0.83, 1.1). For the remaining alert categories significantly higher proportions of final drug orders were appropriate in the intervention units: relative risk 2.4 for maximum frequency (1.4, 4.4); 2.6 for drugs that should be avoided (1.4, 5.0); and 1.8 for alerts to acquire missing information (1.1, 3.4). Overall, final drug orders were appropriate significantly more often than a relative risk 1.2 (1.0, 1.4). By tracking personnel time and expenditures, we estimated the cost of developing the CDSS as \$48,668.57. Drug costs saved during the 12 months of the trial are estimated at \$2,137. **Conclusion:** Clinical decision support for physicians prescribing medications for long-term care residents with renal insufficiency can improve the quality of prescribing decisions. However, patient well-being and quality of care rather than the business case related to cost savings are likely to be the key drivers for adoption of this HIT application.

C-A4-02:

Do Automated Phone Calls Improve Adherence to Inhaled Corticosteroids (ICS)?

W M Vollmer, PhD, *Kaiser Permanente Northwest*; C S Rand, PhD, *Johns Hopkins University*; A C Feldstein, MD, *Kaiser Permanente Northwest*; A Waterbury, MPH, *Kaiser Permanente Northwest*; J P Dubanoski, PhD, *Kaiser Permanente Northwest*; J Schneider, MPH, *Kaiser Permanente Northwest*; S Clark, RN, *Kaiser Permanente Northwest*; A Cibildak, MBA, *Eliza Corporation*; F Rizzo, *Eliza Corporation*; D H Smith, PhD, *Kaiser Permanente Northwest*; J Donovan, MS, *Kaiser Permanente Northwest*

Rationale: Adherence to ICS among individuals with asthma is poor and associated with increased asthma symptoms and acute health care utilization; diminished quality of life; and increased health care costs. **Objective:** To determine if a brief, automated telephone intervention using speech recognition (SR) technology improves ICS adherence among adults with asthma. **Methods:** PEANUT is an ongoing randomized clinical trial involving 14,064 members of a health maintenance organization (HMO), aged >18 years, taking medication for the management of asthma. Participants receive usual care (UC) or an 18-month SR intervention. SR participants receive monthly refill reminder calls, as needed, based on dispensing data derived from the electronic medical record. The calls provide educational information, explore barriers to adherence, and offer transfer to an automated refill line as appropriate. The primary outcome is the continuous measure of medication adherence (CMA), a measure of medication days dispensed relative to total observation days. Preliminary data through the first 8 months are presented. **Results:** Of over 10,000 calls attempted so far, we successfully reached the target participant 45% of the time and left a voice message on an additional 40% of calls. CMA scores are significantly higher for SR than UC participants (0.48 vs. 0.45, $P<0.01$), with the strongest effects (a five percentage point net differential) in those aged >60 yrs. One in 16 calls results in a direct transfer to the HMO's automated prescription refill service. **Conclusion:** Early results suggest a small, significant intervention effect. Because small changes in adherence on a population basis can have important public health benefits, this study supports the potential value of SR-based adherence interventions for asthma and other chronic diseases.

C-A4-03:

Risks to the Newborn Associated With In-Utero Exposure to Beta-Blockers and Calcium-Channel Blockers

Robert Davis, MD, MPH, *Kaiser Permanente Georgia*; Susan Andrade, ScD, *Meyers Primary Care Institute*; David Rubanowice, BS, *Group Health Cooperative*; Heather McPhillips, MD, MPH; Denise Boudreau, PhD; Marsha Raebel, PharmD, *Kaiser Permanente Colorado*; David Smith, PhD, MHA, *Kaiser Permanente Northwest*; M Ulcickas-Yood, DSc, MPH, *Henry Ford Health System*; Kim Lane, MPH, *Harvard Pilgrim Health Care*; Renny Varghese, MPH, *Kaiser Permanente Georgia*; Richard Platt, MD, MSc, *Harvard Pilgrim Health Care*

Background: While medication use to manage cardiovascular disease during pregnancy is widespread, data on its safety for the developing infant is scarce. We used population-based data from 5 HMOs to study risks for perinatal complications and congenital defects among infants exposed in-utero to beta-blockers and calcium-channel blockers. **Methods:** We studied women older than 15 years who delivered an infant between 1/1/96 to 12/31/00, and who had been continuously enrolled with prescription drug coverage for one year

prior to delivery. We further limited our study to mother-infant pairs with 30 and 365 days follow-up for the evaluation of perinatal outcomes and congenital anomalies, respectively. Information on prescription drug dispensing, and inpatient and outpatient diagnoses and procedures was obtained from automated databases at each health plan. **Results:** There were a total of 87,407 mother-infant pairs with at least 30 days follow-up in the five health plans. Of these, a total of 405 full-term infants were exposed during pregnancy to beta-blockers and 721 full-term infants were exposed to calcium-channel blockers. Infants exposed to beta-blockers in the third trimester of pregnancy were at over three-fold increased risk for hypoglycemia (RR 3.1; 95% CI 2.2, 4.2), for feeding problems (RR 1.8; 95% CI 1.3, 2.5) and for prolonged hospitalization (RR 2.0; 95% CI 1.3, 3.1). Infants exposed to calcium-channel blockers in the third trimester had an increased risk for neonatal seizures (RR 3.6; 95% CI 1.3, 10.4), and for hematological disorders (RR 2.6; 95% CI 1.4, 5.1). A chart review confirmed the seizures and hypoglycemia cases but found no serious hematologic conditions common to the calcium-channel exposed infants. There were no increased risks for congenital anomalies among either group of infants. **Conclusions:** Infants whose mothers receive beta-blockers are at increased risk for neonatal hypoglycemia. Beta-blockers can cross the placenta, increasing insulin and decreasing glucagon in the newborn, leading to hypoglycemia. Infants whose mothers take calcium-channel blockers are at increased risk for neonatal seizures, although the mechanism leading to this increased risk is less clear. These data should be disseminated to the obstetric and neonatal community so that appropriate newborn management strategies may be developed.

PS2-04:

Impact of Medication Therapy Management Delivered to Home-based Medicare Beneficiaries

Thomas Delate, PhD, MS, *Kaiser Permanente Colorado*; Elizabeth Chester, PharmD, MPH, BCPS, *Kaiser Permanente Colorado*; Erin Welch, PharmD, *Kaiser Permanente Colorado*; Troy Stubbings, PharmD, *Kaiser Permanente Colorado*

Background: Medication Therapy Management (MTM) is a voluntary patient-participation program mandated for Medicare Part D sponsors by the Centers for Medicare and Medicaid Services for chronically-ill beneficiaries with high medication costs/utilization. MTM is intended to optimize therapeutic outcomes for individual patients. The objective of this study was to assess the impact of a pharmacist-managed MTM program on mortality, healthcare utilization, and prescription medication costs and quantify drug-related problems (DRP) identified during MTM. **Methods:** This quasi-experimental, controlled study was conducted at Kaiser Permanente Colorado, a group model HMO, among beneficiaries who were targeted for MTM in 2006. The MTM intervention was designed to identify potential DRP, educate the patient/caregiver about appropriate medication use, and ensure that the patient was appropriately integrated into clinical services. Data were collected from administrative databases and manual chart abstractions. Study outcomes included all-cause death (primary outcome), hospitalization, and ED visit rates and medication cost changes in the 180 days post-MTM targeting (follow-up) and quantification of DRP. Multivariate logistic regression was used to adjust the outcomes for baseline risk and other potential confounders. Beneficiaries who declined MTM and experienced death, hospitalization, or ED visit received a mock MTM intervention. **Results:** A total of 459 (Opt-in) and 336 (Opt-out) beneficiaries who agreed and declined, respectively, to receive MTM were included in the analysis. At baseline, groups were similar in age, sex, disease burden, healthcare utilization, and medication spend. Opt-in compared to Opt-out beneficiaries were less likely to die; adjusted odds ratio (AOR)=0.5, 95% confidence interval (CI)=0.3–0.9 but more likely to have had a hospitalization (AOR=1.4; 95% CI=1.1–2.0) and an increase in medication costs (AOR=1.4, 95% CI=1.1–1.9) during follow-up. There was no difference in ED visit rates. At least one DRP was identified in >83% of beneficiaries in both groups, with the most common DRP being drug interaction. **Conclusions:** Our investigation supports the use of MTM, with its optimization of medication therapy and increased coordination of information between healthcare providers and patients, since it may positively impact mortality in a population of high-risk Medicare beneficiaries.