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RESEARCH ARTICLE

Impact of a Pay-for-Performance Program on Care for Black Patients with Hypertension: Important Answers in the Era of the Affordable Care Act

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Objective. Evaluate the effect of a pay-for-performance intervention on the quality of hypertension care provided to black patients and determine whether it produced risk selection.

Data Source/Study Setting. Primary data collected between 2007 and 2009 from Veterans Affairs physicians and their primary care panels.

Study Design. Nested study within a cluster randomized controlled trial of three types of financial incentives and no incentives (control). We compared the proportion of physicians' black patients meeting hypertension performance measures for baseline and final performance periods. We measured risk selection by comparing the proportion of patients who switched providers, patient visit frequency, and panel turnover. Due to limited power, we prespecified in the analysis plan combining the three incentive groups and oversampling black patients.

Data Collection/Extraction Method. Data collected electronically and by chart review.

Principal Findings. The proportion of black patients who achieved blood pressure control or received an appropriate response to uncontrolled blood pressure in the final period was 6.3 percent (95 percent confidence interval, 0.8–11.7 percent) greater for physicians who received an incentive than for controls. There was no difference between intervention and controls in the proportion of patients who switched providers, visit frequency, or panel turnover.

Conclusions and Relevance. A pay-for-performance intervention improved blood pressure control or appropriate response to uncontrolled blood pressure in black patients and did not produce risk selection.

Key Words. Quality of care, race/ethnicity, physician incentive payment programs

The Patient Protection and Affordable Care Act (ACA) of 2010 contained provisions to reform some methods of paying health care providers to improve the quality and efficiency of health care. One type of potential reform is the creation of financial incentives for quality. While there is widespread support for these reforms (Davis, Abrams, and Stremikis 2011), few data are available to guide their design (Petersen et al. 2006; Scott et al. 2011). There are even fewer available studies evaluating the potential impact of payment reforms, such as pay-for-performance programs, on vulnerable populations such as minority patients.

Several observational studies have found that performance incentives such as those in pay-for-performance programs have the potential to improve (Millett et al. 2009a; Jha, Orav, and Epstein 2010; Bhalla et al. 2013), worsen (Millett et al. 2009b), or maintain the quality of health care for minorities (Chien et al. 2007; Alshamsan et al. 2010). A cross-sectional study found that after introducing financial incentives in a large, integrated health care delivery system, physician performance improved on five performance measures, including those for diabetes mellitus and coronary artery disease care, across all ethnic groups (Bhalla et al. 2013). Incentives might create motivation to focus upon those receiving poorer care as a strategy to improve quality overall. On the other hand, performance incentives might encourage focus upon care for more adherent or healthier patients, who are better able to achieve a given clinical target, such as blood pressure or glucose control (Shen 2003; Casalino et al. 2007; Snyder and Neubauer 2007). To our knowledge, there are no prior large randomized trials evaluating the effect of performance incentives on the quality of health care provided to minority patients.

Hypertension is more prevalent, more severe, and more resistant to treatment in blacks than in whites (Hajjar and Kotchen 2003; Downie et al. 2011; Persell 2011; Redmond, Baer, and Hicks 2011), and the mortality rate from hypertension is higher in blacks than in whites (Wong et al. 2002;

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Fiscella and Holt 2008; Ford 2011). Thus, identifying interventions to improve hypertension control could ultimately reduce the sequelae of hypertensive disease in blacks. We carried out a nested study to evaluate the effect of pay for performance on black patients. Our study was nested in a cluster-randomized trial of financial incentives that previously found better performance for those who received incentives for meeting guideline-recommended hypertension quality measures for a combined measure for blood pressure control and appropriate clinical response to uncontrolled blood pressure (Petersen et al. 2013).

We also assessed whether there were unintended effects of the intervention such as risk selection. Risk selection is a phenomenon whereby condition severity and complexity influence providers to select patients out of a primary care panel to improve the overall measured performance of the panel.

METHODS

Parent Study Design

This study was nested within a cluster randomized controlled trial (NCT00302718; www.clinicaltrials.gov) assessing the effectiveness of performance incentives in improving hypertension care in the Veterans Affairs (VA) primary care setting. The trial methods and results are described elsewhere (Petersen et al. 2011, 2013). Briefly, after consenting physicians, we randomized 12 VA hospital-based primary care clinics to one of four study groups, differentiated by the type of incentive rewarded: (1) physician-level (individual) incentives; (2) practice-level incentives; (3) physician- and practice-level (combined) incentives; and (4) no incentives (control). All physicians at a hospital were assigned to the same group. To ensure that facilities of the same type would not be concentrated in one arm, randomization was constrained on hospital teaching status, geographic location, participation in the Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT) (ALLHAT Officers and Coordinators for the ALLHAT Collaborative Research Group 2002; Cushman et al. 2002), and whether the primary care setting was “geographically integrated” (i.e., comprised of adjacent clinics). Up to seven full-time primary care physicians enrolled from each hospital. At sites where more than seven physicians were eligible and consented to the study, participants were randomly selected from among those who consented. At the six hospitals randomized to a practice-level incentive group, the

physicians invited up to 15 nonphysician colleagues (e.g., nurses, pharmacists) to participate.

At the start of the intervention, we educated participants about guideline-recommended hypertension management and explained the study performance measures. Performance measures and guideline-recommended care were based on JNC 7 hypertension guidelines (Chobanian et al. 2007; Petersen et al. 2011). Intervention group participants also received information about incentives, which were rewarded each time a sampled patient met a performance measure. At the end of each of the five 4-month performance periods, participants in all groups received audit and feedback on their performance, and intervention group participants received monetary rewards commensurate with their individual and/or practice's performance. Physicians earned \$9.10 for each outcome achieved (Petersen et al. 2013). Among physicians who participated in all five performance periods, the average total payment over the course of the study was \$2,744.

Nested Study Design

The parent trial, which enrolled 83 physicians and 45 nonphysicians from the 12 hospitals, was not powered to determine the effect of the incentive on black patients, racial disparities, or the effect of individual incentive types on black patients. Therefore *a priori*, we specified that we would do the analysis only among black patients and aggregate all intervention arms together to achieve power to study black patients. For the grant application to fund the nested analyses, we determined the sample size required to achieve adequate power. We performed a simulation of 300 Monte Carlo cycles that accounted for random variation among physicians and patients, the uncertainty in estimating the physician's practice by sampling, and the unbalanced study design.

The parent trial randomly sampled 70 patient charts from each physician participant and abstractors reviewed charts until 40 usable charts were obtained. For the nested study, all charts of black non-Hispanic patients were used from the 40-chart sample, and any additional black non-Hispanic charts were added from the remaining charts in the 70 chart sampling frame. In addition, we oversampled black patients from the physicians' remaining patient panel to obtain a sufficient number of black non-Hispanic patient charts. This was repeated for both the baseline (August–November 2007) and final (April–July 2009) performance periods in the nested study of black patients. Power calculations were based on collecting data from 18 black hypertensive patients per physician at each time point. Because some physicians had fewer than 18

such patients at one or both time points, we reviewed additional charts from physicians with more than 18 patients and performed a weighted analysis.

Of the 83 physicians enrolled in the parent trial, six were not working at their facility during the baseline performance period, five were new employees, and one was on extended leave. The 77 physicians with baseline data were eligible for inclusion in the nested study. Nine of these participants left the primary care clinics at their facility before the end of the final performance period, and another physician withdrew for a personal reason. The analysis therefore includes the 67 physicians (and the patients in their panels) participating in the baseline and final performance periods. There were no significant differences in demographics or practice characteristics between the 67 physicians included in the analysis and the 10 who were not eligible for analysis.

We used electronically collected data on physicians' patients. In addition, chart abstractors, blinded to the study aims and to the patient's study arm assignment, collected data on patient demographic characteristics, blood pressure readings, relevant comorbidities, medication details, and compelling indications for alternative medications (such as beta-blockers for postmyocardial infarction patients) from the VA's electronic medical records.

We classified patients according to the self-reported race and ethnicity they provided at VA intake registration (VHA Handbook 1601A.01: Intake Registration 2009). If race or ethnicity was unknown, chart abstracters reviewed clinic notes for patient-reported race/ethnicity; they recorded provider-reported race/ethnicity only if a patient report was unavailable. Only a small number of charts reviewed were missing self-reported race or ethnicity; race was determined from clinic notes in 1.5–4.0 percent of patients while ethnicity was determined from clinic notes in only 0.9–1.5 percent of patients. Self-report is the preferred method for determining race and ethnicity (Ford and Kelly 2005). Self-reported race/ethnicity in VA databases has a high concordance with other large data sources, such as Centers for Medicare and Medicaid Services databases (Stroupe et al. 2010). Because of differences in hypertension prevalence, treatment, and control between blacks and Hispanics (Hajjar and Kotchen 2003), to increase the precision of our analyses, we classified patients as "black" only if their race was "black or African American" and their ethnicity was "not Hispanic, Spanish, or Latino."

VA Primary Care Panels

Each VA patient enrolling for care is assigned to a primary care provider (2007 Veterans Health Care Benefits 2007). In general, a veteran has only one

VA primary care provider; exceptions can be made when a patient has two residences and spends significant time in each location. Inactivation of patients from a physician's panel occurs if the patient dies; if the patient has not been seen by the assigned provider in the past 24 months; if the patient is newly assigned to the provider and has not been seen by the provider in the past 12 months; or if the patient relocates or discontinues VA care. Patients appropriate for removal from a panel are identified and inactivated at least monthly (VHA Handbook 1101.2: Primary Care Management Module [PCMM] 2009). Patients may also request assignment to a new provider.

Rewarded Performance Measures

Our primary outcomes were performance in the final period evaluated using each of the study performance measures: proportion of sampled black hypertensive patients receiving guideline-recommended antihypertensive medications, proportion with controlled blood pressure, and proportion with uncontrolled blood pressure who received an appropriate clinical response to an uncontrolled blood pressure (e.g., lifestyle recommendation for stage 1 hypertension or guideline-recommended medication adjustment) (Petersen et al. 2011, 2013; Urech et al. 2015). Because the latter two measures are interdependent, such that only one of the two can be achieved per patient, we also evaluated performance in terms of whether each patient either had controlled blood pressure or received an appropriate clinical response to uncontrolled blood pressure (combined blood pressure measure). Additionally, we evaluated a combination of all of the study performance measures: blood pressure control, appropriate response to uncontrolled blood pressure, or use of guideline-recommended medications.

Measures of Risk Selection

Because patients in the VA may change their primary care provider (United States Department of Veterans Affairs 2013), one concern about implementing pay for performance is that it might result in risk selection, in which physicians select patients to maximize performance scores. Physicians may view patients with complex conditions as impediments to raising their performance measure scores and gaining financial incentives, which may drive them to exhibit behavior that encourages these patients to change primary care providers or reduce the intervals in which such patients are seen. To investigate this, we used VA administrative data to evaluate the following measures among black

hypertensive patients in each participating provider's panel: whether a patient switched providers, panel turnover among physician participants, and visit frequency. Patients assigned to any other providers over the intervention period were classified as having switched providers. Patients of trainees were excluded from the analysis. We calculated panel turnover as the percentage of the provider's assigned patients before the intervention who were no longer assigned to the provider at the end of the intervention. To determine visit frequency, we enumerated the days during the intervention period in which each patient had a visit with the provider and compared the rates for intervention and control groups.

Analysis

To achieve adequate power for the analysis, *a priori* we prespecified combining the three incentive groups into one intervention group and compared measures between this collective intervention group and the control group. We compared physician demographic and practice characteristics across intervention arms to evaluate the homogeneity of the three incentive groups. Additionally, we compared physician demographic and practice characteristics in the control and intervention groups to evaluate the adequacy of randomization. We also explored the relationship between each of these characteristics and each performance measure. We used linear regression to model the effect of the intervention on providers' performance in the final period. The unit of analysis was the physician. Full models included covariates for physician gender, race, years practicing since completing residency, and baseline performance; whether the provider practiced at an academically affiliated hospital; whether that hospital was an ALLHAT study site (ALLHAT Officers and Coordinators for the ALLHAT Collaborative Research Group 2002; Cushman et al. 2002); percentage of the physician's patients who were male; percentage of the physician's patients who were diabetic; average age of the physician's patients; and whether the physician reached the ceiling value for the performance measures at baseline (Weissman et al. 2001; Petersen et al. 2011, 2013; Urech et al. 2015). Because geographic differences in blood pressure control are reflected in VA performance benchmarks, full models also included a covariate for geographic region, indicating whether a site's benchmark was <70 percent (see Table 3).

Models were weighted by the minimum number of charts reviewed for a particular provider over the baseline and final performance periods. To calculate the adjusted effect of the intervention, we first developed a list

of possible covariates that we believed could affect the final outcome in addition to the baseline value and the intervention. Nonsignificant variables were eliminated by a backwards elimination procedure described, for example, in (Cheng et al. 2010). The basis for comparing models was Akaike's information criterion (AIC), a log-likelihood function corrected for the number of covariates. First, we tested for the significance of the site (hospital) as a random effect. Then, we applied backward elimination to the physician characteristics to arrive at the model that exhibited the maximum effect of the intervention. Models were compared using the chi-square test at the .05 level. We evaluated linear and nonlinear transformations for the covariates and tested for collinearity using the variance inflation factor. Because we tested five outcomes, we adjusted the alpha levels to account for multiple comparisons using the Benjamini–Yekutieli method (Benjamini and Yekutieli 2001). As a check against overfitting, we conducted a bootstrap analysis in which each provider's patients were resampled and the analysis was repeated 1,000 times.

We used chi-square tests to evaluate the association between the percentage of patients who switched providers and study group and between panel turnover and study group. We used t-tests to determine whether patient visit frequency differed significantly between the intervention and control groups. SAS 9.2 (SAS Institute, Inc, Cary, NC, USA) was used for statistical analyses, and the MIXED procedure was used for linear regression.

RESULTS

Physician characteristics were not statistically significantly different across the four study arms. Physician demographic and practice characteristics were also similar between the combined intervention and control groups (Table 1).

Physicians in the intervention group had an unadjusted average of 74.5 percent (standard deviation [SD] = 14.5 percent) of their black patients achieve blood pressure control or an appropriate response to uncontrolled blood pressure at baseline, which increased to 80.2 percent (SD = 16.4 percent) at postintervention (Table 2). Physicians in the control group also experienced an increase in the unadjusted proportion of black patients meeting this performance measure at postintervention, from 78.3 percent (SD = 15.6 percent) to 79.4 percent (SD = 12.6 percent). Both intervention and control

Table 1: Physician Demographic and Practice Characteristics

<i>Characteristic</i>	<i>Intervention (n = 50)</i>	<i>Control (n = 17)</i>
Male – no. (%)	27 (54)	12 (71)
Race – no. (%)		
White	21 (42)	7 (41)
Black	5 (10)	0
Asian Indian	13 (26)	4 (24)
Other	11 (22)	6 (35)
Years practicing since the completion of residency, mean (SD)	13.2 (8.2)	13.5 (7.7)
Work at teaching hospital – no. (%)	44 (88)	13 (76)
Work at hospital where ALLHAT training has been provided – no. (%)	32 (64)	13 (76)
Work in a southern region – no. (%)	27 (54)	6 (35)
Proportion of patients who are male*, mean (SD)	.905 (.202)	.930 (.241)
Patient age, mean (SD)	60.2 (3.5)	60.0 (3.8)
Proportion of patients who are diabetic, mean (SD)	.383 (.108)	.376 (.114)
Number of black non-Hispanic patients, mean (SD)	50.6 (35.6)	38.1 (32.4)

* $p < .05$.

group physicians had a higher unadjusted average proportion of white patients compared to black patients achieving either blood pressure control or an appropriate response to uncontrolled blood pressure, at both baseline and postintervention (Table 2). However, this study was not powered to compare results from black and white patients.

There was no significant site random effect in any models. The optimal model for the combined blood pressure measure was adjusted for baseline performance, physician race, whether the physician worked at a teaching hospital, and geographic region. There was no evidence of collinearity. The proportion of black patients who achieved blood pressure control or received an appropriate response to uncontrolled blood pressure in the final performance period was 6.3 percent (95 percent confidence interval [CI] 0.8–11.7 percent; $p = .03$) greater for physicians in the intervention group than for physicians in the control arm (Table 3). This means that on average, a physician in the control group would have 6.3 percent more of his/her hypertensive black patients (63 per 1,000) in control or receiving appropriate response if the physician had been in the intervention group. However, after correcting for multiple comparisons (five study outcomes), the significance threshold did not meet the new adjusted significance level of 0.02.

Table 3: Adjusted Difference between Intervention and Control Group Physicians in Proportion of Black Patients Achieving Performance Measures in the Fifth Period

<i>Performance Measure</i>	<i>Difference (95% CI)*</i>	<i>p value</i>
BP control or appropriate response to uncontrolled BP [†]	0.063 (0.008–0.117)	.03
Use of guideline-recommended antihypertensive medications [‡]	0.024 (–0.028 to 0.075)	.37
BP control [§]	0.021 (–0.043 to 0.085)	.53
Appropriate response to uncontrolled BP	0.128 (0.003–0.253)	.05
BP control, appropriate response to uncontrolled BP, or use of guideline-recommended medications**	0.028 (–0.002 to 0.059)	.07

*Difference between intervention and control groups, where reference group is control group.
†In a model controlling for physician’s baseline performance, physician race, whether the physician worked at a teaching hospital, and geographic region.
‡In a model controlling for physician’s baseline performance, percent of physician’s patients that were male, number of years physician has been practicing since completing residency, and whether physician is of black race.
§In a model controlling for physician’s baseline performance, physician gender, number of years physician has been practicing since completing residency, whether the physician is of white race, whether the physician worked at a hospital that participated in ALLHAT, whether the physician worked at a teaching hospital, geographic region, and ceiling effects.
||In a model controlling for physician’s baseline performance, percent of physician’s patients that were male, physician gender, physician race, whether the physician worked at a hospital that participated in ALLHAT, whether the physician worked at a teaching hospital, and ceiling effects.
**In a model controlling for physician’s baseline performance, whether the physician worked at a teaching hospital, geographic region, and whether physician is of black race.
BP, blood pressure.

Final performance on the guideline-recommended medication measure did not differ between intervention and control groups (Table 3). Likewise, final performance did not differ between groups when blood pressure control and appropriate response to uncontrolled blood pressure were modeled separately and when evaluating a combined measure that indicated whether a patient met any of the study performance measures.

There was no difference in the percentage of patients who switched providers in the intervention ($n = 1,830$ patients; 25.1 percent) and control groups ($n = 300$ patients; 25.1 percent; $p = .98$). At the end of the intervention period, 2,104 (28.8 percent) of intervention patients were no longer assigned to their original provider, compared to 353 (29.6 percent) of control patients ($p = .61$). The mean number of patient visits during the intervention period was 9.1 (SD = 8.1) in the intervention group and 9.0 (SD = 8.4) in the control group ($p = .77$), suggesting that intervention group providers did not reduce visit frequency for black patients.

DISCUSSION

In a study of black patients with hypertension, we found that physicians who received performance incentives for meeting guideline-recommended hypertension quality measures in a randomized trial demonstrated better performance than control group physicians on a combined measure of blood pressure control or appropriate clinical response to uncontrolled blood pressure in the final period of the trial, although the measure did not meet the significance level when adjusted for multiple comparisons. There were no differences between intervention and control providers in the measure of guideline-recommended medication use. Reassuringly, we found no evidence that risk selection was responsible for performance gains in the intervention group through reduced frequency of visits or selection of patients out of primary care panels. If selection were occurring, we would have seen a greater percentage of patients in the intervention group switching providers; a greater percentage of intervention group patients dropping out of their providers' panels; and/or fewer visits by intervention group patients during the period of the trial.

One of the reasons that we may not have found evidence for risk selection is that, in contrast with other published studies (Van Herck et al. 2010; Serumaga et al. 2011), we provided incentives for both process and outcome performance measures of care. We also rewarded clinicians who overcame clinical inertia and made a guideline-recommended action, regardless of whether the patient achieved blood pressure targets. We designed our incentives to reward each instance of desired behavior (i.e., use of guideline-recommended medications, achievement of blood pressure control), rather than relying upon a threshold of performance or a tournament (competition) approach (Van Herck et al. 2010). Therefore, our design choices may have dampened motivation for engaging in risk selection.

Given changes in payment methods and incentives stimulated by the Patient Protection and Affordable Care Act, this study is a welcome addition to the field. Payment system changes are being implemented widely. For example, the New York City Health and Hospitals Corporation has announced a performance pay plan for physicians (Hartocollis 2013). However, a systematic review (Chien et al. 2007) found only one empirical study evaluating the effect of performance incentive programs on racial disparities in health care. The authors found that racial disparity in receipt of coronary artery bypass graft surgery significantly increased in New York State after the institution of a public reporting system, whereas there was no change in

disparities in states that did not implement public reporting. In contrast, a study that used time series and concurrent control group designs to evaluate a Medicare-based pay-for-performance program found minimal evidence of minority patient avoidance at the hospitals receiving the program (Ryan 2010). Vigilance is needed to assess impacts of changes in policies over time. Another observational study found that hospitals with a greater proportion of African American patients were less likely to be eligible for Medicare pay-for-performance rewards and more likely to incur financial penalties, potentially widening disparities (Karve et al. 2008).

Our study has several strengths. First, randomized trials of payment methods are relatively rare in the literature. Other assessments of the use of performance incentives for improving health care quality have suffered from a dilution of the incentive due to multiple payers or competing incentives that make it difficult to assess effectiveness (Petersen et al. 2006; Frolich et al. 2007; Van Herck et al. 2010). Relative to these situations, studying incentives in the VA health care system provided several advantages. First, the VA is both the insurer and the provider of health care, so organizational responses to incentives are easier to anticipate and assess. Second, the VA uses a single payment approach, rather than a diverse mix as seen elsewhere. Third, the VA employs salaried physicians to care for its enrollees, making the relatively modest incentives provided more salient. Salaried VA employees have few ways to augment their income outside of an arrangement such as provided by this study. Lastly, the VA has a common national electronic medical information system, making the collection of common practice data across widely disparate geographic sites and types of facilities feasible.

Limitations of the study include the unknown generalizability of our findings to settings outside of the VA or to conditions other than hypertension managed in the primary care setting, and the predominantly male VA patient population that comprised our sample. Furthermore, VA is a single-payer system and employs salaried physicians while many U.S. physicians are paid on a fee-for-service basis. However, an increasing number of U.S. physicians are seeking salaried positions; the American Medical Association currently estimates that 60 percent of family doctors and pediatricians are employed in salaried positions, making our findings more generalizable to settings outside the VA (Rosenthal 2014). Due to limitations of power, we were unable to assess disparities between black and white patients or effects of various incentive types. We also were unable to test a varying amount of incentives, and responses to incentives may have differed if larger payments were studied. Finally, in 2006, the

VA health care system instituted a new payment system that includes performance pay based on the accomplishment of specific clinical quality goals and objectives (Department of Veterans Affairs Health Care Personnel Enhancement Act of 2004). However, the specific measures for which payments are given have not been implemented uniformly across VA facilities. In addition, VA performance pay encompasses a wide array of measures, while our incentive focuses solely on management of hypertension, thus maximizing the salience of our intervention. Furthermore, the random allocation of VA facilities to study groups minimized the likelihood of confounding by other concurrent quality improvement programs.

Our results suggest that, if properly designed, performance-based health care incentives avoid impacting the quality of care for black patients for a common, chronic disease with high associated preventable morbidity and mortality, without attendant risk selection. Further studies are needed to determine the effect of pay-for-performance programs on health disparities between blacks and other groups and for other clinical conditions and settings of health care.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.