Quality in Primary Care (2015) 23 (3): 150-156

Research Article

Cost and Quality in Hypertension Care: Observations from a Primary Care Quality Improvement Initiative

Valerie A. Carey, Ph.D
Focused Medical Analytics, LLC, Pittsford, NY

Michelle R. Casey, MPA
Finger Lakes Health Systems Agency, Rochester, NY
Department of Public Health Sciences, University of Rochester School of Medicine and Dentistry, Rochester, NY

Gregory H. Partridge, BA
Focused Medical Analytics, LLC, Pittsford, NY

Thomas Mahoney, MD
Finger Lakes Health Systems Agency, Rochester, NY
Department of Medicine, University of Rochester School of Medicine and Dentistry, Rochester, NY

Howard B. Beckman, MD
Focused Medical Analytics, LLC, Pittsford, NY
Finger Lakes Health Systems Agency, Rochester, NY
Department of Public Health Sciences, University of Rochester School of Medicine and Dentistry, Rochester, NY
Department of Medicine, University of Rochester School of Medicine and Dentistry, Rochester, NY

ABSTRACT

Background: Cost-savings programs should not be undertaken at the expense of patient health. Therefore, the relationships between medical care utilization and health outcomes must be studied to determine where savings might be achieved without compromising appropriate treatments. Previous studies have found that cost variations have little impact on health outcomes, although these results have been challenged. Few published studies have examined cost-outcome associations for specific conditions treated in a primary care setting.

Aims: We investigate the relationship between blood pressure control rates and hypertension care costs for adult hypertensive patients served by primary care practices participating in a regional quality improvement program in western New York State.

Methods: This project used an observational design at the practice level. Counts of hypertensive patients with controlled and uncontrolled blood pressure were provided by 32 primary care practices participating in a quality improvement program involving ~50,000 hypertensive patients over a 12-month period. Cost data was derived from a separate de-identified, multi-payer medical claims database. Hypertensive patients visiting physicians at the participating practices were identified, and hypertension-specific service costs for these patients were aggregated at the practice level. A generalized linear model was used to model the effects of care costs on blood pressure control rates. The analysis was performed while controlling for practice location, a likely proxy for patient socioeconomic status and other environmental and demographic factors.

Results: We find that the annual cost of hypertension care does not have a statistically significant association with blood pressure control for this population.

Conclusion: Factors other than cost of care must explain differences in blood pressure control rates among these primary care practices. Identifying low-cost, high-quality practices may provide lessons to improve the cost and quality of care. However, examination of disaggregated data and larger sample sizes are desirable to form firmer conclusions at the practice level.

Keywords: Primary care, quality of health care, cost effectiveness, healthcare costs, hypertension

'How this fits in with quality in primary care'

What do we know?

•Quality improvement programs aimed at primary care physicians may emphasize cost savings, but it is necessary to ensure that such programs do not compromise appropriate care.

•No previous studies have examined whether increased hypertension spending is associated with better BP control outcomes for patients treated in a primary care setting.

What does this paper add?

•A methodology is described that permits the combination of claims data from insurers/health plans with clinical data from primary care practice electronic medical records to create an assessment of concurrent cost and treatment outcomes.

•Practice-level variation in the cost of hypertension care is not associated with differences in blood pressure control rates for adult hypertensive patients treated by 32 primary care practices in western New York State.

Introduction

Programs to reduce medical spending must ensure that their efforts do not reduce effective, necessary care. Therefore, identification of cost-related factors which are and are not associated with improved health outcomes is crucial in informing health care policy decisions.

Studies on the influence of spending on health outcomes have found mixed results.[1,2] Fisher, et al. have shown that, at the regional level, variations in health care utilization are not associated with differences in health outcomes. [3,4] Others have also found no relationship, or a negative relationship, between cost and quality. [5-7] However, Sheiner has suggested that geographic cost variations are primarily due to patient health differences, while other studies have found that higher-intensity care improves outcomes in specific clinical situations.[8-11] Moreover, Finkelstein, et al. found that cost variations are due to a combination of factors, indicating that, while savings opportunities exist, projects aimed at reducing spending must be carefully designed to avoid discouraging effective treatments.[12]

Of 61 cost-effectiveness studies reviewed by Hussey et al., only 4 focused on costs associated with specific conditions treated in a primary care setting, although research in this area is ongoing.[1,5] Because many cost-savings initiatives target primary care providers, information regarding cost-effectiveness in this setting is crucial. Examination of hypertension treatment costs and outcomes is particularly urgent, as this condition affects approximately 40% of adults age 25 and over worldwide, and is estimated to cause 9.4 million deaths annually.[13]

Here, we examine hypertension care costs and blood pressure (BP) control outcomes for hypertensive patients visiting primary care practices in western New York. Our hypothesis is that increased cost of hypertension care does not reliably improve a primary care practice's blood pressure control rate.

Cost-outcome studies are often hindered by lack of all relevant information. Although health status information is generally available in a practice's electronic medical record (EMR) system, information about services rendered outside the practice (e.g. specialist visits and emergency room usage) are often not included, and cost data are typically not available. Conversely, medical claims provided by insurance companies may provide cost or utilization information, but crucial health outcome data is missing. With the availability of a multi-payer medical claims data base in metropolitan Rochester, NY and voluntary submission of EMR data by a set of primary care practices, the relation between condition-specific costs and outcomes can finally begin to be evaluated in a single geographic region. This paper provides the results of a cross walk between two databases to answer the question: At a practice level, does more spending on hypertension care reliably predict improved BP control? The answer to this question will inform future quality-improvement projects, which aim to reduce costs while improving health outcomes.

Methods

Between April 2013 and March 2014, BP control outcomes from practice EMR systems were collected as part of in a primary care quality improvement project administered by the Finger Lakes Health Systems Agency (FLHSA) in a six-county region of western New York State. Simultaneously, the two largest commercial health insurers in the region submitted health-care claims, including medical, professional, facility, and pharmacy charges, to a regional multi-payer database. We align these data sets, extracting cost data from the multi-payer claims database and control rates from the EMR data, to enable a practice-level analysis of cost and outcome associations. Figure 1 summarizes the data processing methodology, which is described in detail in the sections below.

EMR Data

As part of a larger project, "Transforming Primary Care Delivery: a Community Partnership", participating primary care practices were invited to improve their delivery of primary care services using the medical home model. These practices submitted EMR data for 65,518 patients as counts of patients with controlled and uncontrolled BP (<140/90 mm Hg).

Patients with hypertension on the practices' problem lists were included in the control measure. The data was limited to patients aged 18-85 who had a BP reading between April 2013 and March 2014, and who resided in the New York State counties of Monroe, Livingston, Ontario, Seneca, Wayne and Yates. The 32 participating practices were located in the same six-county region. FLHSA staff categorized the practices locations (urban, suburban, or rural) based on the practice's zip code and patient populations. 4 practices were categorized as urban, 14 as suburban, and 14 as rural.

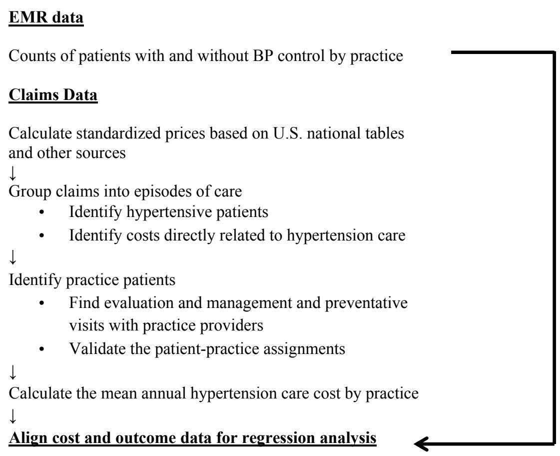

Figure 1: Data processing flow chart. Outcome data was taken from EMR data supplied by the practices, whereas the cost measure was derived from claims data. Key claims data processing steps include calculation of standardized pricing, episode grouping, and patient-practice assignments.

Health Care Claims Data

The multi-payer claims database contained de-identified health care claims and insurance coverage spans provided by two payers, Excellus BCBS and MVP, and included Commercial, Medicare Advantage, and Medicaid HMO products. This data set covers approximately 70% of regional lives. Processing of claims data was performed using SPSS v 22.0.0.1 (IBM). The claims were standardized across the payers, and when necessary, payer-specific provider identifiers were mapped to U.S. standard National Provider Identifiers using information from the claims data, e.g. zip code, name, and taxonomy codes.

Standardized Pricing

The claims data sets did not include care charges or allowed amounts; therefore, standardized costs of care were estimated based on procedure codes, diagnosis codes, and other fields using a variety of methods, but generally following U.S. national (Medicare) pricing tables. All professional claim lines in a calendar year were assigned the weight from the October version of the Center for Medicare and Medicaid Services (CMS) resource based relative value scale using the Rochester, NY geographically adjusted conversion factor, with adjustments for some services based on typical Commercial charges. [14,15] CMS Ambulatory Patient Classification fee schedules were used to assign outpatient service prices based on the last quarterly update of the service year.[16,17]

Costs of the facility component of inpatient stays were calculated on a per-visit basis using CMS fee tables for CMS Diagnosis Related Group (DRG) codes, and New York State (Medicaid) tables for 3M DRGs (AP-DRGs and APR-DRGs). For inpatient psychiatric visits, we use a modified per-diem price based on published CMS Inpatient Psychiatric Facility pricing protocols relevant for the visit dates.[18,19] Most rehabilitation visits were assigned the CMS flat rate relevant for the visit dates, but adjustments are applied for short (3 days or less) and long (45 days or more) visits. [20,21]

Pharmacy claims were priced based on National Drug Code (NDC) rates derived from a variety of proprietary commercial sources, as well as public utilization data.[22] Most NDCs were assigned a per diem cost, but drugs with highly variable supply days per unit were priced on a per-claim basis.

Episode Grouping

Claims were grouped into episodes of care using the Ingenix Optum Symmetry Suite Episode Treatment Group (ETG) grouper (v8.3). The ETG grouper's patient comorbidity table was used to identify hypertensive patients; our analysis includes patients with a hypertension comorbidity in March 2013-April 2014. The diabetes and ischemic heart disease status for the hypertensive patients was determined using the same process. Claim lines assigned to the hypertension ETG 163000 were included in the hypertension cost analysis.

Assignments of Patients to Practices

Our claims data is de-identified; therefore we used provider and service code information to identify patients visiting the participating practices. We considered individual primary care physicians, nurse practitioners, and physician assistants to be employed in a calendar quarter if their employment at the practice overlapped the calendar quarter by 30 or more days. We restricted our analysis to patients ages 18-85 as of March 31, 2014 whose zip codes overlapped the six counties included in the control rate data at any point during the measurement year.

We included patients with preventative or evaluation and management (E&M) visits to the practice-associated providers between April 2013 and March 2014. Eligible visits were identified using CPT/HCPCS codes in the professional claims, and limited to specific place-of-services codes (Table 1). Visits with practice providers were identified using the following criteria: (1) visits involved service, billing, or service/billing provider combinations that were uniquely associated with a practice, and (2) visits involved service providers who worked at both the practice and at other locations, and a retrospective, single-provider attribution process assigned the patient to a practice-only provider based on visits occurring during April 2012 – March 2013. 99.5% of assignments used method (1).[23]

Using these methods, 50,223 patient-clinic assignments were found. About 1% of patients visited multiple clinics; therefore, these assignments represent 49,749 unique patients. The mean (median) number of visits per hypertensive patient to the assigned practices during the measurement year was 3.3 (3). The mean patient age was 61, and 54% were female.

Validation of Patient Assignments to Practices

Correctness of Patient Assignments: We examine patient characteristics and counts to demonstrate that our patient-practice assignments are reasonable. The mean (median) distance between member residence and assigned practice zip code centroids was 6.9 (5.4) miles. Assuming that patients and practice densities by zip codes are similar, and using 2010 census estimates for zip code populations, the expected mean (median) distance between a patient and practice selected at random is 22 (18.0) miles. Therefore, the provider- attributed-patient distances are much less than what would be expected by chance (note also that the total area of the region is 4,800 square miles). For urban, suburban, and rural practices, the

Table 1: Codes used to identify preventative and evaluation and management visits in the medical/outpatient claims data. Visits identification required a match to both code types, e.g. CMS place of service 11 and CPT 99241.

Code	Description
CPT/HCPCS Codes	
G0101	Pelvic/breast exam
G0245-G0246	Evaluation of diabetic patient
G0438-G0439	Annual wellness visit
G0344, G0402	Preventive physical exam (Medicare patient)
S0610-S0613	Annual gynecological exam
S0622	College physical exam
99024	Post-operative follow-up
99201-99215	New/established office visits
99241-99245	Office consultation visits
99324-99337	Domiciliary, rest home, etc. services
99339-99340	Domiciliary, home care, etc. plan oversight
99341-99350	Home visit
99381-99397	Preventive medicine
CMS Place Of Service Codes	
	Blank / missing
11	Office
17	Walk-in retail health practice
49	Independent practice
50	Federally qualified health center
53	Community mental health center
60	Mass immunization center
71	State or local public health practice
72	Rural health practice

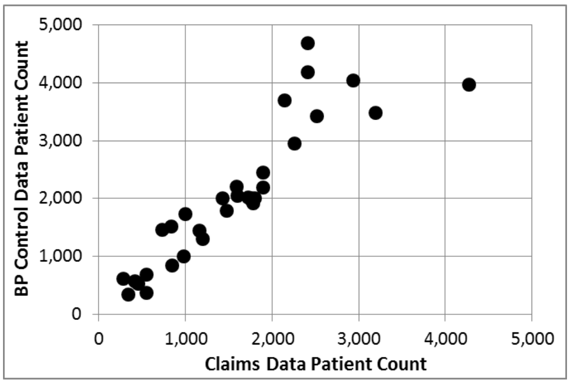

Figure 2: Scatter plot comparing the number of hypertension patients in each practice as submitted in the EMR data vs. the number of assigned hypertensive patients from the claims data.

median distances were 3.0, 5.3, and 6.5 miles, respectively. Provider-patient distances seemed reasonable for all practices, with median distances ranging from 0 miles to 10.6 miles.

Figure 2 shows a plot of the BP control data hypertensive patient counts vs. the counts of assigned members from claims data. The Pearson correlation coefficient is 0.898 for this data, indicating a strong relationship. We further verified that demographics were reasonable, for example that patients assigned to a geriatric specialty practice had a mean age of 73 years, compared to the overall mean of 61 years.

Patient Coverage Rates: Products in the practice-provided BP control rate data include all commercial insurance companies accepted by the practices, as well as fee-for-service Medicaid and Medicare patients and uninsured patients, whereas the claims data include only Commercial and managed care products from the two largest regional payers; therefore, the populations do not fully overla The claims-based hypertensive patient assignment count (50,223) is 77% of the included EMR data BP readings (65,518). This is consistent with the large market shares of these payers. However, the ratio of claims data patients to BP control data patients is lower for urban (58%) than for suburban (81%) and rural (85%) practices.

Additional information provided by FLHSA indicated that, at urban practices, 33% of all (hypertensive and non-hypertensive) patients use Medicaid and Medicare fee-for-service or "other" products (primarily self-pay), which are not included in the claims data set. In contrast, 12% of suburban patients, and 23% of rural patients, use fee-for-service or "other" products. Although all-patient product distributions may not reflect distributions for hypertensive patients, it seems likely that the lower coverage rates for urban practices are due to higher rates of uninsured and fee-for-service patients.

Hypertension Cost Measure

The cost metric was the mean annual cost of hypertension care for patients visiting each practice. The measure included all claim types (facility, pharmacy, medical, outpatient, etc.) For each patient, costs were calculated on a per-member per-month basis, and then converted to annual costs based on coverage spans. To reduce the distorting effects of outlier cases, we set an upper threshold of annual care costs to four times the 75th percentile costs; 1.2% of patients had costs higher than the threshold amount ($2,218).

Because pharmacy coverage dates did not necessarily overlap with medical coverage dates, pharmacy and non-pharmacy charges were calculated separately and then combined into a final annual cost of hypertension care. For patients with less than 3 months of coverage, we estimated the measure as the median cost for patients with the same age category, sex, and diabetes and ischemic heart disease condition status. 16.2 % (24.1%) of patients had some gap in medical (pharmacy) coverage. However, only 0.8% (6.5%) had fewer than 3 months of medical (pharmacy) coverage. Coverage gaps were similar across practices, with the mean medical (pharmacy) coverage months ranging from 10.6 to 11.4 (9.9 to 10.9) for all practices.

Mean costs within some service categories were also calculated. Within the hypertension services, the categorization was applied at the claim line level based on service codes.

Regression Analysis

Regression analysis was performed using R version 2.15.0 (R Foundation) invoked via the SPSS 22.0.0.1 R integration package (IBM). Raw success (controlled BP patient counts) and failure (uncontrolled BP patient counts) was the single, two-category dependent variable. The independent cost variable was normalized by dividing by $10. As BP control is a binary outcome, we used a generalized linear regression model with a logit link function to model the probability that any given hypertension patient will have controlled B Our data was overdispersed; therefore our analyses used the "quasibinomial"

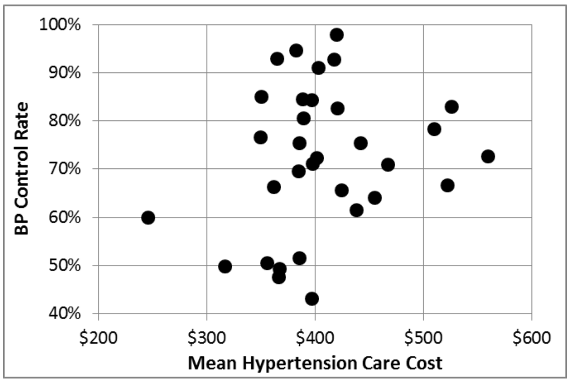

Figure 3: Scatter plot showing the control rate (% of patients with BP control) vs. mean annual hypertension care cost.

Table 2: p-values and parameter estimates for the hypertension cost variable (mean annual costs divided by $10) in the regression analyses. Parameter estimates are shown as odds ratios, with the 95% confidence intervals for these estimates in parentheses. N is the number of data points (practices) used in the analysis. Results are shown for regression models with and without the practice location, as well as models including and excluding urban practices.

	p-value	Parameter estimate		N
models including urban practices				
cost only	0.571	1.014	(0.967 - 1.066)	32
cost + practice location	0.373	1.025	(0.973 - 1.082)	32
models excluding urban practices				
cost only	0.246	1.036	(0.979 - 1.100)	28
cost + practice location	0.282	1.033	(0.976 - 1.098)	28

family option in the R glm() function. We repeated our regression analysis with and without the location code variable (practice urban, suburban, or rural designation), and with and without urban practices.

Results

A scatter plot of the BP control rates versus mean hypertension care costs for the 32 practices (Figure 3) does not show any definite cost/quality trends. Table 2 shows regression analysis results for this data. We modeled BP control as a function of cost with and without the location code variable. The cost variable is not statistically significant in either case, as indicated by the high p-values and the 95% confidence intervals for the parameter estimates, which include 1. These results indicate that increased spending on hypertension care is not a significant factor in BP control outcomes.

While the aggregated BP control data precludes control for most demographic and environmental factors, we did control for practice location (urban, suburban and rural), in our analysis. Because our claims data coverage rates are lower for urban practices, we also repeated our analyses with and without these clinics. Omitting these practices had no meaningful effect on our results (Table 2).

Another qualitative summary of the cost and BP control data can be found in Table 3. The 32 practices were divided into quartiles (8 practices each) according to their BP control outcomes. The first quartile is the lowest quality (lowest % of patients with BP control). Table 3 shows the total annual hypertension care costs, as well as hypertension costs in the three highest-cost service categories (pharmacy, evaluation/management, and imaging/radiology). None of these costs demonstrate a clear trend with respect to quality groups. The quartile patients' demographic and health status characteristics also do not show systematic differences.

The Pearson correlation coefficient for the scatter plot data shown in Figure 3 is 0.212 (p=0.244). The partial correlation coefficient, controlling for the location code variable, is 0.174 (p =0.350). The large p-values for the correlation coefficients are consistent with the regression results, which do not show statistically significant associations.

Discussion

We have examined the relationships between BP control rates and cost, aggregated at the practice level. We do not find statistically significant relationships between the cost of hypertension care and BP control rates (Table 2).

As multiple stakeholders focus on improving the value of care, primary care providers are left to struggle with when to provide more services and when to reduce services determined to be unnecessary. In our past work, [24] as we presented cost data

Table 3: p-Annual hypertension care costs and patient characteristics by practice quality quartile .

	(lowest)	Quality quartile		(highest)
	1	2	3	4
# practices in quartile	8	8	8	8
BP control rate range	43%-61%	64%-72%	73%-83%	84%-98%
Cost measures (mean annual dollars)				
Total	$367	$425	$433	$393
Pharmacy	$183	$176	$211	$184
Evaluation/ management	$101	$147	$133	$106
Imaging/ radiology	$39	$49	$38	$51
Assigned patient characteristics				
# patients	8,340	16,652	13,090	12,061
Mean age	61.1	59.2	62.6	62.2
% female	52.4%	56.1%	52.6%	55.4%
% diabetic	28.7%	31.7%	30.4%	31.3%
% w/ ischemic heart disease	18.6%	17.3%	20.7%	20.0%

to practitioners, they often responded with, "Sure I am more expensive, but my outcomes are better". By combining clinical EMR data with claims data, this methodology begins to provide answers for higher cost practices. While there are high-cost, high-BP-control practices, the identification of lower-cost, high-BP-control practices provides an opportunity discern how to deliver high levels of quality while lowering health care costs. For capitated medical groups or health systems, knowing where practices inside and outside the system fall on this cost/quality scatter plot will be critical.

Strengths and limitations

The power of our analysis is limited by the format of the BP control data provided by the practices. We received aggregated BP control data for each practice, which prevents analysis of subgroups or control for most demographic and socioeconomic factors. The inclusion of actual BP readings, as opposed to simple controlled/uncontrolled status would also allow the identification of those more severely affected by the condition, for example, those with Stage 2 hypertension (BP≥160/100 mm Hg). In addition, we are hindered in determining the effects of services administered to a minority of patients; even if these treatments are highly effective, it is unlikely that they would substantially change the aggregated control rate for the practice as a whole. Furthermore, practice-level observations may not hold at the physician level.

In addition, about 23% of patients in the BP control data set are not present in our claims data set. This limitation affects urban clinics more than rural and suburban practices, probably because they serve a larger share of uninsured and of fee-for-service Medicare and Medicaid patients. It seems reasonable to assume that Excellus BCBCS and MVP patients are similar to Commercial and Medicaid/Medicare managed care patients who choose other insurance companies, and therefore cost information for these patients will be representative of clinic-wide costs. However, uninsured patients and those using fee-for-service Medicare or Medicaid products may be systematically different from managed care patients. This issue may disproportionately affect urban practices. However, we, repeated the regression analyses omitting urban practices, and did not see meaningfully different results (Table 2).

Despite these limitations, we note that our data set includes cost and BP control data for a large number of patients (~50,000 individuals), and both the qualitative evidence and the odds ratio estimates near 1 (for a $10 scaling of costs) suggest that increased spending has no meaningful effect on BP control. Therefore, this study presents preliminary evidence supporting the hypothesis that "more is not reliably better".

Implications for future research

We envision that defining the low-cost, high-quality groups as a best-practice community will enable examination of how these cost-effective practices approach hypertension care. Clearly, spending more is not always the answer. We hope that additional investigations will begin to answer questions such as, are the best-practice groups more or less likely to spend money on E&M visits, medication, testing or procedures? Alternatively, are there other non-financial factors that are responsible for the different results?

It is highly desirable to obtain control rate data by patient or by patient subgroups. Such data is being collected by FLHSA as part of other projects. We hope that the claims processing and pricing methods and patient assignment techniques described here will inform the analysis of this and other richer data sets.

ACKNOWLEDGEMENTS

The authors would like to acknowledge Benjamin Chapman, PhD MPH, Associate Professor Psychiatry, University of Rochester Medical Center for invaluable assistance with statistical consulting and manuscript preparation. We also acknowledge the data preparation work of Barbara Landschoot of Focused Medical analytics and Alexis Smirnow from the Finger Lakes Health Systems Agency.

SOURCE OF FUNDING

Data collection and processing for the project described was supported by Cooperative Agreement Number 1C1CMS331063 from the Department of Health and Human Services, Centers for Medicare & Medicaid Services. The contents of this article are solely the responsibility of the authors and do not necessarily represent the official views of the U.S. Department of Health and Human Services or any of its agencies.

REFERENCES

1. Hussey PS, Wertheimer S, Mehrotra A (2013) The Association Between Health Care Quality and Cost: A Systematic Review. Ann Intern Med 158:27-34.
2. Burke LA, Ryan AM (2014) The Complex Relationship between Cost and Quality in US Health Care. AMA J Ethics 16:124-130.
3. Fisher ES, Wennberg DE, Stukel TA, Gottlieb DJ, Lucas FL, et al. (2003)The implications of regional variations in Medicare spending. Part 1: The content, quality, and accessibility of care. Ann Intern Med 138: 273-287.
4. Fisher ES, Wennberg DE, Stukel TA, Gottlieb DJ, Lucas FL, et al. (2003) The implications of regional variations in Medicare spending. Part 2: Health outcomes and satisfaction with care. Ann Intern Med 138: 288-298.
5. Abraham M, Crespin DJ, McCullough JS, Christianson JB (2014) What Is the Cost of Quality for Diabetes Care? Med Care Res Rev 71: 580-598.
6. Yegean J, Yanagihara D (2013) Value Based Pay for Performance in California. Issue Brief. Integrated Healthcare Association Se Report No: 8.
7. Baicker K, Chandra (2004) Medicare spending, the physician workforce, and beneficiaries' quality of care. Health Aff (Millwood) Suppl Web Exclusives: W4-184-197.
8. Sheiner L (2014) Why the Geographic Variation in Health Care Spending Can't Tell Us Much About the Efficiency or Quality of Our Health Care System. Brookings Papers on Economic Activity. Brookings Institute.
9. Doyle JJ, Graves JA, Gruber JA, Kleiner S (2012) Do high-cost hospitals deliver better care? Evidence from ambulance referral patterns. NBER Working Paper. National Bureau of Economic Research. Report No.: 17936.
10. Mangione CM, Gerzoff RB, Williamson DF, Steers WN,

Kerr EA, et al (2006) The association between quality of care and the intensity of diabetes disease management programs. Ann Intern Med. 2:107-116.

11. Silber JH, Kaestner R, Even-Shoshan O, Wang Y, Bressler LJ (2010) Aggressive treatment style and surgical outcomes. Health Serv Res 45: 1872-1892.

12. Finkelstein A, Gentzkow , Williams H (2014) Sources of Geographic Variation in Health Care: Evidence from Patient Migration. NBER Working Paper. National Bureau of Economic Research Report No: 20789.

13. World Health Organization (2013) A Global Brief on Hypertension: Silent Killer, Global Public Health Crisis. World Health Organization Report No.: WHO/DCO/WHD/2013.2.

14. Center for Medicare and Medicaid Services (2013) Medicare Program; Revisions to Payment Policies Under the Physician Fee Schedule, DME Face-to-Face Encounters, Elimination of the Requirement for Termination of Non-Random Prepayment Complex Medical Review and Other Revisions to Part B for CY 2013. Fed Regis 78: 48996-49059.

15. Center for Medicare and Medicaid Services (2013) Medicare Program; Revisions to Payment Policies Under the Physician Fee Schedule, Clinical Laboratory Fee Schedule & Other Revisions to Part B for CY Final Rule. Fed Regist 78:74230-74823.

16. Center for Medicare and Medicaid Services Medicare and Medicaid Programs: Hospital Outpatient Prospective Payment and Ambulatory Surgical Center Payment Systems and Quality Reporting Programs; Electronic Reporting Pilot; Inpatient Rehabilitation Facilities Quality Reporting Program; Revision to Quality Improvement Organization Regulations; Final Rule. Fed Regist. 2012; 77: 68210-68565.

17. Center for Medicare and Medicaid Services (2013) Medicare and Medicaid Programs: Hospital Outpatient Prospective Payment and Ambulatory Surgical Center Payment Systems and Quality Reporting Programs; Hospital Value-Based Purchasing Program; Organ Procurement Organizations; Quality Improvement Organizations; Electronic Health Records (EHR) Incentive Program; Provider Reimbursement Determinations and Appeals; Final RuleFed Regist 78: 74826-75200.

18. Center for Medicare and Medicaid Services (2012) Medicare Program; Inpatient Psychiatric Facilities Prospective Payment System-Update for Fiscal Year Beginning October 1, 2012 (FY 2013). Fed Regist 77: 47224-4726.

19. Center for Medicare and Medicaid Services (2013) Medicare Program; Inpatient Psychiatric Facilities Prospective Payment System-Update for Fiscal Year Beginning October 1, 2013 (FY 2014). Fed Regist 78: 46734-46777.

20. Center for Medicare and Medicaid Services (2012) Medicare Program; Inpatient Rehabilitation Facility Prospective Payment System for Federal Fiscal Year 2013. Fed Regist 77: 44618-44636.

21. Center for Medicare and Medicaid Services. Medicare Program; Inpatient Rehabilitation Facility Prospective Payment System for Federal Fiscal Year 2014. Fed Regist. 2013; 78(151): 47860-47934.

22. http://www.fdhc.state.fl.us/medicaid/prescribed_drug/board.shtml.

23. Pope GC (2011) Attributing Patients to Physicians for Pay for Performance. In Cromwell J, Trisolini MG, Pope GC, Mitchell JB, Greenwald LM, editors. Pay for Performance in Health Care: Methods and Approaches.: Research Triangle Press 181-201.

24. Greene RA, Beckman HB, Mahoney T (2008) Beyond the Efficiency Index: Finding a Better Way to Reduce Overuse and Increase Efficiency in Physician Care. Health Aff 27: w250-w259.

ADDRESS FOR CORRESPONDENCE

Howard Beckman, Senior Consultant, Finger Lakes Health System Agency, Chief Medical Officer, Focused Medical Analytics, Tel: 585-381-5488; Fax:585-381-5481; e-mail: hbeckman@fma-us.com