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Background/Aims: Payments to hospital providers are not solely driven by the resource requirements of individual patients, but also reflect payment policies specific to the health care payer and hospital provider. For example, Medicare adjusts payments to hospitals according to facility and local geographic characteristics that may not be relevant to studies estimating the associations of individual patient characteristics with true costs of care. We developed a method to estimate hospital costs using the diagnosis related group (DRG) payment weights on which Medicare bases hospital payments that reflect patient medical and surgical acuity. Our purpose was to compare cost estimates for hospital stays calculated using DRG payments weights to actual Medicare hospital payments. **Methods:** We used Medicare Provider Analysis and Review (MedPAR) files and DRG weight tables linked to participant data from the Study of Osteoporotic Fractures (SOF) from 1992 through 2010. Participants were women age 65 and older recruited in three metropolitan and one rural area of the United States. Standardized hospital costs were estimated using DRG payment weights for 1,397 hospital stays (assigned 182 separate DRG codes) for 795 SOF participants for one year following a hip fracture. Cost estimates based on Medicare payments included Medicare and secondary insurer payments, copay and deductible amounts. **Results:** The mean (SD) of inpatient DRG-based cost estimates per person-year were \$16,268 (\$10,058) compared to \$19,937 (\$15,531) for MedPAR payments. The correlation between DRG-based estimates and MedPAR payments was 0.71, and 51% of hospital stays were in different quintiles when costs were calculated based on DRG weights compared to MedPAR payments. **Conclusions:** DRG-based cost estimates of hospital stays differ significantly from Medicare payments, which are adjusted by Medicare for facility and local geographic characteristics. These findings also may apply to studies estimating associations of individual patient characteristics with health care costs across multiple payers (such as HMORN members) who have different payment policies based in part on local geographic and health care system characteristics (including contracts between specific payers and hospital providers). DRG-based cost estimates may be preferable for analyses when hospital, payer, and local geographic variation could bias assessment of associations between patient characteristics and costs.

Keywords: Hospital costs; Claims data

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B2-3:

Comparative Effectiveness of a Computerized Algorithm versus a Physician Instituted Protocol to Manage Insulin Infusions after Cardiac Surgery

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Background/Aims: Glucose management after cardiac surgery in our hospital was done using a locally developed paper insulin infusion protocol. Prolonged time to achieve and maintain target blood glucose was common and hypoglycemia was a significant problem. A computerized algorithm for insulin infusion was implemented and compared to the paper insulin infusion protocol. A barrier to effective implementation of this practice change was timed glucose measurements that consumed more nursing time. This was overcome by increasing nursing education and thereby efficiency. Hyperglycemia after meals and rapid glucose changes with glucose altering medications was addressed by adding extra glucose readings to allow the system to adjust the infusion rate. **Methods:** In order to assess the effectiveness of the new system, permission was received from the IRB to perform a retrospective chart review. Data for the paper protocol was obtained from 248 patient records during the time period of 7/1/11 to 12/30/11. Data for the computerized system was obtained from 181 patient records during the period of 8/1/12 to 5/2/13. Primary endpoints were time to achieve target glucose and hypoglycemia occurrence rates before and after intervention. The data was analyzed for time to achieve target glucose using a comparison of means and sample confidence levels for means of normal distributions with unknown variances. **Results:** Mean time to achieve target blood glucose before the intervention was 14.9 hours, and after the intervention was only 4.9 hours. Difference in time to achieve target glucose

was 10 hours ($P < 0.005$ with 99.5% confidence level). Percent of patients with blood glucose $< 40\text{mg}\%$ was 4.45% (11 of 248) and blood glucose $< 60\text{mg}\%$ was 20.6% (51 of 248) before the intervention. With the computerized insulin algorithm, percent of patients with blood glucose $< 40\text{mg}\%$ was 0 and $< 60\text{mg}\%$ was 0.55% (1 of 181). **Conclusions:** The management of postoperative insulin infusions with a computerized algorithm results in significant improvement in patient care delivery with more efficient glucose control, little hypoglycemia, and an average saving of 10 hours of intensive care stay and nursing time. The health economic implications of this finding are being studied.

Keywords: Insulin infusions; Post cardiac surgery

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B2-4:

Variations in the Cost of Ambulatory Care Episodes: An Opportunity for Improvement?

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Background/Aims: Policymakers are exploring bundled payments to providers, but little is known about their application in ambulatory care. As an example, this study examines the cost of acute bronchitis episodes. **Methods:** Data were from electronic health records and claims of a large ambulatory group practice with mixed payment sources. Optum's Symmetry Grouper was used to create episode treatment groups (ETGs) for all services. There were 78,828 episodes of acute bronchitis, cared for by 427 primary care physicians/urgent care centers (PCPs) (1,568 PCP-years) in 2007-2011. Costs included standardized fees for physicians, laboratory/imaging ordered, and specialist services. The grouper extends an episode indefinitely with continuing related services, so we separately considered episodes closed in: (a) 1 day, (b) within 30 days, and (c) those extending beyond 30 days. In a nested model, we focused on lead physician 'effects,' controlling for patient characteristics. **Results:** Of the total episodes, 78% closed in 1 day, 19% closed in 2 to 30 days, and 3% took > 30 days. One-day episode costs were most stable (mean cost = \$77, coefficient of variation (CV) = 0.36), followed by 30-day episodes (mean cost = \$181, CV = 0.56), and longer than 30-day episodes (mean cost = \$268, CV = 0.78). Among 1-day episodes, 21% of the PCP-years (with 166 unique PCPs) had costs significantly below the average. Only 22% of the episodes of these PCPs extended beyond 1 day vs. 32% for all other PCPs ($P < 0.01$), and the costs of their longer episodes averaged \$176 vs. \$205 ($P < 0.01$). Among the 91 PCPs with 2 or more years of significantly lower 1-day costs, 85% (77 PCPs) did not have elevated rates of longer episodes or significantly above average costs for longer episodes. **Conclusions:** Focusing on 1-day acute bronchitis episodes (78% of the total) markedly reduces the variance across episodes, but substantial variation in episode costs across PCPs remains. With some PCPs repeatedly achieving low 1-day costs without evidence of subsequent problems, episode-based payment may lead to improved resource use.

Keywords: Episode-based payment; Cost

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D4-1:

Economic Impact of an Evidence-based Standardized Perinatal Care and Practice Measurement Process: Evidence from a U.S. Integrated Healthcare Delivery System

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Background/Aims: Recent estimates indicate 10-15% of all babies born in the U.S. are admitted to the neonatal intensive care unit (NICU) which along with evidence that coordinated prenatal care is positively correlated with better birth outcomes (fewer low birth weight and premature babies, and fewer infants transferred to NICU's) suggest the potential for improvement in perinatal care quality and cost. The aim of this analysis is to examine the economic impact of an evidence- and guideline-based standardized coordinated perinatal care and electronic health record measurement process (Geisinger Health System (GHS) Perinatal ProvenCare® (PPC)) for both the mother and infant implemented in a large integrated U.S. healthcare delivery

system to test whether it reduces the total cost of care. **Methods:** GHS PPC applies to care over the entire gestational period (antepartum, intrapartum and postpartum) using a single standardized pathway with 103 best practice measures grouped in five clinically relevant bundles and automated reporting for all patients across 22 practice sites and four hospitals. Geisinger Health Plan claims data from 2007 to 2010 for 3,369 mother-infant combinations were used to calculate total costs of care per live birth for mothers and infants for PPC and control groups. A difference-in-difference method was used to estimate the cost impact accounting for baseline differences between groups and the secular trend in the control group. A set of multivariate regression models was developed to calculate regression-adjusted cost estimates. **Results:** Average total cost of care per live birth in the PPC group was approximately 26% ($P = 0.001$) lower compared to the control group. Much of this cost savings was attributable to reductions in the cost associated with infant care, including lower utilization of expensive NICU services. **Conclusions:** This study demonstrates the potential for reduction in medical care costs of a standardized perinatal care delivery process based on Geisinger's experience. The findings suggest that cost savings are attributable to prevention of adverse patient outcomes. If applied more broadly, including to state Medicaid programs which cover almost half of U.S. births, similarly implemented standardized processes could result in better health outcomes and significant cost savings.

Keywords: Perinatal care; Cost

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D4-4:

Shared Medical Appointments: A Promising Innovation to Improve Patient-Physician Relationship and Ease Primary Care Shortage

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Background/Aims: Shared medical appointments (SMAs) or group visits have been touted as a primary care system change to overcome the challenges of short visits, underused self-management education, and to relieve physician shortage. However, few studies have examined SMAs from the patient's perspective. Using data collected through focus groups, we present the thoughts and experiences of patients participating in SMAs. **Methods:** We conducted five focus groups with participants who had attended SMAs at a large, non-profit, multispecialty group practice in northern California which serves four counties and more than 700,000 patients. Focus groups were recorded, transcribed, and thematically coded according to study aims. Transcripts were coded at the paragraph level. Disagreements in coding were discussed until consensus was reached. **Results:** Similar themes emerged across the focus groups. Patients expressed many benefits to SMAs including enhanced learning by being able to cover more information than what would be provided in a traditional visit, increased motivation for health behavior change, and were able to connect with others in a similar situation. Patients also felt that the SMA altered their relationship with their physician. Patients now saw the more "human" side to their physician which placed them at ease for future visits. Overall, the power dynamic between patient and physician was lessened as the patient now viewed themselves as being able to impart information to the physician. **Conclusions:** Given the upcoming Affordable Care Act and existing primary care shortage, SMAs provide a way for patients to improve access, relationships with physicians, and an increased knowledge of health, but also to help ease patient load for physicians. Thus, SMAs are an innovative form of delivery that can improve efficiencies and better use the scarce resource of primary care physicians.

Keywords: Shared medical appointments; Qualitative

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PS1-26:

The Impact of Relational Dynamics in Primary Care Departments on Patient Satisfaction with Clinic Performance

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Background/Aims: We examined the extent to which relational dynamics among primary care providers and clinic staff impacts clinic quality and efficiency from the patients' perspective. Relational dynamics, measured by team communication (frequency, timeliness, accuracy, problem-solving) and relationships (shared goals, shared knowledge, mutual respect), has been associated with better performance in hospital settings through better communication and coordination of tasks among providers; however, the impact in primary care has received more limited attention in the literature. We take advantage of the natural variation in practice culture that occurred in 13 family medicine and 13 internal medicine departments in a large multispecialty practice in California. **Methods:** We conducted a cross sectional study using data from a relational dynamics survey completed by providers (142 physicians; 96 medical assistants; 46% response rate), Press Ganey patient satisfaction data ($n = 13,076$; 21% response rate), and EHR from July 2011 to June 2012. Relational dynamics was measured by 7 reliable items of team interaction (Cronbach's $\alpha = 0.90$), scored 1 (lowest) to 5 (highest). Department averages were constructed and matched to 8 patient satisfaction measures of clinic quality and efficiency, scored as the % of "very satisfied" respondents. Relevant patient case-mix, physician, and department characteristics were included in multilevel models with random effects at the department level. **Results:** Relational dynamics varied across the 26 departments ranging from 3.57 to 4.52 (mean = 4.17; SD = 0.25). A one SD increase in relational dynamics was associated with an increase in the % of patients "very satisfied" with scheduling appointments (1.61, $P < 0.05$), getting the clinic on the phone (1.46, $P < 0.05$), returning phone calls (2.19, $P < 0.01$), returning emails (2.23, $P < 0.05$), wait times (3.71, $P < 0.01$), and the likelihood of recommending the practice (1.53, $P < 0.01$). However, there was no relationship with the ease of obtaining referrals and the sensitivity to patients' needs. **Conclusions:** The relational dynamics in primary care departments are associated with improvements in patient satisfaction with clinic performance. These findings support establishing formal procedures to enhance the communication and relationships among primary care providers and clinic staff in order to improve the patient experience with care.

Keywords: Relational dynamics in primary care; Patient satisfaction

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PS1-29:

Changing the Culture of Medicine: An Exploration of Lean Healthcare in Primary Care

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Background/Aims: Despite its soaring costs, healthcare in the U.S. still suffers from inefficiencies and wastefulness. Given recent health care reform efforts, healthcare organizations know significant change is on the horizon, and in anticipation of that, some organizations have begun adopting delivery systems that address these wastes and inefficiencies. One system that has gained considerable attention in recent years is commonly referred to as Lean Healthcare. Originating from the manufacturing industry, this approach to healthcare focuses on retaining value for the patient and eliminating non-value or waste. However, implementing Lean healthcare is not without its challenges. One major challenge to implementing Lean is essentially cultural. More specifically, the values and norms associated with Lean and those deeply entrenched in the field of medicine may conflict, and therefore reconciling them may be necessary to successfully implement Lean. **Methods:** This study consists of a qualitative evaluation of a Lean implementation effort at a large healthcare organization. Researchers conducted observations of key implementation events and interviewed frontline leaders, as well as physicians, nurses, and medical assistants who have participated in the change effort. The data produced from these qualitative methods were analyzed and coded using an inductive, grounded approach. **Results:** This paper highlights five main major changes that produced cultural conflict when this healthcare organization implemented Lean. These include: (1) adopting team care approaches (2) democratization of the workplace and the erosion of hierarchies (3) reducing variation and standardizing work (4) surveillance of staff and employees (5) a perceived emphasis on profit over patient care. **Conclusions:** Implementing new ways of delivering care in healthcare organizations is often met with many challenges. Some of these challenges may be rooted in a conflict between