



Welcome to the Department of Family Medicine & Public Health Science’s first departmental Research Day. During today’s event you will hear from our keynote speaker on the topic of Health Care vs. Health Culture. In addition, we have presentations and electronic poster viewing of abstract submissions from our doctoral (medical, PhD) students, our MPH students, and our residents (family medicine, transition year) whose research work was conducted or is ongoing in the department.

Thank you for attending and we hope you find the day informative.

Tsveti Markova, MD, FAAFP

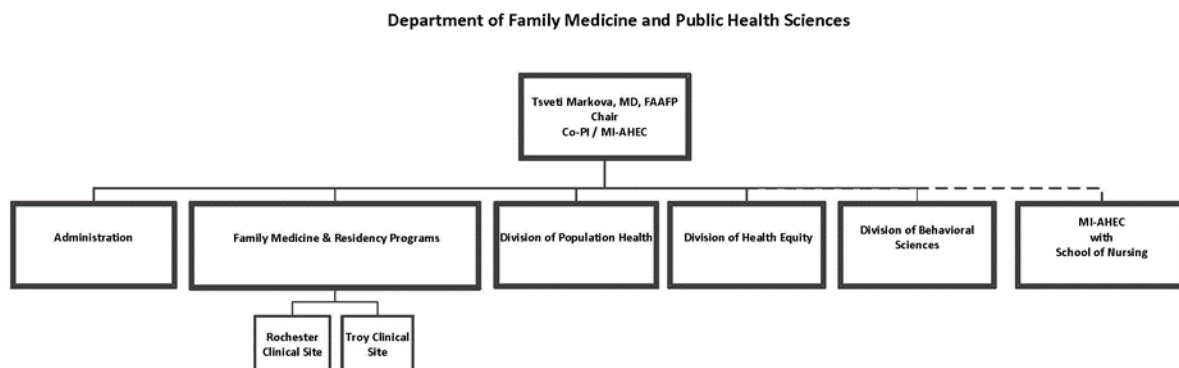
About Us

Organized in the 70’s in response to legislative recognition of the need for more physicians to practice Family Medicine in Michigan, our department has grown significantly over time. It is now a home to more than 40 physician and PhD faculty members, and more than 250 voluntary faculty, engaged in research, education and clinical care. Family Medicine as a specialty is committed to providing personalized, front-line medical care to people of all socioeconomic strata, delivering the majority of care for America’s underserved rural and urban populations. The Department of Family Medicine and Public Health Sciences at the Wayne State University School of Medicine upholds and furthers this legacy through a commitment to excellent patient care, rigorous medical education and groundbreaking research. Many faculty and students are engaged in research on health equity and disparities, including studies on cancer, heart disease, asthma, obesity, HIV, and maternal and child health. This work is primarily focused on Detroit and other cities in Michigan but includes work nationally and internationally. Our faculty are active in medical education both in the undergraduate and residency levels at the School of Medicine. We also lead the WSU Master’s in Public Health program.

Our department prides itself on being respectful of diversity, embracing all aspects of health and well-being. We exhibit academic excellence and high-quality care, student success at every level, research innovations to further community health and philanthropic partnerships to secure the future.

Our Mission

The Mission of the Department of Family Medicine and Public Health Sciences is to be committed to improving the health, well-being, and environment of individuals, families, and communities by advancing the science and practice of family medicine and public health through innovation and excellence in research and education.





DFMPHS Research Day Agenda

April 19, 2017

8:00 AM – 12:30 PM

Margherio Conference Room, Mazurek Education Commons

8:00-8:30 AM	Continental breakfast and networking	
8:30 AM	Welcome	Tsveti Markova, MD, FAAFP Professor and Chair, Department of Family Medicine & Public Health Sciences Associate Dean for Graduate Medication Education & DIO
8:35-9:30 AM	“Should Health Care be Replaced by Health Culture?”	Phillip Levy, MD, MPH, FACEP, FAHA, FACC Professor and Associate Chair for Research, Department of Emergency Medicine Assistant Vice President for Translational Science and Clinical Research Innovation
9:30-10:05 AM (10 min presentation each/ 5 min Q&A at end of 3 presentations)	Trainee presentation themes: Prostate Cancer Screening Disaster Preparedness Quality Improvement in Infectious Disease Management	Joshua Kong (Doctoral Graduate student) Teena Palathanam (MPH student) Eleanor King, MD (Resident)
10:10-10:45 AM (10 min presentation each/ 5 min Q&A at end of 3 presentations)	Trainee presentation themes: Food Security Adherence Among Adolescents with Type1 Diabetes Quality Improvement and Continuity of Care	Lydia Lanni (Doctoral Graduate student) Dixy Rajkumar (MPH student) Mitul Mehta, MD (Resident)
10:45-11:30 AM	Break and Poster Session <i>Please see poster abstracts</i>	
11:30-11:45 AM	“Patient-Doctor Shared Decision Making in Screening and Treatment of Prostate Cancer”	Jinping Xu, MD, Associate Professor, DFMPHS
11:45-12:00 noon	“WIC-Academic Partnership to Eliminate Preschool Obesity Health Inequities”	Elizabeth Towner, PhD, Assistant Professor, DFMPHS
12:00-12:15 PM	Award Announcements and Presentation of Awards	
12:15-12:30 PM	Closing	Tsveti Markova, MD, FAAFP

Title: Accessibility and Outcome Analysis of Mobile Health Clinics in the United States: A Review of the Literature

Authors: Maliha Ahmed MPH Candidate; Juliann Binienda, PhD

Introduction: Mobile health clinics (MHCs) provide a multitude of services to vulnerable populations across the United States. While this relatively new model of care is often considered ancillary, it shows significant promise for increasing access to care, reducing health care costs, and improving health outcomes.

Methods: A literature review was performed for studies published within the last 10 years. Data sources included Bio-Med Central, Science Direct, PubMed, and manual bibliographic searches. Inclusion criteria specified that studies be in the English language and that search words include mobile health clinic, mobile clinic, and mobile medical clinic.

Results: In the United States, approximately 2,000 MHCs are currently operating. Utilization patterns indicate that vulnerable populations visit MHCs not only for convenience of location but for the supportive environment they provide, thereby reducing barriers and increasing self-efficacy. MHC patients are often insured, suggesting significant barriers beyond access to medical insurance. Positive health outcomes include better preventative care and chronic disease management while cost-benefit analyses show high return on investment and reduction in health care costs.

Conclusion: Although the scope of practice for MHCs is somewhat limited, the literature strongly suggests benefits in their ability to provide care to vulnerable populations. Long-term health outcome data has not been as thoroughly studied. Nonetheless, future research efforts should compare health outcomes for those who utilize mobile health clinics.

Title: On Variable Selection with Missing Data

Authors: Prithish Banerjee; Samiran Ghosh, PhD

Introduction: Selection of important variables contributing to the “true model” generating the data is one of the most challenging task for biomedical, social, and public health datasets containing multitude of missing covariate information. A common practice is Complete Case Analysis (CCA), which involves list-wise deletion of missing observations. The resulting analysis might be biased if the missing pattern is not completely random. Whereas combining the results of variable selection on Multiple Imputed (MI) datasets is not trivial since conventional method of combining MI datasets (Rubin’s Rule) is not applicable for variable selection.

Methods: We primarily focusing on developing a variable selection mechanism applicable to MI datasets based on linear model. A novel method of data integration is applied on MI datasets, on which we select significant variables using a penalized weighted least square model. The penalties chosen for the task are Least Absolute Shrinkage Selection Operator (LASSO), Smoothly Clipped Absolute Deviation (SCAD), Minimax Concave Penalty (MCP), and Bridge regression. Several weighing assignment of weighted least squares on each observation based on the dress of missing-ness are proposed.

Results: Performances of the proposed variable selection mechanism with each penalty and weights are studied extensive via simulation under Missing Complete At Random (MCAR) and Missing At Random (MAR). Application to some real life clinical and epidemiological data is currently under study.

Conclusion: Some future directions will be towards incorporating Generalized Linear Model (GLM) into the similar stacking framework and consider a more general missing pattern Not Missing At Random (NMAR).

Acknowledgement of funders: The research of last author is partly supported by PCORI contract number ME-140921410 and NIH grant number P30-ES020957.

Title: Bayesian Approach of Assessing Non-inferiority of a New Treatment with Binary Outcomes in a Three-arm Trial

Authors: Shrabanti Chowdhury; Ram C. Tiwari; and Samiran Ghosh, PhD

Background: In comparative effectiveness research (CER) one of the main goals is to study comparative benefits of competing interventions. Non-inferiority (NI) trials are of great importance for CER when one cannot guarantee superiority of one active treatment over the other. Such trials aim to demonstrate that an experimental treatment is non-inferior to an existing clinically proven active comparator by not more than a pre-specified margin. NI trial may or may not include a placebo arm. The inclusion of a placebo arm giving rise to the three-arm trial is prudent, if ethically reasonable, since it requires less stringent assumptions as compared to the two-arm placebo-free NI trial. We consider fraction margin approach where NI margin is formulated as a pre-determined negative fraction of the unknown effect size of reference drug in current trial.

Method: This poster presentation exhibits an overview of Bayesian procedure for testing NI in the three arm trial with binary end points considering risk difference as the function of interest. Bayesian paradigm provides a natural path to integrate historical and current trials' as well as uses patients' and clinicians' opinions as prior information which may greatly reduce the cost burden on current trial in terms of effective sample size. The developed statistical methods are assessed via extensive simulation studies.

Results: Preliminary data shows overall satisfaction with our clinic services and providers. 1/3 of patients initially committed to the educational event. One patient attended. Reasons for not scheduling a follow-up appointment varied among patients.

Conclusions: TBD; the data collection for Phase 2 will be completed by April 5, 2017. The initial data shows trends of positive patient satisfaction, and variable patient awareness of uncontrolled hypertension. Our project will determine if a return visit protocol and educational intervention would improve follow-up rates.

Acknowledgement of funders: N/A

Title: Optimizing Follow-up Rates for Hypertension Management in a Primary Care Setting

Authors: Amin Farokhrani MD, Lilia Peress MD, Starr Whittaker MD, Gypsa Katoch MD, Rhonda Dailey MD, John Otremba MD

Background: Timely follow-up for chronic conditions in the primary care setting can be challenging. The aim of this study was to identify patients' understanding of the management of their uncontrolled hypertension and determine the need for a standardized follow-up protocol and educational intervention. Additionally, we assessed patient compliance and satisfaction to identify strategies to improve follow-up rates. The study was set in a suburban family medicine clinic. Participants included residents and attending physicians.

Method: The Plan Do Study Act (PDSA) method of quality improvement was used. Uncontrolled hypertensives were provided with a survey assessing satisfaction level and understanding of blood pressure control at their initial visit. Patients were then scheduled for a 2-3 week follow-up and provided a secondary survey. Qualifying patients were invited to an educational event and provided a survey assessing whether the event improved their understanding of their condition. Intervention: 1. Follow-up protocol 2. Contacting patients who did not schedule a follow-up 3. Educational session

Results: Preliminary data shows overall satisfaction with our clinic services and providers. 1/3 of patients initially committed to the educational event. One patient attended. Reasons for not scheduling a follow-up appointment varied among patients.

Conclusions: TBD; the data collection for Phase 2 will be completed by April 5, 2017. The initial data shows trends of positive patient satisfaction, and variable patient awareness of uncontrolled hypertension. Our project will determine if a return visit protocol and educational intervention would improve follow-up rates.

Acknowledgement of funders: N/A

Title: Stress as a Contributing Factor to Obesity in Early Childhood: A Systematic Review

Authors: Amrita Ghosh, MPH Candidate; Elizabeth K. Towner, PhD

Objective: In US about 25% of young children (ages 0-8) are overweight or obese. Emergent research suggests stress (acute and chronic) may impact both the onset and persistence of obesity in early childhood through a variety of biopsychosocial pathways. The purpose of this systematic review was to synthesize this literature in efforts to inform future obesity prevention and intervention efforts.

Methods: PubMed, Medline and Google scholar were searched for manuscripts (all types) about stress and obesity in early childhood published within the past 10 years.

Results: Eighty-five manuscripts were reviewed. Chronic stressors associated with obesity in early childhood included parenting style (general and feeding-specific), social ostracism (racial/ethnic discrimination, isolation), poverty, and genetic predisposition to stress response. Acute stressors included violence, poverty, and trauma. Ongoing psychological stress chronically elevates stress hormones that are associated with increases in obesogenic eating behaviors and preferences for high-calorie, high-fat food in young children.

Conclusions: Chronic and acute stressors appear to have an important role in the onset of obesity in early childhood. Family-based intervention programs such as the Incredible Years program, Positive Parenting Program and Parent-Child Interaction Therapy that target parenting skills, improving parent-child relationship, and child self-regulation skills are currently being examined for their impact on obesity in early childhood. Future research should examine the impact of including cognitive behavioral and mindfulness strategies within these programs to discern whether a stress management component would enhance their effect for families exposed to the chronic and acute stressors that increase child obesity risk.

Title: Evaluations of the Effectiveness of an Online Evidence-based Course on Prostate Cancer Survivorship Care for Primary Care Providers

Authors: Jacquelyn Keen, MPH Candidate; Yvanna Marlin-Guanga, MPH Candidate; Jinping Xu, MD, MS

Background: Primary care providers (PCPs) in Michigan reported a training need for taking care of post-treatment prostate cancer (PC) survivors. We aim to evaluate our online CME module in improving the comfort-level of PCPs in the assessment and management of long-term treatment side effects for PC survivors.

Methods: An interactive, evidence-based online CME module for PCPs was emailed to potential interested groups of Michigan PCPs. Effectiveness of the CME course was measured by surveying the PCPs and questioning their knowledge prior to, immediately after and 2-months after course completion. Participants rated their comfort-level for the assessment and management of post-treatment side effects prior to and after course completion. A paired t-test used to compare these changes before and after the CME course.

Results: 106 participants completed the initial post-CME survey. Over 98% of all participants rated the quality of information provided in the CME course as “good”, “very good” or “excellent”; 95% rated improvement of their subject knowledge and 97% rated the module effectiveness in the same range. Paired t-test analysis of comfort-level ratings showed a significant improvement in participants comfort-level for assessment (4.00 ± 0.83 vs. 3.37 ± 1.21 ; $p < 0.001$) and management (3.79 ± 0.89 vs. 3.22 ± 1.27 ; $p < 0.001$) of various common treatment-related side effects.

Conclusions: Our online CME course helped Michigan PCPs feel more comfortable taking care of PC survivors to improve their quality of life.

Acknowledgment of funders: This study was funded by MDHHS and the BCBSM Foundation.

Title: Measuring and improving resident knowledge on the indications for ordering and discontinuing isolation precautions for pulmonary tuberculosis (PTB), Methicillin-Resistant *Staphylococcus aureus* (MRSA), and *C. difficile* colitis (CDC)

Authors: Eleanor King MD; Kaitlin Zeytuncu MD; Minhchau Ha MD; Anver Khan MD; Ahmed Saleh MD; Joseph Thomas MD; Pierre Morris MD; and Rhonda Dailey MD

Background: Appropriate use of isolation precautions can prevent hospital acquired infections while unnecessary precautions incur expense. The Joint Commission recommends using evidence-based national guidelines, or expert consensus for isolation precautions. From our observations, we hypothesized that residents at Crittenton Hospital and Medical Center (CHMH) were unaware of the isolation guidelines for pulmonary tuberculosis (PTB), Methicillin-Resistant *Staphylococcus aureus* (MRSA), and *C. difficile* colitis (CDC).

Methods: Collaborating with CHMC associates, we outlined precaution guidelines for PTB, MRSA and CDC and using a survey assessed resident knowledge on these precautions. Subsequently, we educated residents with two lectures and a pocket-sized outline of the hospital guidelines. Following the educational intervention, we distributed a second survey to reassess resident knowledge. The primary outcome measured was the score on the 12 question post-intervention survey.

Results: Our pre-intervention survey response included 54/71 residents (76%). Evidenced by an average score of 58%, we demonstrated a need for education on PTB, MRSA, and CDC isolation precautions. We have completed our educational intervention and are awaiting the final survey results.

Conclusions: We anticipate that a formal education on the appropriate use of isolation precautions will improve resident knowledge. Future projects might include measuring ordering habits of isolation precautions, to determine if the expected increase in resident knowledge translates to better use of precautions.

Title: Africa American Men's Knowledge and Perception of PSA Screening Discussion with their Physicians

Authors: Joshua Kong, MS; Jackie Keen, BS; Jinping XU, MD

Background: In 2012, the U.S. Preventative Service Task Force recommend against prostate-specific antigen (PSA) screening for prostate cancer (PC). However, data suggests that patients continue to have PSA testing. We hypothesize that this discordance may be due to poor patients' understanding of the risks and benefits of PSA screening because of a lack of physician-patient communication. Thus, we conducted an educational workshop to educate African American (AA) men since AA men have the highest incidence and mortality of PC among all racial/ethnic groups in the U.S.

Method: We surveyed a convenient sample of AA men (most without the diagnosis of PC) over 40 years of age, who attended an educational workshop. Descriptive analysis and paired t-test performed to compare PSA screening knowledge pre- and post-workshop.

Results: Total of 23 AA men surveyed with mean age of 61.8. While 66% of participants reported their physicians provided reasons to have a PSA test done, only 35% of them reported their physicians discussed reasons to not have a PSA test. There was a significant increase in PSA screening knowledge (3.88 vs 3.29; $p=0.008$) post-compared to pre-workshop.

Conclusions: Our results indicate that more physicians discussed with patients about the reasons to have a PSA test compared to reasons not to have it done. Further educational interventions target both patients and their physicians are needed to increase balanced discussions and informed decision making of PSA screening.

Acknowledgement of funders: PCORI (patient-centered outcome research institute) funded this study.

Title: The Impact of Food and Transportation Access on Food Security in Low-Income, African-American Families of Preschoolers Living in Detroit

Authors: Lydia Lanni, MA; Kristine Durkin, BS; Ameen Masoodi, MD; Mark Greenwald, PhD; Sylvie Naar, PhD; Velonda Anderson, PhD; Kobra Eghtedary, PhD; and Elizabeth K. Towner, PhD

Background: In Detroit, 70% of children ≤ 5 years old are SNAP eligible. Detroit also ranks 8th in the nation for residents without a car and has no reliable public transportation system. Lack of transportation and food access may contribute to food insecurity. The purpose of this secondary data analysis is to examine the impact of food and transportation access on food security in low-income, African American families with preschoolers living in Detroit.

Methods: Caregivers (N=33) were recruited from Detroit WIC Clinics. Caregivers completed the USDA Food Security Survey and self-reported primary grocery store, transportation used to get to this point of purchase, whether they received SNAP, and number of dependents living in their household.

Results: Approximately half of caregivers reported food insecurity. Caregivers provided for an average of 2.6 ± 1.98 dependents including preschoolers and 64% received SNAP benefits. Slightly over half lived within 2 miles and 80% lived within 5 miles from their primary grocery store and 82% used their own car to get to this point of food purchase. Food-secure families did not differ significantly from food-insecure families on any variables of interest.

Conclusion: Food insecurity was prevalent among low-income, African American caregivers with preschool-age children but not related to food assistance, number of dependents, or food or transportation access. Future research is needed to better understand variables contributing to perceptions of food insecurity.

Acknowledgement of funders: This study was funded by a Targeted Research Award grant from the Society of Pediatric Psychology

Title: Health Literacy, Food Resource Management Skills, and Preschool Obesity in Low-Income, African American Families

Authors: Ameen Masoodi, MD; Kristine Durkin, BS; Lydia Lanni, BS; Gowri Yerramalli; Mark Greenwald, PhD; Sylvie Naar, PhD; Velonda Anderson, PhD; Kobra Eghtedary, PhD; and Elizabeth K. Towner, PhD

Background: Inadequate health literacy (IHL) is associated with poor health outcomes, including obesity. Preschoolers rely on their caregivers for food, and an emergent literature suggests food resource management skills like food budgeting may be associated with obesity in early childhood. The purpose of this secondary data analysis is to expand this literature by examining the relationship of health literacy to food resource management skills and preschooler weight status in a sample of low-income, African American families.

Method: Caregivers (N=28) were recruited from Detroit WIC clinics if preschoolers were obese (n=17) or of a healthy weight (n=11). Health literacy was assessed using the New Vital Signs (NVS) survey. Caregivers also self-reported sociodemographic information and frequency of using 20 food resource management skills.

Results: Slightly over half (69%) of caregivers had IHL. Preschooler weight status did not differ significantly by caregiver HL. Caregivers with adequate HL (AHL) used coupons significantly more often than caregivers with IHL ($p=.02$). A trend that caregivers with AHL accessed food banks more often than caregivers with IHL was also observed ($p=.08$). Caregivers with IHL canned their food and only consumed fresh fruits and vegetables in the beginning of the month significantly more often than caregivers with AHL ($p=.05$ and $p \leq .001$, respectively).

Conclusion: IHL was common in our sample of low-income, African American caregivers. While preliminary, our findings suggest AHL be related to more frequent use of food resource management skills but not related to preschooler weight status. Study replication with a larger sample is important in further delineating these relationships.

Acknowledgement of funders: Society of Pediatric Psychology (Division 54 of the American Psychological Association).

Title: Assessing and Improving Continuity of Care in a Residency Based Family Medicine Center

Authors: Mitul Mehta, MD; Pauline Zhang, MD; Nicole Lopez, MD; Pari Patel, MD; Marco Peterson, MD; Tess McCready, MD; Elizabeth Towner, PhD

Background: Continuity of care endorses quality patient care by establishing a long-term doctor-patient relationship. At the Wayne State University Family Medicine Center, ensuring continuity is difficult as the majority of providers are residents and the current policies/procedures in place challenge providing continuity of care. The aim of this quality improvement initiative was to gather initial information to inform practice-related changes targeting improved continuity of care.

Method: A short, continuity of care survey was administered to patients (N=51) and resident physicians (N=88).

Results: 94% of patients identified their primary care provider (PCP). 75% of this group reported seeing their PCP on the day they completed the survey. In contrast, 48% of resident physicians reported being scheduled to see patients for whom they considered themselves to be the PCP.

Conclusions: A discrepancy was evident between patients and providers regarding perceived continuity of care. The next step in the project will be to explore reasons why patients feel they are seeing their PCP while resident physicians do not feel that they are seeing their own patients.

Title: Disaster Preparedness for the Faith Community Nursing and Health Ministries Network

Authors: Teena Palathanam, MPH Candidate

Background: A disaster like a flood, earthquake or tornado can strike any time. Houses of worship are often the first part of a response wave in an event of disaster. The purpose of the study is to determine if faith based organizations are ready to face a disaster.

Method: A needs assessment survey was created and administered to the faith community nurses and health ministers in order to identify and determine the preparedness and disaster response training requirements. A literature review was conducted to identify existing disaster plans and protocols to guide the curriculum development. The training workshop was delivered to the faith community network participants which outlined the key aspects of the curriculum.

Results: The results of the needs assessment survey showed that none of the churches (N=11) were adequately equipped to face a disaster. Most of the churches did not have emergency communication plans (40%) in place. Majority of the churches (45.45%) had no plans to develop a safety inquiry system to check on members during emergencies. The churches had mostly conducted fire drills (60%) and evacuation drills (40%). None of the participants had lock down drills or severe weather drills conducted in their churches. A majority of the respondents (50%) were most interested in training in emergency drills and exercises

Conclusions: It is important that churches develop comprehensive disaster plans. Also, periodic evaluation of the disaster mitigation and preparedness strategies must be conducted to ensure effectiveness.

Acknowledgement of funders: Henry Ford Health System is a nonprofit corporation in Michigan and one of the nation's integrated health systems.

Title: Translating Home-Based Intervention to Improve Adherence and Metabolic Control Among Adolescents with Type 1 Diabetes

Authors: Dixy Rajkumar, MPH Candidate; Gordon Rumschlag, MPH Candidate; April Carcone, PhD, MSW; Colleen Buggs, MD, PhD; Deborah Ellis, PhD

Objective: To obtain information on treatment satisfaction for Reach For Control (RFC), an intensive home-based family treatment targeting regimen adherence among adolescents with type 1 Diabetes (T1D) and chronically poor metabolic control (CPMC).

Methods: Eligible participants were 10-18 years old ($M=14.3$) diagnosed with T1D for at least one year and had $HbA1c > 9\%$ ($M HbA1C = 11.5\%$) and receiving medical care at Children's Hospital of Michigan. Families were participants in a randomized clinical trial of RFC, an adapted version of an evidence-based intervention modified for delivery by community health workers. RFC included diabetes education and skills training, parenting and family interventions, and training in communication with medical providers. The youth's primary caregiver completed a semi-structured interview at treatment completion to assess satisfaction and obtain feedback regarding need for treatment modification. Interviews were audio-recorded, transcribed, and analyzed using Framework Matrix Analysis.

Results: Caregivers reported high satisfaction ($M=8.07$, $Range = 1-10$) with RFC overall. Qualitative findings also indicated that caregivers had a positive experience with RFC. Themes were that the intervention provided families with new information that helped them better manage their adolescents' diabetes care, increased adolescents' accountability for diabetes management and parent involvement, and led to behavior changes such as improved parent-child communication regarding diabetes care.

Conclusions: These results suggest that RFC was well received by families and provide support for the feasibility and acceptability of the intervention.

Acknowledgment of funders: National Institute of Diabetes and Digestive and Kidney Diseases Grant # R34DK102091

Acknowledgements

The Department of Family Medicine and Public Health Sciences Research Day 2017 was made possible by the dedicated efforts of our department's faculty and staff. Dr. Samiran Ghosh assisted with the development of an agenda. Drs. Samson Jamesdaniel, Julie Gleason-Comstock, and Dawn Misra reviewed and selected abstracts for oral and poster presentations. Ms. Judy Magdalenic and Ms. Erica Sagese assisted with organization and communications. Dr. Julie Gleason-Comstock managed all aspects of the event, including solicitation of abstracts, notifications to authors, organization of materials, and follow up with authors. Her efforts were invaluable. We also thank our department chairperson (Dr. Tsveti Markova) for her support of this event and our faculty presenters (Drs. Phil Levy, Jinping Xu, and Elizabeth Towner) for their willingness to share their research contributions with our department students, trainees, and faculty.



Department of Family Medicine
and Public Health Sciences