%, making it the highest in Latin America. Dietary intake is an important contributor to stunting, however a gap in knowledge remains about what children eat and the cultural context of food choice. This study evaluates dietary intake among children 12 to 24 months from southwestern rural Guatemala.

**Methods:** This cross-sectional study included a convenience sample of 15 mothers of stunted children and 16 mothers of normal height children from participants of the Niños Sanos (Healthy Kids) program from the Center for Human Development in El Trifinio region, Guatemala in February 2017. Anthropometry was collected and twenty-four hour dietary recalls were used to measure children’s dietary intake. Dietary data was analyzed using NutriBase 11 software.

**Results:** There is a trend towards greater energy and protein intake from solid foods in normal height children. Normal height children had a mean energy intake of 394.24 kcal and protein intake of 15.5 g from solid foods, while stunted children had a mean of 358.63 kcal and 14.19 g, respectively. Eggs and chicken were the most frequently consumed animal source foods. Coffee was consumed by 64.5% of children at least once a day. 61% of children were still breastfed.

**Conclusion:** Children with normal height may have higher energy and protein intake. Further studies should include a more diverse and bigger sample size to evaluate factors that may be linked to stunting in these communities.
Measuring the Impact of a Gay Straight Alliance on Lesbian, Gay, and Bisexual High School Students’ Mental and Emotional Health

Lisa Diaz
Preceptor: Ashley Brooks-Russell, PhD, MPH
Site: University of Colorado, Anschutz Medical Campus

**Background:** Evidence has shown that lesbian, gay, and bisexual (LGB) youth experience a higher prevalence of negative emotional and suicidal outcomes than their heterosexual counterparts. The purpose of this cross-sectional study is to assess the association between the presence of a Gay Straight Alliance (GSA) in high schools and selected emotional health outcomes among LGB students.

**Methods:** Data from the 2015 Healthy Kids Colorado Survey was used to analyze outcomes by exposure to a GSA (N= 28,259 observations from 253 high schools). Weighted prevalence was calculated for selected outcomes including suicide attempts, hopeless feelings, and bullying; and were stratified by sexual identity. Adjusted multivariate logistic regression described the odds of each outcome by exposure.

**Results:** Compared to LGB students in schools without a GSA program, LGB students in schools with a GSA reported a significantly lower prevalence of having attempted suicide (lower by 30%, p=0.0001). After adjusting for race/ethnicity, grade level, and school setting, the prevalence of suicide attempts in schools with a GSA remained significantly lower than the rate for students in schools without a GSA (lower by 28%, p=0.0004). The prevalence of other outcomes measured in the presence of a GSA was lower, but did not show significance.

**Conclusions:** The presence of a GSA is associated with a lower likelihood of LGB high school students experiencing emotional or suicidal outcomes. Future program evaluation might define measures that show how a GSA in schools might significantly lower prevalence rates of adverse emotional health outcomes for LGB youth.
Background: The Center for Disease Control’s Social Vulnerability Index (SVI) uses American Community Survey census tract data to assess community needs after disasters. Applicability of SVI to more common outcomes has not been evaluated. This study investigates a novel use of the SVI to identify increased risk in high school football concussion.

Methods: Researchers assessed the 2014 SVI scale’s ability to identify schools with higher football concussion rates in a national high school injury surveillance study (High School RIO, 2013/14-2015/16) through rate ratios and 95% confidence intervals. Mixed model linear regression assessed SVI elements (poverty, income, etc.) and school characteristics association with concussion rates.

Results: There were 13 socially vulnerable schools of 254 in the sample. Competition (RR:0.65,CI95%:0.48-0.89) and overall (RR:0.77,CI95%:0.53-0.98) concussion rates were lower in socially vulnerable schools. Overall rates of concussion were higher in small(RR:1.38,CI95%:1.27-1.50) and private (RR:1.30,CI95%:1.23-1.41) schools, practice and competition rates followed this pattern. Rural schools had significantly higher competition rates (RR:1.11,CI95%:1.03-1.21) and lower (RR:0.90,CI95%:0.82-0.99) practice concussion rates. SVI characteristics associated with overall concussion rates were single parent (p=0.0043) and minority (p=0.0099) status. After controlling for school size, type, and the rate of other injuries these single parent (p=0.0048) and minority (p=0.037) associations remained.

Conclusions: Schools with higher social vulnerability show lower concussion rates in high school football. Limitations include a low proportion of socially vulnerable schools and differences between school catchment area and census tracts. Future studies could elucidate relationships between school characteristics and concussion rates.
Trends and Factors of Invasive *Streptococcus pyogenes* Subtypes in the Denver Metro Area, 2010-2015

Matthew Estes  
Preceptor: Nisha Alden  
Site: Colorado Department of Public Health and Environment

**Background:** Invasive *Streptococcus pyogenes* is a bacterium responsible for necrotizing fasciitis, toxic shock syndrome, and sepsis. The organism is subtyped into emm types by its M-protein, allowing epidemiologists to determine which emm types are prevalent in their community, and identify outbreaks. This paper determined if the rate of invasive infections in the Denver metro area was significant, if rates of certain emm types were significant, and which factors were associated with infections.

**Methods:** Using a dataset containing 924 cases from 2010 to 2015, the overall rate of infections and rates of emm types were calculated, and tested to see if the change in trend was significant. Risk factors for emm types with significant trends were then determined using statistical analysis.

**Results:** The rate of all infections, and emm types of interest, from 2010 to 2015 did not have a significant change in trend. However, the trend of cases of emm82 (p<0.0001), emm89 (p=0.034), and emm92 (p<0.0001) were significant with an increase in 2015. Homelessness (p=0.0001), race (p=0.01), sex (0.01), alcohol abuse (p<0.0001), and cirrhosis (p=0.02) were all related to emm82. Homeless were 5.5 times more likely to become infected with emm82 than any other emm type in 2015. Age was significantly related to emm89 (p=0.03), and intravenous drug use was associated with emm92 (p=0.01).

**Conclusion:** The increase of invasive streptococcus pyogenes infections in 2015 is related to the increase of certain emm types in the community, and those emm-types affected certain populations. Identifying these groups will help in future interventions.
Maternal depressive symptoms and the risk of abnormal developmental screening results within the first year of life

Jessica Filley
Preceptor: Ayelet Talmi, PhD
Site: Children’s Hospital Colorado

Background: Children of depressed mothers are more likely to experience impaired cognitive and social development, exhibit poor self-control, and have poor peer relationships. There is limited research examining these relationships within the first year of life. This study examined abnormal infant development and the association with mothers who screened positive for pregnancy-related depression in a pediatric primary care setting.

Methods: Infant development was assessed with Ages and Stages Questionnaires at 6- and 12-months of age; maternal depression was based on the Edinburgh Postnatal Depression Scale at the 2-month well child visit. There were 3512 infants included as part of the initial cross-sectional review of electronic medical records, 1867 for whom 6-month ASQ was available and 1531 for whom 12-month ASQ was available; 957 had both available. Multivariable logistic regression assessed the risk of abnormal development in infants whose mothers screened positive on the EPDS. Odds ratios were reported.

Results: Infants were 2.341 times more likely to have abnormal ASQ results at 6 months (95% CI: 1.376 – 3.985, p=0.0017) and 2.926 times more likely to have abnormal ASQ results at 12 months (95% CI: 1.624 – 5.272, p=0.0004) when their mothers had a positive EPDS score compared to infants with mothers who had a negative EPDS score.

Conclusions: In the first year of life, infants have an increased risk of screening positive for abnormal development when the mother exhibits depressive symptoms. This suggests that early assessment and interventions related to pregnancy-related depression screenings may be beneficial for early childhood development.
Bacterial Composition of Oropharyngeal Swabs and Tracheal Aspirates in Mechanically-Ventilated Children

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Sites: Children’s Hospital Colorado and Colorado School of Public Health, University of Colorado Anschutz Medical Center

Introduction: Ventilator-associated pneumonia (VAP) occurs in 3-10% of mechanically-ventilated children. Tracheal aspirates are used to monitor the lower airway bacterial colonization that leads to VAP, but concerns remain that they may be contaminated with upper airway bacteria. This study compares the microbiome (bacterial composition) between tracheal aspirates and oropharyngeal (OP) throat swabs.

Methods: Tracheal aspirates and OP swabs were collected from 25 children in a prospective cohort study of 140 mechanically-ventilated children at Children’s Hospital Colorado from 2010-2011. For each sample, 16S rRNA gene sequencing identified bacteria present. Paired data were examined using Morisita Horn (MH) indices, which measures similarity between samples on a scale from 0 (no similarity) to 1 (identical). Further analyses identified taxa that differed between paired samples.

Results: Twenty-five bacterial taxa were included in the analyses. The median MH index was 0.85 (IQR 0.30-0.93). Eleven patients (44%) had MH indices below 0.7, indicating low similarity between samples. The relative abundance of Actinobacter, Moraxella, Prevotella and Staphylococcus differed between OP swabs and tracheal aspirates (Wilcoxon signed rank test, p < 0.05, Bonferroni corrected). The presence of Staphylococcus also differed between paired samples (McNemar’s test, p < 0.05, Bonferroni corrected).

Discussion: The microbiome of oropharyngeal swabs and tracheal aspirates differed in overall similarity and the relative abundance of specific bacterial taxa in many patients. For these patients, tracheal aspirates could be used to monitor bacterial colonization of the lower airway in advance of VAP development. Further analyses will be conducted to determine why differences among patients exist.
Evaluating the Effectiveness of the Be the Better YOU Program for Centura Health’s Employee Population

Kaitlin Galonska
Preceptor: Angie Villamaria
Site: Centura Health

Introduction: Based on Centura Health’s 2015 Health Assessment, stress levels have substantially increased over the recent years. Mindfulness-based stress reduction programs have been proven to reduce stress. The study evaluated the effectiveness of the Be a Better YOU, a mindfulness-based stress reduction program, designed and developed to provide Centura Health’s employees with tools and information for managing stress and recommendations for future programming.

Methods: This was a pre/post evaluation study design. The program was strategically designed in the summer of 2016 and from October to December 2016, 161 participants completed the four-week program, which included weekly chapters consisting of an education and activity portion. Stress levels were collected via self-report at baseline and after program completion based on a 5-item rating scale comprised of extremely stressed, very stressed, moderately stressed, slightly stressed, and not at all stressed. Differences in pre/post self-reported stress levels and program feedback were described.

Results: At baseline, 48% of participants reported being moderately, very or extremely stressed whereas after program completion 29% of participants reported being in those categories. Nearly one third of the population (32.1%) reported the breathing activity was most effective at reducing their stress levels.

Conclusions: Self-reported stress levels reduced after the completion of the program therefore Be a Better YOU appears to be a feasible program. Following the program, based on the success of this preliminary study, the results can inform future, larger scale programming to better understand and reduce employee stress.
Evaluation of Educational Materials for the Prevention of *Aedes aegypti* Transmitted Diseases in Ecuador

Reese Garcia  
Preceptor: Naveed Heydari, MPH  
Site: Ecuador

**Background:** The Ecuadorian Ministry of Health (MOH) conducts educational campaigns for the prevention of *Aedes aegypti* transmitted diseases (Dengue, Chikungunya, Zika). Despite efforts, educational materials may not be reaching vulnerable populations due to ineffective tailoring or delivery methods. This evaluation was conducted to understand the association of sociodemographic characteristics with community member’s disease knowledge and perceived utility of educational materials.

**Methods:** Researchers administered 117 surveys to community members throughout four cities in southern Ecuador at education events between July and August 2016. The instrument was translated into Spanish and utilized a multimethod design. Researchers ran descriptive and inferential statistics to determine which factors influenced overall knowledge and which formats were preferred. Specifically, they looked at demographics, geographic location, disease knowledge, and type of information and format of educational materials.

**Results:** Nearly 90% of respondents claimed that the MOH’s materials were easy to understand and increased knowledge and motivation to take prevention measures. Researchers observed significant differences in disease knowledge between females and males (chi-square =11.42, df=2, p=.003), and location (chi-square=14.52, df=6, p=.02). Approximately 50% of individuals with a primary education were unsure where to obtain information.

**Conclusions:** Educational materials are reaching communities and appear efficacious. Given that women had higher knowledge than males, future programming should consider separately targeting men. The MOH must also take into account cultural nuances across cities, such as disease risk perception, and acknowledge that educational status can affect how one obtains their information. Future steps should assess how disease knowledge translates into prevention.
**Are Professional Educational Modules an Effective Means to Help Radiologists Decrease Patient Fluoroscopy Dose?**

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Preceptor: Brad Lofton, M.S. DABR
Site: St. Francis Medical Center, Colorado Springs

**Background:** As technology increases, patients are receiving more diagnostic imaging tests and procedures, which are not without risk. The purpose of our quality improvement project was to determine if developing and implementing professional educational modules might help radiologists decrease patient dose during fluoroscopy.

**Methods:** We created educational modules to provide information to radiologists (18) and technologists (15) who perform fluoroscopy at our site hospital about practices to decrease dose in this modality. These modules were based upon the pre-existent Image Gently and Image Wisely guidelines. Eleven percent of radiologists and forty seven percent of technologists completed all training. Thirty-four fluoroscopy procedures were utilized. Studies were divided into seventeen matched pairs. Radiation dose was compared before and after the educational intervention using the paired t-test method.

**Results:** Following the educational intervention, we compared six dose metrics. We saw no statistical change in four measures (p>.05), which were within good range both before and after. Fluoroscopy time varied within acceptable range, likely due to procedural difficulty rather than education. However, we did see a statistically significant difference (p< .01) in the method of image capture following education, with a decrease in direct radiation exposures. (scale 0-3, before: 0.9; after1.6).

**Conclusions:** This change in image capture represents one method of decreasing patient dose. However, due to single healthcare system and time constraints, our procedure numbers are small. A repeat study would be helpful on a larger scale with increased numbers to evaluate better the value of education in helping decrease dose to patient.
The Impact of Scheduling Recess Before Lunch on Meal Consumption in Greeley-Evans Elementary Students

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Greeley-Evans School District 6

Background: Dietary intake is one factor that largely impacts adolescent obesity and school meals may be the only opportunity for some adolescents to consume the recommended amount of daily fruits and vegetables. Scheduling recess before lunch has been shown to increase meal consumption, however many schools have yet to implement this schedule. The purpose of this study was to determine whether scheduling recess before lunch in Greeley-Evans elementary schools increases fruit and vegetable consumption, in hopes to implement this schedule across the district.

Methods: A cross-sectional observational study was conducted throughout 11 Greeley-Evans elementary schools from September-December 2016. Fruit, vegetable, entrée, and beverage consumption were observed and measured in increments of 25% during lunchtime for 106 students. The analysis compared scheduling recess before or after lunch with fruit and vegetable consumption for each student. We also conducted t-tests between fruit and vegetable consumption with gender, grade, and school.

Results: Recess was scheduled after lunch for nearly 39% of students. When recess was scheduled before lunch 62% of fruit was consumed, and 47% when recess was scheduled after lunch (p=0.074). There was no difference in vegetable consumption, however females were more likely to take a vegetable than males, 62% to 32%, respectively (p<0.05).

Conclusion: Without statistically significant data, we cannot state that scheduling recess before lunch increases fruit and vegetable consumption in Greeley-Evans schools. However, there was a trend in fruit consumption when recess was scheduled before lunch. Further research should examine this by observing a larger population.
Quality of Diabetes and Hypertension Care at the DAWN Student-Run Free Clinic

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Site: The DAWN Clinic

Background: Student-Run Free Clinics are part of the safety-net healthcare system, but little is known about the quality of care in this setting. This study aims to compare diabetes and hypertension care at the DAWN Clinic to Colorado safety-net providers using national standards and to establish quality improvement targets.

Methods: We conducted a mixed-methods evaluation of diabetes and hypertension management for patients initiating care from March 1, 2015 to September 31, 2017. Quantitative study consisted of retrospective chart review assessing whether patients received recommended screening tests (process outcomes) and achieved disease control (intermediate outcomes). These were compared to Colorado Medicaid (CoM) using one proportion tests and paired t-tests. Qualitative study involved in-depth chart review of randomly-selected well- and poorly-controlled diabetic and hypertensive patients to identify barriers to health and variations in care.

Results: Diabetic patients (n=30) receiving recommended screening was: HbA1c 93.3% (vs. 77.8% CoM, p=0.04), nephropathy care 70% (vs. 85.4% CoM, p=0.02), retinopathy exam 30% (vs. 40.47% CoM, p=0.24). Diabetic intermediate outcomes showed: 46.7% (vs. 37.3% CoM, p=0.29) good control and 40% (vs. 55% CoM, p=0.10) poor control.

Patients with hypertension (n=75) experienced an average decrease in systolic blood pressure from baseline of 8.66mmHg (p<0.01) and overall 33.3% (vs. 58.9% CoM, p<0.01) of patients were at blood pressure goal (<140/90).

Conclusions: DAWN Clinic diabetes and hypertension outcomes are comparable to Colorado Medicaid except for lower rates of nephropathy screening and blood pressure control. Future quality improvement efforts should address these outcomes, improving follow-up, standardizing documentation, and barriers to care.
Exercise, Sleep, and the Aging HIV Population

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Site: Colorado School of Public Health¹, Rush University², University of Colorado-Denver³

Introduction: Sleep complaints are consistently reported in people with Human Immunodeficiency Virus (HIV). This study investigates the difference in sleep quality and quantity in older adults with and without HIV, before and after an exercise intervention.

Methods: HIV-infected and uninfected participants (n=70) were recruited into a 6-month exercise intervention. The Pittsburg Sleep Quality Index (PSQI) and wrist-worn actigraph data were collected at 0, 12, and 24 weeks to measure subjective and objective sleep outcomes, respectively. Two sample T-tests compared PSQI score, total sleep time, sleep onset latency, wake after sleep onset, and sleep efficiency at each point. Multiple covariates were investigated to determine associations with the sleep outcomes.

Results: Mean PSQI scores were significantly different between HIV-infected (8.7, 3.5) and HIV-uninfected (6.6, 3.7, p=0.02) at baseline and post-intervention (8.3, 3.7 and 4.9, 2.6, p<0.01). Objective measures of sleep were not statistically different at baseline or at week 24 (all p>0.1). Furthermore, there was no significant change in any outcome from 0 to 24 weeks. Significant associations exist between sleep outcomes with the covariates employment, education, marijuana use, smoking, drugs, alcohol, and comorbidities (p<0.05).

Discussion: This study is the first of its kind to investigate whether an exercise intervention can impact the sleep of the HIV-infected population. In this preliminary analysis, we found no significant effect of an exercise intervention on sleep quality, although sleep quality was poorer among HIV-infected compared to uninfected participants. Further analyses with a greater number of completed participants will allow for adjustment of contributing factors.
Background: The Action Center is a non-profit organization that serves Jefferson County residents including homeless with basic needs and pathways to self-sufficiency. Currently, there is a gap in accessing care that these participants face. The purpose of this project is to identify behavioral and socioeconomic factors associated with access to care and barriers based on chronic health conditions.

Methods: A retrospective cohort design was used (participants with chronic disease (n=182) and without (n=240) from September 2016 to December 2016. A multivariable logistic regression analysis was utilized to examine the association between chronic disease status and experiencing a barrier to accessing healthcare.

Results: Participants with a chronic condition were 1.5 times more likely to experience a barrier when accessing healthcare (unadjusted OR 1.553; 95%CI 1.034, 2.332 p = 0.034); this association was significant after adjusting for potential confounder (adjusted OR 1.742 95%CI 1.099, 2.761 p = 0.018). Not satisfied with current provider (OR 2.084; 95%CI 1.160, 3.743; p = 0.014), current health insurance (OR 2.161; 95%CI 1.161, 4.021; p = 0.015), and not having a primary care provider (OR 1.963; 95%CI 1.255, 3.071; p = 0.003) were associated with having a barrier to healthcare.

Conclusions: After adjusting for confounders, there was an association with chronic disease and having a barrier when accessing health care within the participants of The Action Center. Satisfaction of primary care provider, health insurance, doctor visit, and having a primary care provider did increase the chance of having a barrier to health care on its own.
An Analysis of the Relationship between Inflammation and Increased Insulin Resistance in Women with Type 1 Diabetes

Samantha Hoss
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Site: Barbara Davis Center

Background: Women with type 1 diabetes (T1D) have higher rates of cardiovascular disease (CVD) and are more insulin resistant than women without T1D (non-DM). The purpose of this study was to find out if women with T1D have greater inflammation compared to non-DM women; and if this explains the increased insulin resistance observed in women with T1D.

Methods: In the cross-sectional Women Insulin and Sex Hormones Study, a three-stage hyperinsulinemic-euglycemic clamp was performed in 12 participants with T1D and 13 non-DM participants. Mean glucose infusion rate (GIR) and free fatty acid (FFA) suppression were used to assess insulin sensitivity. We examined the association between inflammation and insulin resistance in participants by diabetes status and inflammation using multivariable linear models.

Results: There was no significant difference in inflammation by diabetes status. FFA suppression and GIR were negatively correlated with inflammatory score (FFA p=0.041; GIR p=0.042). In linear regression models, high vs. low inflammation was only associated with GIR in the non-DM group (p=0.02). GIR was significantly lower in women with T1D and non-DM women with low inflammation. FFA suppression was lower in women with T1D than non-DM women regardless of inflammatory status. Among women with T1D, FFA suppression was significantly lower in women with high vs. low inflammation (0.03).

Conclusions: High inflammation was associated with GIR and FFA suppression, but these relationships differed by diabetes status. Women with T1D did not have higher levels of inflammation than non-DM women, suggesting that other factors are responsible for decreased insulin sensitivity in T1D.
The Health and Wellness Program for Refugees

Almas Jabeen
Preceptor: Susanne Roser, MPA
Site: Mercy Housing Denver Metro Properties – Grace Apartments

Background: Barriers to health care affect health outcomes for the refugee population. Research conducted on how refugees experience access to health care services is minimal. The goal of this qualitative analysis study is to assess the community’s needs and to analyze barriers to healthcare among refugees at Mercy Housing's affordable housing site with the Health and Wellness Program.

Methods: 332 subjects were identified from the enrollment dataset (August 2016 to March 2017). From these, 45.2% did not have known health insurance status and were selected for a standardized interview, consisting of five multiple choice questions, and 10 open-ended questions. In-person interviews were conducted with certified translators and results were analyzed to discover common themes related to health care access. Based on these results, recommendations are provided.

Results: The interviews were completed with 149 subjects that spoke Karen, Karenni, and Nepali languages. One interview was incomplete due to difficulty in finding a translator. 91.9% had insurance (Medicaid, CHP+, private) while 8.1% of the subjects had no insurance. Nine residents had access to health discount programs. The main barriers to healthcare access were transportation (28.9%), lack of health literacy (15.4%), and language barriers (34.2%).

Conclusion: Using the Health and Wellness program to assess the needs and barriers of the population proved useful. For future work in creating a stronger, health-based platform at the affordable housing site, the program may be modified based on this evaluation to provide resources necessary for transportation, interpretation and health education services.
Social Determinants of Community Associated *Clostridium Difficile* Infection in Colorado

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Preceptor: Helen Johnston, MPH
Site: Colorado Department of Public Health and Environment

**Background:** Patients with CA *C. difficile* infection lack the traditional risk factors that define healthcare-associated *C. difficile* cases. The rate of CA CDI cases has increased annually in Colorado since 2011. Through the Centers for Disease Control and Prevention’s Emerging Infections Program (CDC EIP) surveillance, data collected has shown differences in risk factors between community and healthcare-associated cases\(^1,2\).

**Methods:** Line listings of positive tests were provided to the Colorado Department of Public Health and Environment from clinical laboratories across Colorado. Key data categories include demographics, exposures to healthcare settings, outcomes, clinical and radiographic findings, selected underlying conditions, and prior medications. Cases were randomly selected for medical chart review using a stratified random sampling scheme. Case data was then linked with census data to obtain area-level socioeconomic measures.

**Results:** Of the 615 patients with community-associated CDI, 320 (52.2%) of the population was white, 374 (61%) of the population was female with a mean age 47.7 years. 174 (28%) of all cases resided in Arapahoe county with median household incomes of $63,265. When compared to hospital-associated cases (N=787), there was a significant difference in age (\(p<0.0001\)), household median income (\(p=0.0003\)), residence (\(p=0.0003\)), ethnicity (\(p=0.0382\)), and race (\(p<0.0001\)) among community associated cases.

**Conclusion:** Significant differences were detected in socioeconomic risk factors between community-associated and hospital-associated *C. difficile* infections in Colorado. Outcomes from this data indicate the need to address health disparities seen in patients with *C. difficile* infections. Intervention and prevention efforts are needed to reduce rates of infection within a community setting.
Factors that Predict Initiation and Continuation of Breastfeeding for Adolescent Mothers in the Colorado Adolescent Maternity Program (CAMP)

Rachel Karban
Preceptor: Jeanelle Sheeder, PhD
Site: Children’s Hospital Colorado

**Background:** Breastfeeding provides optimal nutrition for the first year of an infant’s life. Adolescent mothers have been shown to have a lower rate for breastfeeding initiation and a higher rate of early (<6 months) cessation than adults. This study assesses factors associated with breastfeeding initiation and continuation in CAMP.

**Methods:** Demographic, psychosocial, birth, and feeding data were collected on a cohort of CAMP patients who delivered in 2015. We compared breastfeeding-initiators and continuers using bivariate analyses. Survival analysis was used to determine the highest risk time for breastfeeding cessation. Provider notes were reviewed to identify reasons for stopping.

**Results:** A total of 177 CAMP patients delivered and obtained postpartum/infant care in 2015; 84% were breastfeeding at the newborn visit, 25% were breastfeeding at 6 months. Mothers who continued breastfeeding were more likely to be in school/graduated (97.1% vs. 80.4%; OR: 8.05; 95%CI: 1.04-62.44) and to have desired pregnancy (48.3% vs. 27.0%; OR: 2.53; 95%CI: 1.06-6.00). Other demographic and psychosocial variables were similar between the groups. For breastfeeding initiators, median time to cessation was 3.1 months.

**Conclusions:** This study demonstrates that adolescent mothers initiate breastfeeding at a high rate but discontinue early. Mothers who drop out of school and have a non-intended pregnancy are at higher risk for early breastfeeding cessation. Future interventions should focus on ways to support breastfeeding continuation beyond the newborn period.
Factors Contributing to Restaurant-Associated Foodborne Outbreaks in Colorado

Mitchell Keener
Preceptor: Elaine Scallan, PhD
Site: The Colorado Integrated Food Safety Center of Excellence

Background: Foodborne illness continues to be a serious problem in the United States. Every year, approximately 47.8 million people become ill and 3000 die from food related illness. To ensure food safety in Colorado, state and local health departments inspect and regulate restaurants while also conducting environmental assessments for outbreak investigations to determine the contributing factors to an outbreak.

Methods: Outbreaks reported from Colorado to the National Outbreak Reporting System (NORS) were described to characterize the contributing factors to foodborne illness outbreaks in Colorado. The completeness of the contributing factor data was assessed by determining what outbreak variables were associated with whether an outbreak was assigned contributing factors during an environmental assessment.

Results: Of 227 foodborne disease outbreaks investigated between June 2009 and April 2015, 95 (32%) were restaurant associated, 63/95 (66%) of restaurant-associated outbreaks had at least one reported contributing factor assigned, and 54/95 (57%) had a pathogen assigned. Of the 63 outbreaks with a contributing factor assigned, 51% had at least one contributing factor related to food preparation within the establishment. Outbreaks that were assigned contributing factors were more likely to be larger in size and to have a pathogen assigned to the outbreak.

Conclusions: Food preparation within restaurants in Colorado should be a focus to reduce the number of outbreaks. Contributing factor information is vital to preventing future outbreaks, therefore finding the implicated pathogen and understanding the difficulties of detecting contributing factors during small outbreaks are important considerations for environmental health specialists conducting environmental assessments.
A Multiple Policy Case Study: Colorado Food Systems Digital Hub Utilization

Amy Kleinman
Preceptor: Wendy Peters Moschetti, MCP
Site: LiveWell Colorado

Background: The Colorado Food Policy Network (Network) consists of food system coalitions who work to ensure that Coloradans have access to healthy, affordable food. LiveWell launched the Colorado Food Systems Digital Hub to support the work of the Network. The purpose of this study was to determine the geographical differences in Hub utility by evaluating the extent to which the Hub equips the Network with the information needed to advance their research, policy, and community engagement needs.

Methods: In this case study, key informant interviews (n=12) were conducted with stakeholders in the Network to understand how the Hub is being used. An online survey was issued (n=159) to all Hub members to identify individual and regional utilization trends.

Results: Key informant interviews revealed the most common uses of the Hub within rural food system coalitions as resource sharing, peer networking, and tracking statewide food system work. Urban food system coalitions are using the Hub to inform policy makers, support food assessments, and to identify best practices. Survey results (n=28) supported these findings and revealed that regardless of region, 86% of respondents use the Hub to pair locally-collected data with secondary food environment data on the Hub.

Conclusions: These findings indicate that LiveWell should enhance the communication functions on the Hub, increase the availability of local data, and upgrade data mapping capabilities. With these changes, the Hub will continue to support the data needs of both rural and urban food system coalitions while building the capacity for regional food systems change.
Knowledge of Norovirus and Attitudes towards a Potential Norovirus Vaccine in Rural Guatemala: A Cross Sectional Survey

Steven Krager
Preceptor: Molly Lamb, PhD
Site: UC Denver Center for Global Health

Background: Noroviruses are a leading cause of acute gastroenteritis (AGE) worldwide. With several vaccines under development, population-level attitudes about norovirus disease and vaccines are needed. Following a norovirus surveillance study in rural Southwest Guatemala we surveyed participants’ norovirus knowledge and interest in future vaccines.

Methods: Households with children ages 6 weeks to 17 years were enrolled into two surveillance systems: 1) a prospective cohort tracking AGE symptoms and 2) two separate cross-sectional surveys inquiring about AGE symptoms in the preceding week. At study completion, participating households were surveyed about knowledge of norovirus and attitudes towards a potential norovirus vaccine.

Results: Surveys were completed on 564 (90%) of 627 households. In the analyzed households 469 (83%) of respondents correctly identified how norovirus is transmitted, 484 (86%) stated that norovirus can be a serious illness, and 545 (96%) understood that norovirus most commonly affects children age 0-5 years. Over 99% recognized diarrhea as a symptom of norovirus. Over 97% indicated interest in a norovirus vaccine. Higher level of parental education was associated with a willingness to pay more for a potential vaccine.

Conclusions: Households that recently participated in an AGE surveillance study in rural Guatemalan demonstrated an appropriate understanding of norovirus transmission and risk, and a strong interest in a future norovirus vaccine. These results could inform future norovirus vaccination programs.
Assessment and Evaluation of the Campus Recreation Program, Services, and Learning Objectives

Amanda Lalonde
Preceptors: Scott Schuttenberg, MS; Vince Carter, MS; Jade Dworkin, MS
Site: University of Northern Colorado Recreation Center

Background: On average, 62% of students report campus recreation influenced their decision of which college to attend. Subsequent to enrollment, 75% of students use campus recreation, of those, 64% report that increased recreation participation provided beneficial skills and abilities important for use after college. Furthermore, 90% of students report campus recreation activities will be important for them to maintain healthy lifestyles after graduation. Students indicated the following health benefits from participation: overall health, fitness, stress management, weight control, self-confidence, and concentration. The purpose is to present campus recreation assessment and evaluation results, which are fundamental to the success and health of students, and align with the mission of the university.

Methods: To ensure program vitality and relevance, the University of Northern Colorado utilizes the Council for the Advancement of Standards in Higher Education (CAS) assessment and evaluation tool for student services. The use of the CAS self-assessment guide, collection of evidence, content analysis, and SWOT analysis provided data related to quality programming, effective learning objectives to support healthy habits, and the mission of the university.

Results: Assessment and evaluation data will inform the campus recreation strategic planning by utilizing current strengths, weaknesses, opportunities and threats in future program development. One specifically targeted opportunity addressed learning objectives, which provide an adequate guide to participants to assist with academic and health successes.

Conclusions: These learning objectives apply to the future of public health through campus recreation programs and services to enhance the campus community’s physical, mental, occupational, environmental, social, intellectual, and spiritual well-being.
Assisting Public Health Practitioners and Partners with Data Interpretation and Utilization via Development of Non-Technical Data Source Factsheets

Sydney Lawrence
Preceptors: Westley Lighthall, MPH, Renee Calanan, PhD
Site: Colorado Department of Public Health and Environment (CDPHE)

Background: The Center for Health and Environmental (CHED) data portal on the CDPHE website houses several population-based data sources that are routinely accessed by internal and external partners for several purposes, including public health surveillance, program planning and evaluation, and grant writing. Incomplete or inaccurate understanding of the data sources can prevent partners from properly interpreting and utilizing data, potentially resulting in inadequate planning and implementation of programs and unsuccessful grant applications. The purpose of this project was to create a resource for partners with detailed information about key data sources to aid in interpretation and utilization of the data.

Methods: Preliminary research was conducted to gather initial information about the data sources and plan for semi-structured interviews with data source experts and end users to inform content and formatting of the factsheet. A first draft was developed and shared with interviewees to gather feedback and gain buy-in. Collaboration with the communications branch aided in factsheet design and development. Wide dissemination of the factsheet included email distribution and posting on the CHED data portal.

Results: Thirteen internal and external partners were interviewed about eight data sources. The following attributes were identified for inclusion: data steward/agency, data source description, methodology, data availability, considerations for data interpretation, and related links. A one-page factsheet format was desired for both online viewing and handouts at meetings.

Conclusions: Data source factsheet development and dissemination demonstrate the essential public health services, and support data-informed decision making within the public health field.
Food Insecurity is associated with Metabolic Syndrome in NHANES Participants 1999-2014

Caroline Ledbetter
Preceptor: Anna Baron, PhD Biostatistics
Site: Colorado School of Public Health

Background: In 2011, it was estimated that 14.9 percent of households were food insecure at least some of the year. Heart disease is the leading cause of death in the US and diabetes is seventh. Metabolic syndrome (MetS) is associated with a twofold increased risk of developing cardiovascular disease and a fivefold increased risk in developing type 2 diabetes. A better understanding of the association between food security and poor metabolic health can improve the effectiveness of public health interventions.

Methods: This study used data from 13,793 18-65yr old participants collected as part of NHANES 1999-2014. The association between food insecurity and MetS was estimated using relative risk regression. We adjusted for race/ethnicity, age, physical activity, smoking status, education and income. Food insecure was analyzed as both a binary (food secure/food insecure) and ordinal (full/marginal/low/very low food security) variable.

Results: The unadjusted prevalence of MetS in food secure individuals was 0.30(0.29-0.32)% and in food insecure individuals was 0.33(0.30-0.36)%. Food insecurity was associated with MetS in females [adjusted relative risk (ARR) 1.41(1.04-1.92)] but not in males [ARR 1.06(0.77-1.47)]. Low food security was associated with MetS (when compared to full food security) in females [ARR 1.86(1.26-2.73)] but not males [ARR 1.19(0.79-1.79)].

Conclusions: Food insecurity is associated with a moderately increased risk of MetS in females. Further research is required to access the reasons for these gender differences. It is important for public health professionals to consider access to affordable high quality food when working to promote good metabolic and cardiovascular health.
Evaluating Outcomes of a Three-Tiered Orientation System in Matching Surgical Technicians to Cases Based on Skill

Tamara P. Lhungay  
Preceptor: Shandra Wilson, MD  
Site: University of Colorado Hospital

**Background:** New surgical technicians at University of Colorado Hospital (UCH) could be assigned high-risk, complex cases. This could negatively impact learning and patient outcomes, and cause unnecessary expenses. We created a novel, three-tiered orientation system to match surgical cases with technicians based on skill level, and evaluated this approach using surveys and medical error data.

**Methods:** April 2015 – September 2016, we implemented the tiered orientation system for surgical technicians at UCH, a high-volume, academic surgical center. Trainees, surgeons, and operating room (OR) leadership completed pre- and post-surveys evaluating the program. Survey questions asked about case-assignment efficacy and perceived patient risk. We used T-tests to assess changes, and obtained data on retained surgical items (RSI) and incorrect counts (discrepancies in surgical equipment counts before and after surgery) from hospital records.

**Results:** Pre- and post-surveys were completed by 27/47 and 6/13 trainees, respectively, 16/38 and 16/38 surgeons, and 5/16 and 7/15 OR leaders. Leaders reported significant positive changes for the following survey items: awareness of objective criteria (p=.008); ease of case-matching (p=.02); objectivity of assignments (p=.03); and assignment appropriateness (p=.006). Additionally, RSI and incorrect counts declined during this program.

**Conclusion:** Only survey responses from leadership demonstrated perceived improvement. This could be attributed to leadership’s observant nature, while surgeons/trainees were more likely to encounter issues first-hand. This study suggests that a skill-based case-matching system has potential to improve assignments and objectivity. Also, decreased incorrect counts and RSI suggest improved patient outcomes. Further research with a larger sample size is necessary to confirm findings.
Testing the Statistical Agreement of Automated Neuroquant Volumetric Analysis to Validated Research Methods Across Multiple MRI Scanner Manufacturers and Field Strengths

Jia Lin
Preceptor: Charlie Rawson, MD
Site: Department of Neurology, Division of Neuroimmunology, Rocky Mountain Multiple Sclerosis Center at University of Colorado Denver

Background: Brain atrophy is a strong clinical predictor of disability worsening in multiple sclerosis (MS). Automated methods are necessary for clinical implantation of volumetric analysis. Here we compare fully automated Neuroquant software to well validated semiautomatic Structural Image Evaluation using Normalization of Atrophy-Cross-sectional (SIENAX) software across four different MR scanners, comparing cross-sectional whole brain volume (WBV) and normalized brain volume (NBV).

Methods: Standard of care MRIs from 273 MS patients were analyzed: 70 on Siemens 1.5T, 65 on Philips 1.5T, 61 on Philips 3T, and 77 on GE 3T scanners. WBV and NBV measurements were calculated using Neuroquant and SIENAX. Statistical agreement was evaluated by linear regression and Bland-Altman plots. Precision & accuracy of WBV, and precision of NBV measurements were calculated for Neuroquant using SIENAX as the reference standard.

Results: There were no significant differences in age, gender, MS subtype, or lesion volume between the four MRI scanner cohorts. Precision for WBV for SIEMENS 1.5T, Philips 1.5T, Philips 3T, and GE 3T scanners were 0.986, 0.967, 0.975, and 0.975, respectively, with mean volume differences, +4.6%, +6.0%, +5.7%, and +3.1%. Precision of the Neuroquant NBV estimation for SIEMENS 1.5T, Philips 1.5T, Philips 3T, and GE 3T scanners was 0.834, 0.828, 0.767, and 0.819, respectively.

Conclusion: Across a wide range of MRI scanners, Neuroquant derived cross-sectional WBV and NBV shows strong statistical agreement to SIENAX, a standard tool for brain volume measurement in MS studies. However, our results suggest that Neuroquant does better with WBV than with NBV.
Graves’ Disease and Refractive Errors after Cataract Surgery

Melisa Lindt
Preceptor: Anne M. Lynch MD, MSPH
Site: University of Colorado Health Eye Center

**Background:** Graves’ disease affects many adults and can change the shape or the refraction of the eye, affecting how well a person sees. The artificial lens implanted during cataract surgery is chosen based off of the measured refraction before cataract surgery. Patients with a history of Graves’ disease are not given distinct refractive consideration prior to cataract surgery. The purpose of this project was to examine the association between poor refractive outcomes after cataract surgery and a history of Graves’ disease.

**Methods:** In a retrospective cohort study, researchers abstracted medical information for all patients that received cataract surgery in 2014 and 2015 at the University of Colorado Health Eye Center. Researchers compared patients that had a history of Graves’ disease (n=16) to patients without a history of Graves’ disease (n=1,613) using Generalized Estimating Equations. The analysis compared the rates of poor refractive outcomes after cataract surgery between the two groups of patients.

**Results:** Among patients with a history of Graves’ disease, eleven cataract surgeries resulted in refractive errors outside of ±0.5 diopters (AOR=2.96, p-value=0.027). In the same group, four cataract surgeries resulted in refractive errors outside of ±1.0 diopters (AOR=4.12, p-value=0.008).

**Conclusions:** Patients with a history of Graves’ disease have more refractive errors after cataract surgery than patients without a history of Graves’ disease. Special refractive consideration is recommended for patients with a history of Graves’ disease prior to cataract surgery. Further research should determine the specific refractive consideration these patients require to achieve improved refractive outcomes after cataract surgery.
Ketamine infusion as an analgesic adjunct in the management of severe pain in Patients with sickle cell disease

Wivine Ngongo
Preceptor: Kathryn Hassell, MD
Site: Colorado Sickle Cell Treatment and Research Center

**Background:** Recurrent episodes of acute pain crises are the hallmark of sickle cell disease (SCD). To date, no evidence-based strategy has been proven effective for SCD pain management. However, anecdotal case reports suggest ketamine may be a useful analgesic supplement in reducing pain while also reducing opioid intake. The present study aimed to characterize the effects of ketamine infusion on pain and inpatient opioid intake to offer auxiliary evidence for these findings.

**Methods:** Retrospective chart review of patients presenting with SCD who received continuous ketamine infusion for pain management through the University of Colorado Hospital between January 2009 and December 2016. Linear mixed-effects regression accounted for multiple observations per patient using random intercepts.

**Results:** In 60 cases from 9 patients, ketamine administrations led to reduced opioid intake and pain scores by 55.42mg (SE=13.42, p<0.0001) and 0.11 (SE=0.024, p<0.0001) each day on average, respectively. In 12 cases where these patients did not receive ketamine, opioid intake increased by 79.7mg (SE=18.99 mg, p<0.0001) while pain scores reduced by 0.039 (SE=0.031, p=0.21) each day on average.

**Conclusions:** Ketamine infusion beneficially serves as an analgesic adjunct in managing sickle cell pain by significantly reducing pain scores and opioid intake. Next, a randomized trial will be necessary to cultivate an evidence-based protocol for the use of ketamine infusion as a therapeutic option.
Youth Community Based Participatory Research: 
Best Practices for Engaging Youth

Kari Mader, MD
Preceptor: Abigail Steiner, MS MPH
Site: Denver Public Health (DPH)

Background: Few community health assessments (CHA) have focused on youth, and none have followed a community based participatory research (CBPR) model. DPH is conducting its first youth CHA and is utilizing a CBPR framework. This aimed to support DPH in identifying data collection methods youth can perform, and establishing best practices for empowering youth to choose methods and complete qualitative data analysis.

Methods: A mixed-method approach of a literature review of 31 articles and eight key informant interviews was utilized. Informants were experts in CBPR or working with youth. Emergent themes were identified and synthesized with the literature to identify best practices for engaging youth in CBPR.

Results: While youth perform all data collection methods, interviews and Photovoice were most frequently used. Youth chose the method in 22% of studies and performed analysis in 45%. Synthesis of the literature and interviews revealed there is no defined method for empowering method selection and qualitative analysis. Current best practice is an approach, rather than method. For method selection, youth researchers should be asked to reflect on their research question and select a logical way to engage their target population. To empower data analysis, youth should be provided the data and asked to collectively identify what patterns they see.

Conclusions: Standard methods for youth engagement need to be developed. This study provides a best practice guide based on available evidence.
**Operation Rabbit Fever: Creation of a Public Health Emergency Management Tabletop Exercise for a *Francisella tularensis* Bioterrorism Event**

Victorialyn Marsh  
Preceptor: Pony Anderson  
Site: Disaster Management Institute, Community College of Aurora

**Background:** Since the events of September 11, 2001, emergency management has become the forefront of preparedness activities. Federal guidelines specify that jurisdictions need to prepare for bioterrorist events, especially for Category A bioagents. This includes *Francisella tularensis*, the etiologic agent of tularemia. Tularemia is a highly infectious disease that presents as a flu-like illness, leading to misdiagnosis. Untreated, it can have a mortality rate of 40-60%. Currently, there are few emergency management exercise series that are designed to help public health agencies prepare for this type of attack.

**Methods:** Using epidemiologic data from case studies, a scenario was developed describing a potential and realistic bioterrorist attack using *F. tularensis* as an aerosol. Documents necessary for the implementation and evaluation of the exercise were created using the Homeland Security Exercise and Evaluation Plan (HSEEP) program toolkits and templates provided by the Department of Homeland Security.

**Results:** A tabletop exercise for the town of Lake City, Colorado was created, with all necessary documentation. The tabletop exercise was designed to demonstrate three core capabilities of operational coordination, public information and warning, and public health, healthcare, and emergency medical services. The exercise was designed to involve senior management and includes a total of 10-20 participants.

**Conclusions:** Overall, this project demonstrated the usefulness of HSEEP in emergency management. Using HSEEP allows comparison between jurisdictions to determine overall national preparedness. Further, this method standardizes response mechanisms. However, the inability to implement and evaluate the project was limiting. Future directions include completion and evaluation of the exercise.
From ‘what’s wrong with you’ to ‘what happened to you’:
Examining Perceptions of Trauma in Delta County to Establish a Resilient School Community

Nicole Miller, RN, BSN, MPH(c)
Preceptor: Stephanie Cole, MPH
Site: Resilient School Communities, with Colorado Association for School-Based Health Care

**Background:** Trauma is a real or perceived adverse experience that affects an individual’s ability to function. The current understanding of trauma in western Colorado’s Delta County school community is not sufficient. A consistent foundation and practice of trauma-informed prevention in the school and school-based health center will decrease youth substance use and maximize their school performance.

**Methods:** A needs assessment was carried out from July 2016-June 2017. Focus groups (n=2) of parents and students provided the qualitative data (n=8). Quantitative findings were derived from two surveys: an organizational assessment completed individually by all school staff (n=32) and health center staff (n=5); and a student health behavior survey (n=411).

**Results:** We utilized a mixed methods analysis that was framed around the socioecological model. Protective factors for youth substance use identified by parents and students include teacher support of students, community-wide support, and the accessibility of the school and school-based clinic; risk factors centered around peer pressure and proximity to other substance users. On the organizational assessment teachers reported a lack of knowledge of trauma-informed systems and a lack of infrastructure to support self-care, revealing the need for policy and program implementation.

**Conclusions:** The shift to trauma-informed practices will be most efficacious if strategies are introduced at each level of the socioecological model. For the Delta County school community, we recommend implementing trauma-informed school policies and procedures, initiating social-emotional learning for students, continuing education for staff and teachers regarding trauma and self-care, and increased attention to primary and secondary prevention measures.
Suicide Among Healthcare Practitioners and Technicians in Colorado: An Epidemiological Study

Sasha Mintz  
Preceptor: Ethan Jamison, MPH  
Site: Colorado Department of Public Health and Environment

**Introduction:** Suicide is a critical public health concern with risks that vary greatly between occupation groups. Studies have shown that the majority of suicide victims with a healthcare occupation die by intentional self-poisoning, but few have epidemiologically studied this association.

**Methods:** Eleven years (2004-2014, N=8,753) of suicide deaths in Colorado were compiled from the Colorado Violent Death Reporting System (CoVDRS). A retrospective cohort study was conducted to examine the risk associated with having a healthcare occupation and an ultimate suicide death by poisoning, compared independently to firearm and hanging. Multivariate logistic regression was used, adjusting for age, residential county type, history of mental health diagnosis, and substance abuse problem as confounders, and gender as an effect modifier.

**Results:** Suicide victims with a healthcare occupation were more likely to die by poisoning rather than by hanging (RR 1.54, 95% CI: 1.41-1.68) or firearm (RR 1.79, 95% CI: 1.60-2.01), when compared to those without a healthcare occupation. The association between healthcare occupation and suicide method was significantly (p=0.032) modified by gender. The increased association between healthcare occupation and suicide method (poisoning versus firearm) was found to be larger among male than female suicides (female, RR=1.09, 95%CI: 1.02-1.16; male, RR=1.42, 95%CI: 1.12-1.80).

**Conclusion:** The results show that healthcare workers who die by suicide have an increased risk of eventual suicide death by poisoning rather than by firearm or hanging. Gender was found to significantly modify this association. These results can be used to inform suicide prevention efforts in healthcare professionals.
HPV Vaccination in Correctional Care: Knowledge, Attitudes, and Barriers Among Female Inmates

Alia Moore, MD  
Preceptor: Ingrid Binswanger, MD MPH  
Site: Denver Women's Correctional Facility

Introduction: Women in prison are nearly 5 times more likely to develop cervical cancer than their non-institutionalized peers. The Human Papillomavirus (HPV) is an important cause of cervical cancer, and incarcerated women have high rates of HPV infection. However, little research has examined female inmates' perceptions of HPV and the HPV vaccine. This study aimed to assess attitudes toward; knowledge, acceptability, and rates of; and barriers to HPV vaccination among incarcerated women.

Methods: A cross-sectional structured survey was verbally administered to English-speaking female inmates aged 18-26 at a Colorado prison between February-March 2017. The instrument included questions addressing attitudes, knowledge, acceptability, and barriers. Participants also provided demographic information. Data was descriptively analyzed.

Results: Of 114 eligible women, 97 (85%) completed the survey. 85% of respondents had heard of HPV. Fifty-seven percent knew of the vaccine and 37% had received it before incarceration. Many women believed the vaccine to be safe (53%) and effective (41%). 77% reported a willingness to receive the vaccine in prison, but cited barriers including concerns about prison staff administering shots (30%) and lack of follow-up in the event of an adverse reaction (41%).

Conclusions: Though respondents were aware of HPV, fewer had heard about the vaccine, and there were significant knowledge gaps regarding both. Nonetheless, women had generally positive attitudes toward the vaccine and found in-prison HPV vaccination acceptable despite barriers. Because most respondents had not received the HPV vaccine before incarceration, it is reasonable to offer age-appropriate female inmates HPV education and vaccination.
Measuring Success: Developing an Evaluation Tool for a Superfund Five Year Review Training Program

Allison Moravec-Rice
Preceptor: Pat Smith, RPM
Site: Environmental Protection Agency, Region 8

Background: The Environmental Protection Agency (EPA) Regional Offices require all Superfund sites to submit 5 year reviews (5YR) that demonstrate their progress towards public health cleanup goals. These reports are very lengthy yet rarely contain all the necessary information to meet regulatory standards. Therefore, a training program was developed to teach Regional Program Managers (RPMs) how to increase quality and statutory compliance while writing 5YRs. This project describes the development of a program evaluation tool to measure the training program’s effectiveness.

Methods: With information from two regional 5YR Coordinators, materials from an Office of Inspector General’s report, subsequent 5YR Work Group documents, and the Biostatistics Consortium, we developed criteria to measure statutory compliance and quality in 5YR’s after RPM’s receive training.

Results: The tool is a quasi-experimental post-treatment design with a control group. Part 1 will measure various criteria to see if the training accomplishes set goals (e.g. reduce page length, increase timeliness, etc.) These criteria are tracked by the EPA. Part 2 will survey RPM’s to see if they think the training improved their writing. Pre-coded results will be entered into a customized GoogleSheets form for statistical analysis. I also created detailed implementation instructions and statistical interpretation language for the 5YR coordinator for reporting purposes.

Discussion: By increasing the quality and statutory compliance of 5YR’s, ongoing Superfund clean-up efforts will be better organized and more effective, and thereby better protect human health. This program evaluation tool will help the EPA determine if they are achieving this goal.
Making Logic Out of Stakeholder Engagement: Developing the Basis of an Evaluation Plan

Hanna Mortimer
Preceptor: Nicole Harty, MPH, ColoradoSPH Departments of Health Systems, Management and Policy and Community and Behavioral Health
Site: Aurora’s Gang Reduction Impact Program

**Background:** The Aurora -Gang Reduction Impact Program (A-GRIP) works to prevent gang activity, reduce youth gang involvement, and increase community awareness of gangs in Aurora. Prior to project inception, A-GRIP did not have an evaluation plan that demonstrated the impact of their work. The purpose of this project was to develop measurable objectives and benchmarks that would demonstrate programmatic success.

**Methods:** Between November 2016 and March 2017 we held: 1) a series of meetings with A-GRIP steering committee members to determine and prioritize focus areas for the evaluation and 2) key informant interviews (n=4) with individuals from A-GRIP funded programs to determine what data sources available for examining program impact. This information aided in the development of a logic model and systematic data collection tool.

**Results:** The logic model specified short and intermediate-term objectives for prevention and intervention efforts. We determined appropriate measures and methods for collection based on objectives, including what to collect, frequency of collection, and which measures apply to each program. For example, A-GRIP will measure gang-attachment using a pre-posttest survey conducted on all participants; percent change will be average annually.

**Conclusions:** This project resulted in A-GRIP having a logic model and a set of measurements from which to base an evaluation plan. This logic model will help A-GRIP define and measure its success to demonstrate its effectiveness to the City of Aurora and apply for additional future funding. Furthermore, it serves as an important model to measure progress for other gang prevention and intervention programs.
"This Is My Gym": A Program Encouraging Children and their Families to be Active Through Play and Interaction with the Built and Natural Environment in Mesa County.

Andrea Nederveld, MD
Preceptor: Jodi Holtrop, PhD, MCHES
Site: Grand Junction, CO

Introduction: Pediatric obesity and overweight affect 30% of children age 18 and under in the United States. Lack of physical activity (PA) plays an important role; by self-report only 25% of children get the recommended 60 minutes per day. Mesa County, Colorado abounds with recreation opportunities; however, low-income populations use these areas less than wealthier populations. This project aims to create a program that encourages low-income children to be physically active in recreation areas in Mesa County.

Methods: We conducted 5 focus groups with low-income children and their parents, gathering information about families’ current PA habits, perceived importance of PA, knowledge of local opportunities and barriers to PA. Discussions were recorded and transcribed; transcriptions were analyzed for topics, subthemes and themes which were used to design the summer activity program.

Results: Parents and children identified cultural change, safety, cost, time, transportation, technology, weather and access to information as barriers to recurrent PA, while recognizing the importance of PA. They saw PA as an important family activity, expressed nostalgia for the past, recognized the importance of parental modeling and expressed willingness to engage in low-cost, easily accessible activities that are culturally appropriate.

Conclusions: Low-income families are interested in increasing PA together. Consequently, this program focuses on connecting people to low-cost activities, ensuring access to adequate information about opportunities for PA and encouraging adoption of new behavioral norms such as increased PA and decreased screen time, while addressing parental concerns for safety and access to a variety of activities.
Improving Length of Stay for Acute Limb Ischemia: A Mixed Methods Continuous Quality Improvement Initiative

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Preceptor: Mark Nehler, MD
Site: University of Colorado Department of Vascular Surgery

Background: Acute limb ischemia (ALI) is associated with significant morbidity and mortality. Intervention is time-sensitive and requires care from multiple teams for optimal outcomes. We aimed to reduce length of stay (LOS) through a multimodal approach that will decrease time to recognition (TTR) by the emergency room and time to intervention (TTI) by vascular surgery.

Methods: This effectiveness and implementation study used a concurrent triangulation mixed methods strategy. The interventions included an ER pathway and surgical workflow improvements. Quantitative comparisons of each outcome (LOS, TTR, TTI) following implementation were to historic controls of the past five years of hospital-wide data to measure effectiveness. Statistical analysis was performed using unpaired t-testing. Qualitative data were collected using four focus groups with the ALI champions, and eight individual faculty interviews using the PRISM framework to guide ongoing implementation and modify the interventions.

Results: Quantitative analysis revealed 540 cases with a pre-intervention median length of stay of 11 (IQR 6-15) days, with a median TTI of 6 (IQR 3-14) hours. The primary outcome of LOS was decreased to 9 (IQR 6-13), p<0.05 with the interventions but there was no identifiable change in TTI (p=0.14). Important themes emerging from the qualitative analysis included systems issues, decision-making processes, implementation, and the pathway.

Conclusions: This project describes an effective mixed methods quality improvement project that improved length of stay while identifying additional targets for direction. Continuous quality improvement initiatives with strong leadership can use an iterative process to improve population care while also designing further interventions.
Use of Military Occupational Codes to Estimate Inhalational Exposures in Military Deployers

GC Pepper¹
Preceptors: SD Krefft¹,² EB Gottschall¹,², R Meehan², M Strand², CS Rose¹,²
Site: ¹University of Colorado School of Public Health ²National Jewish Health (NJH)

Introduction: Three-million soldiers have deployed to Southwest Asia, with exposure to inhalants that cause respiratory disease. Department of Defense uses Military Occupational Specialty (MOS), to classify military personnel by job/training. We characterized Marine MOS by estimated exposure to inhalational hazards.

Methods: We developed an exposure matrix containing five inhalational hazards--sandstorms, burn pits, exhaust fumes, combat dust, occupational VDGF (vapor, dust, gas, fumes), work outdoors. 5-member expert panel of two deployment physicians and three occupational pulmonologists independently ranked 38 Marine MOS codes for exposure intensity (3=high, 2=medium, 1=low) to each hazard. The codes were grouped into four categories: ground combat, aviation, logistics and administration. Used Cohen’s Kappa to determine inter-rater agreement, with ≤0.4=fair, 0.41-0.60=moderate, 0.61-0.80=substantial, ≥0.81=almost perfect agreement. Used descriptive statistics to compare MOS by mean sums (range 6-18) for exposures.

Results: There was moderate agreement among all raters for all exposures except burn pits, for which agreement was only fair (κ = 0.24). The two deployed physician raters had better agreement (κ = 0.54) compared to the three non-deployed physician raters (κ = 0.45). Ground combat had the highest estimated exposure risk (mean sum 14.4) for all six combined inhalational hazards and for 5/6 hazards.

Conclusions: We found substantial variability and only fair to moderate agreement among physician raters for intensity of estimated six exposures for all Marine MOS codes. Ground combat had the highest scores for inhalational exposures followed by aviation, logistics and administration. Future directions include validation of exposure estimates by using standardized deployment exposure questionnaires.
**Boulder County Immunization Coalition: A Quality Improvement and Re-Launching Project**

Truc Pham  
Preceptor: Lesly Feaux, MPH  
Site: Boulder County Public Health

**Background:** The Boulder County Immunization Coalition is investigating new strategies to ensure their members are actively participating. Within the last couple of years, the immunization landscape has changed dramatically and has become more of a public debate due to the passing of HB1288 in 2014. This study aims to shift the focus of the coalition to community engagement, educational events, and active participation with other partners to work on data collection.

**Methods:** A qualitative model of evaluation was used to collect and analyze data. Semi-structured interviews were performed in person and over the telephone with five coalition members and six sister coalitions. A case study approach was used to systematically compare key findings. The primary outcomes of this study were strategies and techniques that would assist Boulder County to re-launch a more active immunization coalition.

**Results:** The interviews identified and generated five strategies the Boulder Immunization coalition should shift focus to: creating opportunities to participate, extending memberships to non-traditional stakeholders, consistency, defining membership, and disseminating information.

**Conclusion:** This project demonstrates that it is necessary for the Boulder County Immunization Coalition to develop a coalition re-launching plan in order to keep pace with the ever changing immunization landscape in Colorado.
The use of Sunscreen, Protective Gear, and Avoidance (SPA) Questionnaire to provide tailored skin protection counseling for patients at the Denver Veterans Affairs Eastern Colorado Health Care System

Zar Phyo
Preceptors: Cory A. Dunnick, MD, Robert Dellavalle, MD, PhD, MSPH, Megan Craddock, MD; Teresa Lanasa, PA; Andrew Fischer, MD; Ryan O’leary, MD; Amanda Schultz, PA; and Jenna Peart, MD
Site: Denver Veteran Affairs Eastern Colorado Health Care System

Background: Skin cancer prevention practices are easy to perform, but are often ignored. To improve knowledge and compliance, healthcare providers can assess patients’ baseline sun protection behaviors then provide tailored counseling. The goal of this quality improvement assessment was to develop and pilot test the Sunscreen, Protective Gear, and Avoidance (SPA) Questionnaire.

Method: Six Denver Veteran Affairs (VA) Dermatology providers were trained on the use of the SPA Questionnaire. Providers then randomly selected 61 patients to pilot test the questionnaire. Quantitative responses to sun protection habits were compared with the frequency of tailored counseling provided. At the end of the study, providers were interviewed for feedback.

Results: Quantitative analyses showed that about 70% of the patients answered “no” to at least one of the sun protection practices questions, while providers provided tailored counseling to 93% of the patients. Providers indicated that the questionnaire influenced their decision about counseling in 77% of the cases. Qualitative analyses from the interview with the providers showed that no issues were encountered while administering the questionnaire and half suggested that the question terminology could be improved.

Conclusion: This study showed that the SPA questionnaire has potential to be a powerful tool that can help providers identify at-risk patients and provide tailored counseling. However, additional well-conducted studies of the effectiveness of the SPA questionnaire for tailored counseling and patient compliance are needed.
Colorado Comprehensive Sexual Health Education Analysis and Policy Recommendation

Allison Preza
Preceptor: Ashley Wheeland, JD
Site: Planned Parenthood of the Rocky Mountains

Background: In 2007, Colorado passed a law requiring schools to teach comprehensive sexual health education (CSE) in Colorado (CO) public schools that chose to offer sexual health education. The current distribution of CSE in CO suggests that many schools are not compliant with the law. Public health policy must reflect the current landscape of CO. Future health and education policies created in response to the actual needs of schools will have a more effective impact on Colorado schools and students.

Methods: In collaboration with Planned Parenthood’s Responsible Sex Education Institute, I developed a multiple choice and short answer survey to use to assess inclusion or exclusion of CSE in CO public secondary schools. The survey collects basic school demographics, sex education practices and questions to determine if the curriculum meets CSE standards set by the state (for schools who indicate inclusion of sex education). For schools that indicate that no sex education is provided, school administrators are asked to identify reasons for excluding CSE from their curriculum.

Results: The survey results and a detailed legislative audit recommendation will be given to a state representative. This information will be used to request a statewide audit of CSE compliance. Data collected will be utilized to develop public policy to address CSE barriers to implementation.

Conclusions: This information will inform the direction of future state policy in regards to creating equitable comprehensive sex education for all students.
**Background:** One challenge faced by adult survivors of childhood sexual abuse (CSA) lies in vocabulary providers use to identify and encourage disclosure. We seek to advance the understanding of appropriate vocabulary for medical and mental health providers in these contexts.

**Methods:** Focus groups were conducted with 10 Denver area providers to identify terms and phrases used to identify CSA survivors. A concurrent triangulation mixed methods design was employed to assess CSA survivors’ acceptance of providers’ phrases as well as to elicit terminology recommendations. Out of 93 recruited survivors, 74 completed surveys that consisted of open-ended and closed-ended questions and 70 participated in semi-structured interviews.

**Results:** Results indicate survivors accept most phrases used by providers. Survivors’ proposed terminology centered around phrases that include (1) “touch”, (2) words conveying an overreach of power, (3) “survivor”, (4) “uncomfortable”, (5) “sexual abuse”, (6) “feel”, and (7) “inappropriate”. Analysis of terminology not acceptable to survivors revealed a theme around assertive and shaming terms including “victim”, “assault”, and “rape”. Prominent themes were also identified for the approach survivors would like providers to use which included (1) conveying a gentle and patient demeanor, (2) exhibiting a caring, respectful, and positive attitude, (3) using direct and specific terms, (4) giving the patient control, and (5) adjusting the process to the individual.

**Conclusions:** Implementing appropriate terminology and practices for the screening of CSA among adults can improve providers’ ability to identify survivors. By identifying CSA, providers can more effectively treat adult survivors and/or connect them to additional services.
**Evaluation of staff perception of high risk flagging suicide prevention program at the U.S. Department of Veteran Affairs**

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Preceptor: Meghann Wraight, PhD  
Site: Denver VA Eastern Healthcare System

**Introduction:** Suicide prevention in the Veteran population is a priority for the U.S. Department of Veterans Affairs (VA). In 2008, the VA developed a suicide prevention program focusing on identification and care planning for Veterans with high risk of suicide. The high risk patient record flag (HR PRF) program’s success lies with numerous front line staff and their viewpoint of the program has not been evaluated. The objective of the project was to determine staff perception of the program to focus efforts for improvement.

**Methods:** A Likert Scale online survey assessed staff's perception of the HR PRF suicide prevention program. Specific topics of the survey included: resources (i.e., personnel, time and tools), training and perception of program effectiveness. The responses were grouped into “Agreeable” or “Other”.

**Results:** The survey was sent to 263 mental health specialists and 79 responded (30.0% response rate). Staff did not agree they had enough staffing (60.6%) and time (63.8%) to follow up with coordinating required care (i.e., appointments) post-flagging. Many staff felt that the program does not adequately promote social connectedness and support (55.2%), increase help seeking behaviors (56.9%) and support care transitions (46.5%). Many staff believe the HR PRF program does effectively identify patients with elevated risk for suicidal behavior (81.0%).

**Conclusions:** The results of this survey will be helpful for the HR PRF program to meet the needs of staff and patients. These results can help focus their attention on activities such as improving efficiency for appointments and ways to improve the program’s activities with the Veterans.
An Update on Hypertension Prevalence, Treatment, and Control in Type 1 Diabetes: Analysis from the Coronary Artery Calcification in Type 1 Diabetes (CACTI) Study

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Site: Barbara Davis Center for Type 1 Diabetes

Background: Patients with Type 1 Diabetes (T1D) are at an increased risk of hypertension. Poorly managed hypertension can cause complications including chronic kidney disease and congestive heart failure. Historically, hypertension has been poorly controlled among those with and without T1D. The objective of this study was to determine changes in prevalence, treatment, and management of hypertension since the first visit among participants with T1D and without.

Methods: The Coronary Artery Calcification in Type 1 Diabetes Study recruited 1,416 adults with and without T1D in 2000-2002. Hypertension prevalence, treatment and control have been gathered over 15 years of follow-up. Retained participants (n=779) completed four visits where blood pressure was measured using standardized Joint National Committee protocol and hypertension history and treatment was assessed. Changes in outcomes were examined using the Cochran-Armitage trend test.

Results: Hypertension increased across the 4 visits in the T1D group (38%, 41%, 52%, 53%, p<0.001), as did treatment among those with hypertension (86%, 94%, 93%, 94%, p=0.04). Control among treated hypertensives did not change (88%, 95%, 93%, 88%, p=0.82). Among controls, hypertension increased across the 4 visits (13%, 17%, 20% 29%, p<0.001), as did treatment among those with hypertension (55%, 55%, 63% 75%, p=0.002). Control among treated hypertensives did not increase among non-diabetic participants (74%, 74%, 90%, 84%, p=0.10).

Conclusion: Hypertension and its treatment increased over the 15 years of the study in both T1D and control participants, but there was no improvement in control among treated patients. Strategies are needed to improve control among aging patients.
Association between genetic variants and the presence of rheumatoid arthritis-related autoimmunity and progression to Rheumatoid Arthritis in an at-risk population

Rachael Sawaya

Preceptor: Jill Norris, Professor and Chair, Department of Epidemiology, Colorado School of Public Health

Site: Colorado School of Public Health

Background: Rheumatoid arthritis (RA) is an autoimmune disease characterized by the presence of RA-related autoantibodies prior to the development of clinical disease. While HLA-shared epitope (SE) is the strongest genetic factor for RA, genome-wide association scans have identified additional single nucleotide polymorphisms (SNPs) associated with RA. We investigated whether these SNPs were associated with the presence of anti-cyclic citrullinated peptide autoantibodies (CCP), and/or with progression to clinically-recognized RA.

Methods: We tested 1066 RA-free first degree relatives of RA patients for CCP; 124 were positive. We examined the association between 41 previously-identified SNPs and CCP positivity using logistic regression, adjusting for race/ethnicity, treating the number of SNP minor alleles as a continuous variable. Ninety-three of the CCP positive relatives were followed over time and 10 were subsequently classified with clinical RA. We examined whether the SNPs were associated with development of RA in CCP positive individuals using Cox proportional hazards, adjusting for race/ethnicity, age and SE.

Results: The SNP RPP14_rs73081554 was associated with CCP positivity (OR: 0.21, 95%CI: 0.08-0.58). ALS2CR12_rs6715284 and TPD52_rs998731 were significantly associated with CCP, but only in those who were negative for SE. In CCP positive relatives, progression to RA was associated with TAGAP_rs2451258 (HR:0.18; CI:0.03-0.94), IL2RA_rs706778 (HR:6.18; CI:1.97-19.34), COG6_rs9603616 (HR:2.70;CI:1.06-6.86), RAD51B_rs1950897 (HR:3.80; CI:1.59-9.06), RUNX1_rs9979383 (HR:4.29; CI:1.27-14.46), and UBASH3A_rs1893592 (HR:3.00; CI:1.13, 8.01).

Conclusions: These findings indicate that some RA-associated SNPs may play an early role in the disease process (autoimmunity development) and others may play a later role (progression from autoimmunity to disease), which may inform disease mechanism, therapeutic, and prediction studies.
Northeast Colorado Health Department Quality Improvement Plan Development

Linda Saxton
Preceptor: Tony Cappello, MPH, PhD
Site: Northeast Colorado Health Department

**Background:** The Northeast Colorado Health Department (NCHP) serves six rural counties in Northeast Colorado and is currently in the process of applying for accreditation from the Public Health Accreditation Board (PHAB). PHAB awards accreditation to state, local, tribal, and territorial health departments based on their compliance with a nationally recognized, practice-focused, set of standards. A requirement for accreditation is to “Establish a quality improvement program (QIP) based on organizational policies and directions”\(^1\). The purpose of this project was to develop a QIP that meets PHAB standards to assist in the accreditation process.

**Methods:** PHAB requirements and standards for QI were compared to current quality processes within NCHD to identify areas that need to be adjusted or developed. QIP’s from accredited health departments, along with QI toolkits and templates from academic and government organizations, informed development of methods and processes that best integrate NCHD’s mission, goals and values.

**Results:** A QIP that will meet PHAB standards was developed. A QI model for department wide quality improvement facilitation was selected and all processes for QI implementation were described. Required QI training was identified and forms to facilitate the quality process were developed and approved.

**Conclusions:** A QIP will assist NCHD in developing processes to assess current services, set goals for improving services, and monitor progress towards those goals. It will help NCHD continuously assess and improve their public health programs and organizational function. The ultimate impact targets improved health outcomes for those served by NCHD, and increased efficiency of the department.
Reevaluation of the Advanced Maternal Age Associated with Increased Risk of Maternal and Neonatal Morbidity

Marc Schweizer
Preceptor: Kirk Bol, MSPH
Site: Colorado Department of Public Health and Environment

Background: Advanced Maternal Age is related to many maternal and neonatal morbidities. However, medical and obstetrical progress and current pregnancy trends at older age necessitate its reevaluation. This study aims at examining age 35 years as a defining Advanced Maternal Age and exploring age 40 years as a potential alternative.

Methods: In this population-based retrospective cohort study, we used Colorado birth certificates data for 2007-2015. Maternal and neonatal morbidities studied were gestational diabetes, gestational hypertension, congenital malformations, and Neonatal Intensive Care Unit (NICU) admission. We used multivariable logistic regression models controlling for relevant confounders to estimate the odds ratios (OR) and 95% confidence intervals (CI) of each morbidity at age 35 years compared to age 30 years.

Results: Adjusted OR at age 35 years compared to age 30 years for congenital malformations (OR: 1.03, CI: 0.92-1.16) and for gestational hypertension (OR: 1.05, CI: 0.96-1.15) were not statistically significant. Adjusted OR for age 35 years compared to age 30 years for NICU admission (OR: 1.09, CI: 1.01-1.17) and gestational diabetes (OR: 1.45, CI: 1.33-1.57) were both significant; however, the magnitude of the risk increase for NICU admission was small.

Conclusions: Women at age 35 years compared to those at age 30 years were not at higher risk for two age-related morbidities (congenital malformations and gestational hypertension), or at a significantly higher risk for having newborns admitted to the NICU. Therefore, age 40 years can be recommended as a relevant alternative for defining Advanced Maternal Age.
Diagnosing Newborn Genetic Disorders: A Nationwide Analysis of Newborn Screening Timeliness

Jordan Sciandra
Preceptor: Marci Sontag, PhD
Site: Anschutz Medical Campus

Background: Newborn genetic screening is a crucial practice that identifies infants with genetic disorders and links them to treatment. Although the federal government recommends that babies be tested and diagnosed within 7 days of birth, thousands of hospitals do not adhere to this timeline, placing newborns at risk for preventable morbidity and mortality.

Methods: Data from over 4,000 cases entered into the Newborn Screening Technical assistance and Evaluation Program (NewSTEPS) repository by public health labs in 19 states between 2011 and 2016 was analyzed to determine if time between birth and diagnosis varied significantly between states. 6 regions were analyzed and coded as Region 1 through 6, and 19 states were analyzed and coded as State A through S. Generalized linear models on ranked data were implemented to perform an ANOVA analysis of mean time to diagnosis between U.S. regions and states.

Results: Time to diagnosis of genetic disorders in newborns is significantly different between both U.S. regions and states. Of the 19 states assessed, states K and M – both in Region 5 - experienced significantly longer times to diagnosis (p < .05) of newborn genetic disorders than all other states and regions.

Conclusions: This analysis revealed that states vary in timeliness for diagnosing newborn genetic disorders and indicated that states in Region 5 are in need of assistance from NewSTEPs in improving time to diagnosis of effected infants.
**The Millennial Physician: Addressing Challenges with Information Access in an Orthopaedic Residency Program**

Nichole Shaw  
Preceptors: Nancy Hadley-Miller, MD, Michael Dayton, MD  
Site: University of Colorado School of Medicine

**Background:** Millennial learners’ learning preferences are unique from their predecessors in medical education. Non-clinical teaching strategies in orthopedic education have remained largely unchanged over time. Stimulated in part by anecdotal reports of low faculty engagement in education, the CU Orthopedic Residency curriculum was evaluated for the incorporation of multimodal approaches for non-clinical education.

**Methods:** Program needs and possible solutions were identified through qualitative interviews with resident physicians, clinical site directors, and non-orthopedic program coordinators. Interview topics were chosen following literature review of learning preferences in surgical subspecialties. Interviews were transcribed and coded, followed by thematic extraction, as they pertain to curriculum satisfaction and faculty engagement.

**Results:** Thematic analysis pertaining to curriculum satisfaction and faculty engagement identified three domains: (1) The non-clinical curriculum includes a strong approach to orthopedic fundamentals: supplementing lectures with case presentations and board-type questions improves engagement; redundancy from cyclical lecture schedule allows mastery. (2) Millennial learners desire opportunities for independent learning: lecture PowerPoints are not available, lecture-associated readings are not offered for supplemental learning, and “newer” formats such as audio or video recordings are not offered. (3) Lack of faculty engagement in education: when hospital culture prioritizes clinical efficiency over resident education, it results in missed opportunities for exposure to expert knowledge.

**Conclusions:** The current University of Colorado Orthopedics curriculum fails to accommodate millennial learners’ preferences. This evaluation resulted in recommendations for improving faculty engagement and creation of a “Residency Handbook” outlining lectures and associated readings. Future work includes uploading recorded lectures to a web-based platform.
Analysis of Pinnacol Assurance’s Risk Management Alliance Program: Determining the Association Between Industry and the Type of Safety Recommendation Given

Brendan Sisombath
Preceptor: James McMillen, CIH, MPH
Site: Pinnacol Assurance

Background: The Occupational Health and Safety Administration states that the core elements of a safety program are management leadership, hazard identification, education and training, program evaluation, and worker participation. Another goal of safety programs is to address frequently occurring injuries within individual industries. The purpose of this study was to determine if Pinnacol Assurance’s safety recommendations are addressing the core elements of safety programs and if they are addressing the most common hazards within the construction, healthcare, and public sector industries.

Methods: A literature review was performed to determine what the most common hazards within the construction, healthcare, and public sector industry are. Risk Management Alliance program safety recommendations were gathered from 98 businesses. The proportion of businesses that received each safety recommendation was determined.

Results: The proportion of businesses that received safety recommendations regarding the key elements of safety programs were 49.5, 91.8, 74.2, 77.3, 87.6, and 71.1 percent respectively. The most common hazards within the construction, healthcare, and public sector industries were found to be falls, patient handling, and ergonomics respectively. The percentage of businesses that received safety recommendations addressing these hazards were below 33.3 percent.

Conclusion: Pinnacol Assurance is providing most businesses with all the core elements of a good safety program, except management leadership, regardless of the business’ industry type. To further bolster businesses’ safety programs, it is proposed that Pinnacol Assurance deliver more safety recommendations regarding management leadership and more recommendations that address the most common hazards in each industry.
Using a Systems Genetic Analysis in Rat to Decipher the Role of Brown Adipose Tissue in Metabolic Syndrome

Harry Smith
Preceptor: Laura Saba, Ph. D
Site: Skaggs School of Pharmacy and Pharmaceutical Sciences

Introduction: Studying complex diseases such as diabetes, obesity, and other metabolic syndrome related conditions have moved from exploring single gene influences to a systems genetics approach, which involves investigating how groups of genes (i.e. networks) affect disease states through gene expression. This study uses a systems genetics approach to examine how gene networks and RNA expression affect metabolic phenotypes in brown adipose tissue (BAT) using a recombinant inbred (RI) rat model.

Methods: BAT phenotype data was collected using an HXB/BXH RI rat panel and contained data on BAT relative weight, glucose oxidation in BAT, and glucose incorporation into BAT lipids. We developed a methodology that identified phenotypic and module eigengene quantitative trait loci (QTLs). Co-expression networks were identified using weighted gene co-expression network analysis. Candidate co-expression networks and genes had to be significantly correlated with a BAT phenotype, and had to have module eigengene QTLs that had peak positions that fell within those same phenotypic QTL regions.

Results: We identified three co-expression networks, and their respective gene and hub gene annotations. Coral4.1 and Cornsilk2.2 were associated with BAT relative weight, and Darkseagreen was associated with glucose incorporation into BAT lipids.

Conclusions: We have shown that there are co-expression networks that play important roles in metabolic pathogenesis related to BAT. We have also shown that these co-expression networks contain hub genes Cd36 and Sort1, which have both been associated with insulin resistance. These results inform metabolic pathway activity, and may enlighten potential biological pathways for drug targeting.
A Quantitative Analysis of Hospital Acquired Pressure Ulcer Mitigation Methods

Lauren Smith
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Site: University of Colorado Hospital- Quality Improvement

**Background:** University of Colorado Hospital (UCH) has observed an increase of hospital acquired pressure ulcers (HAPUs) since July 2015. The presence of HAPUs is not only dangerous for the patients involved, but also costly to the hospital. Factors in developing HAPUs range from age to having multiple comorbidities. As a result, the hospital has implemented interventions that introduce new mitigating materials, but efficiency data analysis has yet to be conducted.

**Methods:** Wound care reports from medical records collected between July 2015 and November 2016 were analyzed. Analysis included date, anatomical location, HAPU grade, device-relatedness, surface-relatedness, and hospital departments. Intervention methods were categorized to the type of HAPUs addressed. T-tests determined the difference in HAPU averages from before and after each intervention.

**Results:** Coccyx and sacrum HAPUs increased from .27 HAPUs daily prior to implementation of Allevyn dressing to .44 afterwards (+.17, P<0.03). Nasal cannula-related HAPUs decreased from .12 to .11 (-.01); however, the difference was deemed insignificant (P<0.74). Tracheotomy tube-related HAPUs increased from .06 to .14 (+.08, P<0.01). Scapula, coccyx, and sacrum HAPUs decreased from .39 to .37 (-.02) after the implementation of the wedge; however, the difference is insignificant (P<0.84).

**Conclusions:** This analysis indicated that the different nasal cannula and implementation of the wedge did not provide statistically significant decreases in HAPUs, while the remaining mitigation methods were revealed to have a statistically significant increase in HAPUs. Numerous confounding factors should be considered, such as improved reporting and information dissemination to healthcare providers. Additional analysis is suggested moving forward.
Introduction: Chronic cadmium exposure has been linked to increased cancer risk both occupationally and in cross sectional studies, and cadmium is labeled a known carcinogen. However, the effect of chronic exposure at low doses remains unclear. The purpose of this study was to assess the relationship of cadmium and cancer in a prospective cohort.

Methods: The San Luis Valley Diabetes Study (SLVDS) was a prospective cohort in southwestern Colorado focusing on diabetes. Demographic information and urine samples were collected as part of clinic visits throughout the study. A sample population (n=551) of stored samples were later analyzed for cadmium. SLVDS records were then linked with cancer outcomes from the Colorado Cancer Registry. Cadmium’s association with General cancer incidence was assessed by survival analysis in the main cohort. Specific cadmium linked cancers were assessed by conditional logistic regression in a nested case control study due to relatively low case numbers.

Results: Urine Cadmium was significantly associated with bladder, kidney, and lung cancer incidence with an odds ratio of 1.945 (95% CI 1.036-3.649). Categorized log creatinine adjusted cadmium was not significantly associated with general cancer incidence. Quartiles of cadmium exposure 2, 3, and 4 were all not significantly associated with increased cancer incidence when compared with quartile 1 with HRs of 0.84(0.48-1.46), 0.69(0.39-1.216), 0.91(0.5-1.64), respectively.

Conclusion: These results corroborate the evidence of cadmium as a carcinogen from previous small scale studies, though only regarding specific cancers. More information is needed on cadmium’s carcinogenic mechanisms, as well as cadmium’s safe exposure limits.
Students Seeking Mental Health Services at School Based Health Centers: Characteristics and Utilization Patterns

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Site: Denver Health School Based Health Centers

Background: Nationwide 75% of School Based Health Centers (SBHC) have an integrated health-care model with mental health (MH) providers and physical health services. Youth have high levels of unmet MH needs, but little is known about how students using SBHC for MH services compare to those using SBHC only for primary care (PC).

Objective: Identify students’ sociodemographic and SBHC use patterns among students seen by MH providers (MH group) relative to students seen only by PC providers (PC group).

Design/Methods: Administrative data from 2014-2015 were analyzed from 9 SBHC serving 10-19 year old students in Denver. We performed descriptive statistics on sociodemographic characteristics, Pearson’s chi-square test to examine the difference in receipt of annual physical between groups, and predicted SBHC clinic visits via negative binomial regression.

Results: MH users (n=516) had an average of 14.2 ± 12.9 SBHC visits and PC users (n=4,026) had an average of 2.6 ± 2.4 SBHC visits. Twenty-nine percent of students in the MH group had an annual physical compared to 52% of students in the PC group (X² = 90, p<0.001). MH group students, those with public insurance, and females had a higher Incidence Rate Ratio for SBHC clinic visits than PC group students, those with private insurance, and males respectively.

Conclusions: Students using MH services access SBHC at higher rates than those seen for PC. Yet fewer students in the MH group received annual physicals. Future work is needed to explore best practices for increased integration of MH and preventive health care.
Water and Conflict: The Relationship between Water Quality and Armed Conflict

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Site: University of Colorado Anschutz Medical Campus

Background: Water quality is a major factor in human health, as waterborne disease is the leading cause of death worldwide. Accordingly, a country’s economic health is also affected by water quality. A little studied area is the impact of conflict on water quality. Conflict and violence are known to impact water quality at a micro or local level, however a macro level quantitative analysis has not been conducted. This analysis was conducted to explore the relationship between water quality and conflict.

Methods: The time frame examined for this study was 1990 to 2015. Data from 184 countries describing sanitation and water quality improvement between 1990 and 2015 were culled from a WHO dataset. These data were compared to the highest achieved conflict hostility level as determined by the “Correlates of War” research project. Regression analyses were conducted to determine the strength of the relationship.

Results: Regression analysis showed a weak correlation between overall water and sanitation quality and hostility and high action level. The strongest relationships were between overall water quality and sanitation in 2015, and high levels of conflict action and hostility.

Conclusions: This study added to the body of research that indicates conflict is harmful to public health. The correlation between water quality and conflict support the hypothesis that conflict level has a negative impact on a country’s ability to provide safe drinking water. Further multivariate regression analysis would better describe the role of conflict in determining water quality, in relation to other factors.
The Population at Risk from Living Near Toxic Release Inventory Sites and Concentrated Animal Feeding Operations in Weld County

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Site: Colorado School of Public Health (EOH Department)

Background: Regulatory exclusion zones (setbacks) around residential structures for public safety and welfare from facility contaminant discharges could be insufficient to protect public health. This project’s goal is to determine populations at risk for adverse health outcomes in Weld County, Colorado from housing units built close to Concentrated Animal Feeding Operations (CAFO) and Toxic Release Inventory (TRI) facilities.

Methods: DataQuick Information Systems from 2012 was used for housing unit locations (latitude/longitude), the Colorado Department of Public Health and Environment from 2014 for CAFO locations, and the Environmental Protection Agency from 2012 for TRI locations. In addition, 2010 U.S. Census Bureau shape files were used for Colorado County boundaries. The ArcGIS software was used to sum the number of housing units within 350, 500, 1,000, and 5,280-foot buffer zones around TRIs/CAFOs. The number of persons per household of 2.8 was used to estimate the populations potentially affected.

Results: The number of housing units within one mile of TRIs was 17,276. The number of housing units within one mile of CAFOs was 1,482. The number of people potentially affected within one mile of TRIs was 48,373. The number of people potentially affected within one mile of CAFOs was 4,150. We then compared these novel results to those identified living within one mile of Oil & Gas wells in the Denver Julesburg Basin.

Conclusions: Future work should include confirming the presence of contaminants utilizing sampling monitors. Household surveys should be conducted to assess possible symptoms from TRI/CAFO pollutants and assess persons per household.
An Evaluation of Maternal Depression Screening and Referral Practices at Denver Health Pediatric Clinics

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Site: Denver Public Health

**Background:** Pregnancy-related depression (PRD) is one of the most common complications of pregnancy and is associated with numerous detrimental outcomes for both mother and child. Despite public health screening efforts, PRD often remains undiagnosed and untreated. In this work we evaluate the process and outcomes of Denver Health’s PRD screening and referral practices at pediatric clinics.

**Methods:** In this mixed methods evaluation we assessed data from chart reviews from 3 pediatric clinics from November and December of 2016 and key informant interviews with clinic staff. Quantitative outcomes defined as: positive depression screen if >10 on Edinburgh Postnatal Depression Scale (EPDS), referral processes completed if referral documented in the patient’s chart. Feedback about clinic work flow obtained from interviews.

**Results:** We reviewed 131 infant charts, 64 charts had positive maternal depression scores. Of these, 34.4% were referred to a behavioral health resource, 23.5% were in treatment and not referred, 17.2% refused the referral, and for 18.8% there was nothing noted (missed opportunities). The in-clinic Behavioral Health Consultant (BHC) was the most commonly used referral source (68% of referrals). Common themes from key-informant interviews included: the value of BHCs in improving patient care, the need to standardize documentation, referral, and follow-up standard work, and the need for improved resource guides.

**Conclusions:** This evaluation identified that a lack of standardized documentation and referral practices impacted patient care, potentially increasing missed opportunities. By addressing common barriers and recommendations using a process improvement plan, Denver Health could reduce these missed opportunities and improve patient outcomes.
**Introduction:** Annually 420,000 individuals visit Emergency Departments (ED) for attempted suicide and self-inflicted injury. Alcohol abuse increases the risk of suicide and intoxication can complicate suicide risk assessment. This study aims to identify differences in ED care between those with and without alcohol intoxication among patients who screened positive for suicide risk.

**Methods:** This was a retrospective review of electronic medical records from adult patients with a positive suicide screen at an urban ED from January 2014 to December 2015. Alcohol intoxication was recorded as “yes”, “no” or “not documented” based on laboratory test and or provider notes. We reviewed a random sample from three *a priori* age groups (18-34, n = 300; 35-59, n= 300; and 60+, n=200) for demographic, medical, and visit characteristics to assess evaluation by a mental health professional, provision of resources, and ED disposition.

**Results:** Intoxicated suicidal individuals were more often males aged 35-59 years. Intoxicated individuals were less likely than those who were not intoxicated to see a mental health professional during their ED visit (70% vs 84%, p < .0001). Intoxicated individuals were more likely to be discharged home (68% vs 60%, p-value <.0001) and receive referral resources (63% vs 56%, p < .0001).

**Discussion:** There were discrepancies in ED care between intoxicated and non-intoxicated patients. This may relate to patients who express suicidality while intoxicated and recant once sober, leading to a less thorough evaluation. It may also reflect difficulty engaging patients in mental health care while intoxicated.
Chronic Kidney Disease within Arid/Semi-Arid Climates: A View Nationally and within the San Luis Valley, Colorado.

Amber Vaughn
Preceptor: Katherine A. James, PhD, MSPH, MSCE
Site: Colorado School of Public Health

**Background:** Chronic kidney disease (CKD) is a non-communicable disease considered a global health problem. CKD of unknown or non-traditional causes (CKDu) subtype is localized to geographical areas with causes poorly understood. CKDu prevalence is among rural, agricultural, working-aged men in dry climates. We examine prevalence of CKD with exposure of arid climates nationally, and CKDu with dehydration and agricultural occupations within the San Luis Valley (SLV), CO.

**Methods:** State level data (N=51) of prevalence of CKD (2014), stratified by age, were used for simple linear regression between CKD and arid states. In the second tier of analysis utilizing the SLV cohort (N=1890) and excluding people with diabetes, logistic regression was used comparing CKDu with dehydration and agricultural occupations adjusting for age, sex, ethnicity, blood pressure, and smoking.

**Results:** Arid states (n=16) have a 0.07 increased prevalence of CKD compared to non-arid states for populations 20-64 years in 2014 (95%CI:0.03-0.10, p-value:<0.01). Within the SLV (n=1142), people with CKDu were 1.78 times more likely to drink low amounts of water compared to people drinking high amounts of water after adjusting for risk factors (95%CI:1.27-251, p-value:<0.01). People with CKDu were as likely to be farmers compared to non-farmers after adjusting for risk factors (95%CI:0.65-1.91, p-value:0.70).

**Conclusions:** CKDu is prevalent within the SLV, and exposure to dehydration is a risk factor for CKDu. Additionally, state aridity could help locate areas of increased risk for CKDu. This further understanding helps identify sensitive populations and provides support for local interventions.
**Healthy Beverage Partnership: Nutrition Environment Assessments at Denver Public Venues**

Kacie Warner  
Preceptor: Jennifer Moreland, MPH  
Site: Denver Public Health

**Background:** Childhood obesity has more than doubled in the last thirty years, with more than one-third of U.S. youth currently overweight or obese. Childhood obesity poses both short and long term negative health effects, including prediabetes, high cholesterol and blood pressure, and the likelihood of adult obesity. Sugary drinks represent a significant amount of calories consumed by children. Six Front Range local public health agencies identified childhood obesity as a priority issue and came together to form the Healthy Beverage Partnership (HBP). The HBP’s goal is to increase the availability of healthy food and beverages in public places.

**Methods:** In 2015, collaborating Denver area agencies voluntarily agreed to make positive changes in their nutrition environments. In 2017, assessments were conducted to evaluate improvements in these nutrition environments and impacts of a nutrition labeling initiative. Using the REDCap database, baseline and reassessment data from four Denver public venues were analyzed, informing tailored recommendations for the sites.

**Results:** Reassessments show an overall trend of increased healthy food and beverage offerings. Labeling of healthy items, educational messaging, and behavioral incentives need more development.

**Conclusions:** Voluntary environmental changes are a useful tool in improving the nutrition environment at public venues.
Evaluating the Social Determinants of Health Screen at Special Care Clinic of Children’s Hospital Colorado

Joy Waughtal
Preceptor: Shelby Chapman
Site: Children’s Hospital Colorado

Background: Treating social issues is not a common practice in the clinical setting despite the impact on health outcomes. The Special Care Clinic of Children’s Hospital Colorado is working to address these social factors—food insecurity, financial burdens, unstable housing etc., by implementing a psychosocial screener as part of a well child clinic visit and connecting families with available resources.

Methods: Between January and February we gathered data from three groups. In this qualitative study 60 families were surveyed via phone to understand the impact of the screener. Providers from the Special Care Clinic were surveyed to understand their impression and comfort level using the screener. Family navigators and social workers were interviewed to understand their roles and impressions in the screening process. Data was analyzed and reported using simple descriptive statistics.

Results: Providers (n=21) found the survey beneficial in relationships with patient families, it benefited patients and it is within the clinics responsibilities to ask about social issues. Families (n=60) were found to be comfortable being asked and answering the questions and believed that the doctors should be asking about social needs. Family navigators and social workers found the screener to be beneficial regardless of resources available.

Conclusions: Overall everyone found the screener beneficial. The screening for social determinants of health is a positive addition to healthy child clinical visits at the Special Care Clinic. Implementing this screening or screening like it to identify outside social needs in clinical care settings can improve patient experiences.
Modeling Rare Mutations in Cell Populations with Boolean Modeling

Holly Weeks
Preceptor: Brian Ross, PhD
Site: UC Denver Department of Pharmacology

Background: Cancerous tumors are made of a heterogeneous population of cells. These cells contain many different types of mutations. Current genetic testing only identifies a sample of the different cells, and so only identifies the most common mutations. While previous attempts at modeling mutations computationally, rely on attractor states or simulating the population through sampling. Unfortunately, these methods are unreliable for identifying rare mutational profiles.

Methods: We created a prostate network, with mechanistic Boolean logic rules, adding a mutational network that allowed for a knock-out mutation at every node (gene). We then applied the Probabool method of Boolean modeling, allowing for a 1% mutation-rate for every mutational node, starting with an even probability of every node being active or not, and no mutations. The results were compared to Monte Carlo simulations.

Results: After modeling the prostate network, we were able to exactly model a 1% mutational rate in the population of cells. The model was more accurate than the common competitor method of Monte Carlo Simulations. On top of the accuracy, all transient behavior of the cells, steady states, and limit cycles the network were identified.

Conclusions: This analysis shows that Boolean modeling is able to model rare mutations in cancer. These models can now be created and used to identify new vulnerabilities. By identifying the true mutational makeup of cancer, better treatment and early detection methods are possible.
The SNAP-Ed Census: A National Profile of SNAP-Ed Program Activity and Evaluation Indicators

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Background: SNAP-Ed, the education arm of the Supplemental Nutrition Assistance Program (SNAP), is charged with promoting healthy eating, physical activity and obesity prevention among 95 million Americans with incomes <185% federal poverty level. Recent program restructuring included the development of a comprehensive Evaluation Framework with 51 behavioral, organizational, multi-sector and population indicators. The SNAP-Ed Census provided a baseline profile of planned activity among the country’s 136 Implementing Agencies (IAs).

Methods: An electronic survey of all IAs in October 2016 queried which of the 51 indicators they intend to impact and evaluate (n=124, response rate=91%). Basic descriptive statistics were used to analyze the data, which included the frequencies of responses.

Results: Analysis showed the majority of IAs impacting healthy eating (95%) and physical activity (79%) behavior change in individuals. Many agencies target organizational partnerships (81%) and while less agencies target multi-sector partnerships (49%). Overall fewer agencies report intent to impact the indicators within the multi-sector chapter of the framework, with social marketing (36%), and agriculture (34%) among the highest. As for the long-term population level indicators fruit/vegetable consumption (48%), physical activity (39%) and healthy beverages (38%) had the highest intent to impact.

Conclusions: These results show SNAP-Ed’s collective impact through mutually reinforcing activities, and shared measurements. It illuminates opportunities for SNAP-Ed to strengthen its obesity prevention programming. While these results do not represent outcomes, this data can be used to inform a discussion around the indicators in order to prioritize SNAP-Ed initiatives and provide technical assistance to agencies redefining programming objectives.
Blood Lead Screening in Colorado among High Risk Children

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Background: No level of lead in the body is considered safe; lead can damage the brain and nervous system, and slow development and growth in children. Colorado guidelines recommend targeted testing for higher risk children based primarily on socioeconomic status and age of housing so that exposures can be minimized early in life. A targeted testing program makes it difficult to calculate screening rates that reflect the population at risk and evaluate adherence to guidelines.

Methods: Screening rates were calculated by census tract using test results from 2011 to 2015 from Colorado’s blood lead database and at risk population estimates calculated using Census and Medicaid enrollment data. Rates were compared spatially.

Results: Screening rates varied based on the definition of population at risk, with at least 9 months of Medicaid enrollment producing the highest rates on average (23.3%) and all children under 6 years of age producing the lowest (5.2%). Using Census screening rates, between 10.9% and 23.9% of children live in census tracts with low or medium screening rates and high risk of lead exposure. Medicaid screening rates should be 100%, but only between 11 and 30 census tracts meet this goal.

Conclusions: While this is the first time screening rates have been able to be evaluated with a denominator that is more representative of the at risk population, rates are still variable and low in many places across the state. Maps created through this project can be used to focus outreach efforts and ultimately increase testing.