The Importance of Clinical Severity in the Measurement of Readmission Rates: A Comparison of Medicare Beneficiaries in 1997 and 2007

Matthew Press \(^1\); Amol Navathe \(^2\); Jingsan Zhu \(^2\); Wei Chen \(^3\); Jessica Mittler \(^4\); Dennis Scanlon \(^5\); Kevin Volpp\(^2\). \(^1\)Weill Cornell Medical College, New York, New York; \(^2\)University of Pennsylvania, Philadelphia, Pennsylvania; \(^3\)University of Pennsylvania, Philadelphia, Pennsylvania; \(^4\)The Pennsylvania State University, State College, Pennsylvania. (Proposal ID # 11695)

BACKGROUND: Preventable hospital readmissions occur frequently, account for substantial costs, and are thought to reflect poor quality of care transitions. Spurred in part by mandatory public reporting and impending financial incentives from the Patient Protection and Affordable Care Act, hospitals and quality improvement organizations have made reducing readmissions a top priority. In order to evaluate their efforts to reduce readmissions, these groups must accurately measure readmission rates and make longitudinal comparisons. But readmission rates are often not adjusted for clinical severity of patients, potentially leading to misinterpretation of longitudinal trends. Since the relationship between clinical severity and readmissions is not fully understood, our objective was to determine the degree to which differences in severity affect readmission rates and whether this changes over time. To do so, we examined differential trends across clinical severity levels in readmission rates of two common conditions over a 10-year period.

METHODS: We analyzed inpatient claims data from fiscal years 1997 and 2007 for all unique Medicare patients (N=1,705,654) admitted to short-term acute-care nonfederal hospitals with principal diagnoses of acute myocardial infarction (AMI) or congestive heart failure (CHF). We examined the change in the odds of 30-day all-cause readmission for patients with higher versus lower clinical severity in 2007 compared to 1997 using a difference-in-differences approach. Each patient was assigned to one of four severity groups: group 1 represented the lowest severity, group 4 the highest. Severity was determined based on claims-level models in which 30-day mortality was regressed on age, gender, and Elixhauser comorbidities. Differences in trends in readmission among severity groups were produced by interacting severity group dummy and year dummy variables.

RESULTS: For AMI, the 30-day readmission rate for group 1 (lowest severity) was 17.1% in 1997 and 14.0% in 2007. The readmission rate for group 4 (highest severity) was 22.8% in 1997 and 23.3% in 2007. Compared to patients in group 1, the change in the odds of readmission over time was significantly higher for AMI patients in group 4 (OR=1.31 [95% CI 1.24, 1.37], P<.01). The results for CHF patients followed a similar pattern. The readmission rate for group 1 was 21.6% in 1997 and 20.5% in 2007. For group 4, the readmission rate was 22.6% in 1997 and 24.7% in 2007. Compared to patients in group 1, the change in the odds of readmission over time was significantly higher for CHF patients in group 4 (OR= 1.20 [95% CI 1.16, 1.24], p<.01).

CONCLUSION: Relative to Medicare patients with low clinical severity, high severity patients experienced increasing odds of readmission in 2007, compared to 1997, following hospitalization for AMI and CHF. As this analysis shows, readmission rates change over time at different rates for patients in differing severity groups. In tracking readmission rates and evaluating efforts to reduce them, policymakers and organizational leaders should take into account the underlying distribution of clinical severity in patient populations and monitor whether it changes over time.
Mapping Quality in Health care Systems: A Novel Tool for Population Management Clemens Hong 1; Steven J. Atlas 1; Lulu Liu 1; He Wei 1; Lawrence Stratton 1; Lenny Lopez 1; Richard Grant 1. 1Massachusetts General Hospital, Boston, Massachusetts. (Proposal ID # 12451)

BACKGROUND: As primary care networks develop population-based systems of care, geographic information systems (GIS) may be a useful tool for identifying community-level variation in quality of care. We used GIS to examine colorectal cancer (CRC) screening rates among patients within our care network by the communities in which they reside.

METHODS: We obtained GIS coordinates from the addresses of 142,690 primary care patients in an academic health system consisting of 174 PCPs working in 13 primary care practices (including 4 community health centers). Using data from an electronic record repository, we identified all patients aged 52-74 years old eligible for CRC screening and calculated the proportion overdue for screening by town or city neighborhood and by census block group to identify geographic areas with low CRC screening rates. We then categorized census block groups by higher and lower CRC screening rates and compared differences in patient socio-demographic characteristics and median census block group household income (limiting the analysis to census block groups with greater than 30 qualifying patients).

RESULTS: Overall, 11044 (23.9%) of eligible patients within our network were overdue for CRC screening and the mean rate of overdue CRC screening by census block group was 24.2% (range 6.3-68.1%). Figure 1 shows geographic variation in the rate of overdue CRC screening among all network patients in cities and Boston neighborhoods in the Boston region. Figure 2 shows the geographic variation in the rate of overdue CRC screening among patients living in the census block group areas surrounding one MGH practice. Across the Massachusetts area served by our network, census block groups with lower CRC screening rates had higher proportions of minorities (29.7% vs 11.7%, p<0.001), non-English speaking patients (17.3% vs 4.3%, p<0.001), and those not completing high school (13.4% vs 2.7%, p<0.001), and a lower census block group median household income ($52034 vs $85442, p<0.001).

CONCLUSION: Mapping quality indicators using GIS coordinates attained from administrative data may be a useful tool for targeting resources or tailoring interventions to the needs of specific communities. This detailed geographic approach may enable health systems, practices, and community health centers to identify communities that are at high risk for lower quality outcomes and thereby reduce disparities in healthcare.
Predictors of medication adherence in hypertensive African Americans: Moving beyond cross-sectional data

Antoinette Schoenthaler 1; Jordan Plumhoff 1; Mary Jane Ojie 2; William Chaplin 3; Oshevire Uvwo 1; Gbenga Ogedegbe 1. 1NYU School of Medicine, New York, New York; 2St John's University, Jamaica, New York. (Proposal ID # 12403)

BACKGROUND: The disproportionately higher rate of hypertension (HTN) and its related cardiovascular morbidity and mortality between African Americans and Caucasians is well documented. Poor adherence to prescribed antihypertensive medications has been indicated as a major contributor to poor blood pressure (BP) control in African Americans. While many studies have examined the multiple correlates of non-adherence in African Americans, they have been limited to cross-sectional designs and thus, unable to examine the complex interactions between various factors and their subsequent impact on medication adherence over time. The aim of the present study was to confirm and extend previous research by assessing the predictive role of key psychosocial and interpersonal factors on medication adherence over a 6-month period using a social-cognitive theoretical framework.

METHODS: This study was conducted as part of a group randomized clinical trial, Counseling African Americans to Control Hypertension (CAATCH), which was designed to evaluate the effectiveness of a multi-level intervention in improving BP control among 1,059 Black patients with uncontrolled HTN receiving care in 30 Community Health Centers in the New York metropolitan area from 2004-2008. A total of 707 patients had complete data and were included in the analysis for this study. Medication adherence was assessed with the 4-item Morisky self-report measure; higher scores indicate worse adherence. The psychosocial predictor variables of self-efficacy (medication adherence self-efficacy scale [MASES]), depressive symptomology (PHQ-9) and social support (MOS) were assessed with well-validated self-report measures at the baseline and 6-months study visits. Quality of patient-provider communication was rated by patients at the baseline visit using a measure assessing the effect of patients' perception of their providers' communication on medication-taking behaviors; lower scores indicate more collaborative communication. Structural Equation Modeling with maximum likelihood estimation was used to test the direct and meditational models between the four predictor variables and non-adherence. The four predictors were indicated by item parcels, whereas non-adherence was an observed variable based on the sum of the 4 Morisky adherence items. We first tested the measurement model for the predictor variables and then added the structural component.

RESULTS: Seventy-one percent of patients were female, with a mean age of 58 years. Approximately half had Medicaid (46%), one-third had less than a high school education (35%), two-thirds were unemployed (69%), and most reported a household income of less than $20,000. Results from the baseline data provide support for a structural model of medication adherence that includes patient's ratings of communication, social support, self efficacy and depressive symptomology as significant predictor variables (all ps < 0.05). The model provided a good fit to the data, CFI = .980, RMSEA = .047. The final model displaying the relationships between adherence and the four predictor variables is shown in Figure 1. In the model, the effects of social support and patient-provider communication on medication adherence were mediated by self-efficacy and depressive symptomology. Specifically, communication rated as non-collaborative increased depressive symptomology (r = .13) and lowered self-efficacy (r = -.14) leading to worse adherence. Alternatively, higher levels of social support decreased depressive symptomology (r = -.18) and increased self-efficacy (r = .10) resulting in better adherence. Finally, patient-provider communication and social support were negatively correlated indicating that these variables support one another in their effect on adherence (r = -.22). These findings were replicated at the 6-month study visit.

CONCLUSION: This study was able to identify several potentially modifiable psychosocial and interpersonal factors that affect adherence behaviors among a sample of hypertensive African American patients participating in a clinical trial. Specifically, ratings of social support and perceived quality of patient-provider communication significantly influenced medication adherence through their impact on self-efficacy and depressive symptomology. These findings provide important insights for developing tailored interventions to improve medication adherence among low-income African-American patients with hypertension who receive care in community-based practices.
Underestimation of Calories Purchased at Fast-Food Restaurants—Who and How Much? Jason P Block 1; Suzanne Condon 2; Ken Kleinman 1; Sheryl Rifas-Shiman 1; Matthew W Gillman 1. 1Harvard Medical School/Harvard Pilgrim Health Care, Boston, Massachusetts; 2Massachusetts Department of Public Health, Boston, Massachusetts. (Proposal ID # 10939)

BACKGROUND: Obesity results from overconsumption of energy in relation to energy expenditure. Adults may over-consume because they are unaware of the calorie content of foods they buy. When presented with restaurant menus in experimental settings, adults underestimate the calorie content of meals they would choose, but no real-world evaluations exist of how well adults estimate the calories of the food they purchase. The purpose of this study was to quantify the difference between actual and reported calorie content of food purchased for dinner at fast-food restaurants in New England and to assess the correlates of underestimation.

METHODS: We interviewed adults 18+ years of age at fast-food restaurants during the baseline phase of a study to evaluate a coming federal regulation that will require chain restaurants across the US to post calories on their menus. We randomly selected 3 McDonald's, 3 Burger Kings, 2 Subways, 1 Wendy's, and 1 KFC in each of Boston and Springfield, MA, Providence, RI, and Hartford, CT, for a total of 40 restaurants. We visited each restaurant three times from April to August 2010 between 5:15 to 7:30 pm, for 120 total restaurant visits. We attempted to approach all adults sequentially as they exited the restaurant. In exchange for a $2 incentive, we conducted a brief interviewer-administered survey to collect demographics, height and weight, food choices, and whether the participant saw and used nutritional information available in the restaurant. As part of the survey, we also asked each participant to estimate the calorie content of his or her dinner. To calculate the actual calorie content of food purchased, we used the participant's receipt and nutritional information from restaurant websites. Using multivariable logistic regression accounting for clustering of respondents by chain, we examined correlates of large-scale underestimation (reported minus actual calories ≥ 500).

RESULTS: We interviewed 915 participants (7.6 respondents per restaurant), representing 36% of adults we approached. 59% of respondents were male, 38% were White, 33% were Black, and 20% Hispanic; 42% were 18-29 years old, 31% were 30-49 years, and 27% were ≥ 50 years old. 556 subjects (65%) were overweight or obese. The mean actual calorie content of meals was 836 calories (SD 425), and the mean underestimation was 135 calories (SD 753; IQ range 530 underestimate to 100 overestimate). 33% purchased ≥ 1000 calories, and 27% underestimated by ≥ 500 calories. The most important factors in food choice were taste (79% said taste mattered "a lot"), convenience (54%), price (32%), and calorie content (26%). 210 (23%) of participants reported seeing nutritional information in the restaurant, but only 38 (19%) of them used that information to inform their food choices. In multivariable models adjusted for age, race/ethnicity, BMI category, and sex, subjects purchasing ≥ 1000 calories were much more likely to underestimate calorie content by ≥ 500 calories (OR 10.43 [95% CI 7.13-15.24]). Noticing calorie information in the restaurant (OR 1.19 [95% CI 0.74-1.92]) was not associated with underestimation. The importance of taste, convenience, price, and calorie content also were unrelated. Compared with Whites, Asians (OR 3.35 [95% CI 1.26-8.90]), Blacks (OR 2.54 [95% CI 1.59-4.06]), and Hispanics (OR 3.60 [95% CI 2.08-6.24]) were more likely to underestimate. 18-29-year-olds v. ≥ 50-year-olds (OR 0.57 [95% CI 0.34-0.94]) were less likely to underestimate, and BMI and sex were unrelated. Correlates of purchasing a ≥1000-calorie meal were underestimation of calorie content by ≥ 500 calories and age 18 to 29 years old v. ≥ 50 years old. The importance of calorie content (mattered "a lot" v. "not at all") predicted a lower odds of ordering a ≥1000-calorie meal.

CONCLUSION: One-third of adults visiting fast-food restaurants in New England purchased ≥ 1000 calories for dinner, and 27% underestimated the meal's calorie content by ≥ 500 calories. Purchasing ≥ 1000 calories strongly predicted underestimating calorie content of meals by ≥ 500 calories. Minorities were more likely to underestimate calorie content, and 18-to-30-year olds were less likely. Collection of similar data after the federal menu labeling regulation goes into effect will help determine the impact of the regulation on these patterns of knowledge and consumption. The strong association of large-calorie meal purchases and underestimation of calorie content holds promise that menu labeling could make calories more salient.
Patient experience with patient-centered medical homes and associated quality of care in Massachusetts, 2009

Asaf Bitton 1; Jennifer Kincheloe 2; David Bates 3; Joel Weissman 4. 1Division of General Medicine, Brigham and Women's Hospital, Brookline, Massachusetts; 2Kincheloe Health, Denver, Colorado; 3Brigham and Women's Hospital, Boston, Massachusetts; 4Massachusetts General Hospital, Boston, Massachusetts.

(Proposal ID # 12512)

BACKGROUND: Patient-centered medical homes (PCMH) have generated significant attention as a way to reform primary care and improve outcomes, yet no state-level evidence exists regarding the availability of its components or association with quality. Of added interest, Massachusetts' health insurance expansion raised questions around the capacity for primary care practices to provide sufficient access and quality care. We sought to assess the extent to which Massachusetts respondents had access to practices with core medical home features, and examined their association with quality of care indicators.

METHODS: We analyzed the 2009 Massachusetts Behavioral Risk Factor Surveillance System (BRFSS) survey, a representative statewide cross-sectional adult survey with a custom module of four questions to assess patient experience with medical homes. The survey sample consisted of adults ≥ 18 years, who were in the single split of the 2009 Massachusetts BRFSS sample that contained the PCMH question module (n = 5693). We defined a high level of "PCMH" care experience as having a personal doctor and answering "always" or "almost always" to all four PCMH questions, including: provider knowledge about a patient's medical history; getting an appointment right away; provider understanding of the patient's specialist care; provider knowledge about the patient's medications. We analyzed predictors of high PCMH care experience, and associations with ten available quality measures. These included access measures, vaccinations, lipid screening for cardiovascular diseases, and diabetes care processes (annual visits, eye exams, foot exams, cholesterol screening, Hemoglobin A1c testing). Multivariable regression models to assess the association of PCMH care experience with each quality measure were adjusted for age, gender, race, insurance, income, and education using SAS-callable SUDAAN.

RESULTS: Overall, 88.2% of respondents reported having a personal doctor, and 29.8% reported having high levels of PCMH care experience. In adjusted analyses, women were more likely than men to report high PCMH scores (adjusted OR (aOR) 1.48; 95% CI: 1.20, 1.83), and those without insurance were less likely (aOR 0.22; 95% CI: 0.13, 0.40). Respondents with high PCMH scores were less likely to report problems with obtaining care in the last year (aOR 0.53; 95% CI: 0.40, 0.71). Among adults with chronic disease, those reporting high levels of PCMH experience were more likely to ever receive a pneumococcal vaccine (aOR 1.36; 95% CI: 1.04, 1.78), an annual influenza vaccine (aOR 1.43; 95% CI: 1.08, 1.88), and annual lipid screening (aOR 2.08; 95% CI: 1.30, 3.34). In diabetic patients, those with high reported PCMH experience were more likely to report obtaining all five recommended care processes (aOR 2.31; 95% CI: 1.31, 4.06).

CONCLUSION: In contrast to some media reports, Massachusetts respondents reported high levels of access to primary care providers, and reasonable access to PCMH-associated care. High levels of PCMH experience were associated with receipt of a number of chronic disease and access quality indicators. Because patient experience is linked to improved quality, it will be crucial to measure experience with PCMH care on a population level as the PCMH model expands nationwide. The implementation of the BRFSS PCMH question module in Massachusetts may serve as an evaluation roadmap for other states to follow.
Limited English Proficient Patients and Time Spent In Therapeutic Range in a Warfarin Anticoagulation Clinic

Clemens Hong, Fatima Rodriguez, Yuchiao Chang, Lynn Oertel, Daniel Singer, Lenny Lopez. 

Massachusetts General Hospital, Boston, Massachusetts; Harvard Medical School, Boston, Massachusetts; Massachusetts General Hospital, Boston, Massachusetts. (Proposal ID # 12479)

BACKGROUND: Warfarin anticoagulation is a common and particularly complex and dangerous outpatient therapy. While anticoagulation clinics may deliver tailored, high quality care to patients receiving warfarin therapy, communication barriers with limited English proficient (LEP) patients may lead to disparities in anticoagulation quality with implications for program design and patient safety.

METHODS: We interrogated electronic data repositories on 2779 patients receiving care from the Massachusetts General Hospital Anticoagulation Management Service in 2010. This included data on international normalized ratio (INR) tests and patient characteristics, including language and whether the Service used a "surrogate" for primary communication rather than speaking with the patient directly. We calculated percent time in therapeutic range (TTR for INR between 2.0-3.0) and percent time in danger range (TDR for INR <1.7 or >3.5) using the standard Rosendaal interpolation method. We ran multivariable linear regression models to study the relationship between LEP and our primary outcomes, TTR and TDR, adjusting for patient age, gender, comorbidity count, education level, and whether the site of primary care was a community health center. Finally, we examined whether the use of a communication surrogate in LEP patients had a differential effect on outcomes.

RESULTS: Among 2779 total patients, the primary reasons for anticoagulation were atrial fibrillation (69.5%) and venous thrombosis and thromboembolism (15.3%). One hundred ninety-seven patients (7.1%) were LEP; LEP patients, compared to English speakers, had a higher number of co-morbidities (3.2 vs 2.9 comorbidities, p=0.004), and were more frequently women (52.3% vs 41.1%, p=0.002), minorities (49.7% vs 5.3%, p<0.001), underinsured (20.8% vs 5.8% with Medicaid, Free Care or Self-pay, p<0.001), and less well educated (51.3% vs 6.5% with less than a high school education, p<0.001). In unadjusted analyses, LEP patients compared to English speaking patients spent less TTR (71.4% vs 74.7%, p<0.001), more TDR (11.6% vs 9.6%, p=0.004). After adjusting for sociodemographic and clinical factors, LEP patients spent less TTR (-2.1%, 95%CI [-4.1% to -0.04%]), but there was no significant difference in TDR (1.1%, 95%CI [-0.4% to 2.5%]) between LEP patients and English speakers. Adjusting for these same factors, compared to English speakers who did not use a communication surrogate, LEP patients who did not use a communication surrogate had a lower percent TTR (-3.2%, 95%CI [-6.2 to -0.3%]) and a higher percent TDR (2.4%, 95%CI [0.3% to 4.5%]). LEP patients who used a communication surrogate were not statistically different from English-speakers who did not use a surrogate in their percent TTR (-2.5%, 95%CI [-5.0 to 0.01%]) or TDR (1.2%, 95%CI [-0.6% to 3.0%]).

CONCLUSION: This anticoagulation clinic achieved a high average TTR. Still, there was a small but significant decrease in TTR seen with LEP patients compared to English speakers. The use of a communication surrogate appeared to reduce this difference slightly among LEP patients. These relationships and the appropriate use of communication surrogates in anticoagulation management need to be further explored. But, it appears that anticoagulation clinics can enhance their services to LEP patients to reduce disparities and improve anticoagulation quality for LEP patients.