

willingness to participate in a health informatics intervention to improve safe NSAID use. We then developed a concept map and classification scheme for analyzing transcripts from the focus groups. Two trained coders labeled the transcripts using ATLAS.ti. **Results:** Forty-eight KPG adults participated in the focus groups: 83% female; 50% African American; median age 54 years. Fortyseven participants indicated current or recent use of OTC NSAIDs. Easy access to OTC NSAIDs (low cost, no prescription required) promoted their use; however, self-medication strategies often combined multiple OTC NSAIDs or increased OTC NSAID dosing to obtain pain relief. Participants acknowledged that the proposed intervention would benefit their health care through more complete reporting and documentation of OTC NSAID use in their EMR. Concerns were expressed about: keeping this information up-to-date, if the information would be used or (if used) evaluated by a qualified provider on their health care team, and mode (e-mail or telephone) and timeliness about how they would be informed about potential risks from their OTC NSAID use. **Conclusions:** Consistent with the Chronic Care Model, participants acknowledged that the proposed intervention would create productive interactions with their providers and likely improve their health outcomes. Their perspectives also yielded some unexpected insights (e.g. importance of timely updating of OTC NSAID use) and have resulted in modifications to the overall intervention design.

PS1-30:

Research Mentor: A Web-based Reference for Planning and Preparing a Research Proposal

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Background: National emphasis on interdisciplinary and translational research as research priorities has created new challenges in grantsmanship. The Office of Scientific Writing and Publication at Marshfield Clinic Research Foundation utilized an informatics approach to create a comprehensive educational resource to assist new and established investigators engaged in research design. An interactive website accessible on the institutional intranet was designed to provide links to information, resources and support personnel to assist with navigating the central and peripheral processes required for successful procurement of institutional and external grants. **Methods:** Research Mentor was designed to provide comprehensive guidance to research fundamentals in a conveniently accessible interactive, user-friendly, online format. The website included resources and links to guidelines for grant development including feasibility analysis and study design planning, biostatistical considerations, peer review, grantsmanship, intellectual property protection, regulatory policies, computer-based training, institutional and national policies governing research, and access to funding agencies, forms, and appropriate support staff. The website was beta-tested by 25 physicians and scientists with varying degrees of research experience and refined based on user comments before the website was launched in spring of 2008. **Results:** Research Mentor proved to be an effective orientation tool for researchers by enhancing grantsmanship skills and providing access to research resources. Research Mentor has been effective in linking the researchers with appropriate support personnel who offer further assistance to researchers in producing competitive proposals. Tools custom-designed for Research Mentor to assist in project planning and design have been frequently accessed by investigators and reduce time spent by support staff on assisting with project planning. **Conclusions:** Informatics venues such as interactive user-friendly online educational websites can offer step-by-step guidance to research design and processes by providing a comprehensive cross-disciplinary research resource that offers value to new and established investigators alike. These tools promote networking with experienced support personnel to facilitate production of competitive grants.

PS1-35:

Use of Web-based Rheumatology Practice Visual Display Tools With an Electronic Health Record (EHR)

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Background: A variety of different types of data (i.e., patient-reported, lab, imaging, clinician-documented) are required to guide and improve rheumatologic treatment decisions. Although these data elements are available in the electronic health record (EHR), the demands of a busy practice do not allow sufficient time to effectively review all sources of data. Moreover, the EHR does not offer a facility to bring relevant but disparate data together in an integrated visual display. We developed a novel web-based software program—Rheum-PACER (Patient Centric Electronic Redesign) that displays relevant data in a web-based dashboard format. We report on the results of the first phase of implementing Rheum-PACER, i.e., identifying key data elements and designing the user interface. **Methods:** Rheum-PACER is a web-based program that obtains, aggregates, and/or exchanges information from/with four sources: patients, nurses, rheumatologists, and the EHR. It is separate from, but accessed seamlessly from within, the EHR. An iterative consensus process was used to identify the data elements desired by/from each of these four sources. **Results:** The Rheum-PACER dashboard is comprised of four key tabs, each of which allows the provider to complete a specific task within a single interface. The “Outcomes General” tab displays parallel temporal trends of patient reported outcomes (PRO), labs, and rheumatic medications. The “Outcomes Composite” tab displays temporal trends of composite PRO scores and physician-recorded data (e.g., tender joint counts), labs, and rheumatic medications over a 12-month period. The “Demographics” tab visually parses rheumatic versus other diagnoses and medications and allows for entry of data not typically found in the EHR (i.e., date of first rheumatic disease diagnosis). The “Construction” tab is used to construct a visit progress note. This tab incorporates pre-populated patient reported data (e.g., events since last visit, review of systems) and EHR data (e.g. medications, lab values) and allows for entry of nurse and physician-derived measures (e.g., physical exam, global scores). **Conclusions:** Web-based software tools that are external to, but which interact with, the EHR have the potential to improve clinical practice and clinical decision-making by providing clinicians with information that is aggregated, formatted, and presented in a way that reflects their cognitive clinical decision-making process.

Pharmacoepidemiology

C-A4-01:

Computerized Clinical Decision Support During Drug Ordering for Long-term Care Residents With Renal Insufficiency

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Objective: To determine whether a computerized clinical decision support system (CDSS) providing patient specific recommendations in real-time improves the quality of prescribing for long-term care residents with renal insufficiency. **Design:** A randomized trial within the long-stay units of a large long-term care facility. Randomization was within blocks by unit type. Alerts related to medication prescribing for residents with renal insufficiency were displayed to prescribers in the intervention units and hidden but tracked in control units. **Measurement:** The proportions of final drug orders that were appropriate were compared between intervention and control units within alert categories: 1) recommended medication doses; 2) recommended administration frequencies; 3) recommendations to avoid the drug; 4) warnings of missing information. **Results:** The rates of alerts were nearly equal in the intervention and control units: 2.5 per 1000 resident days in the intervention units and 2.4 in the control units. The proportions of dose alerts for which the final drug orders were appropriate were similar between the intervention and control units (relative risk 0.95, 95% confidence interval

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)?

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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

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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

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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.