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Research Article

Impact of a P4P and HIT Program to Reduce Emergency Department Hospital Utilization at Federally Qualified Health Centers in Hawai'i

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Abstract

Pay for performance (P4P) and health information technology (HIT) have been used to improve health care quality, but few studies examine interventions combining P4P with HIT support at federally qualified health centers (FQHCs). An intervention-comparison, pre-post study was conducted to determine the effect of a P4P+HIT intervention on emergency department (ED) visits and hospitalizations. While ED utilization decreased in both intervention and comparison groups, there were no significant differences in ED or hospital utilization between intervention and comparison groups. Additional time or support above and beyond P4P+HIT may be necessary to improve the health care provided by FQHCs to underserved communities in Hawai'i.

Introduction

Pay for performance (P4P) and health information technology (HIT) are at the center of efforts to improve health care quality in the United States. Prior examinations of P4P in federally qualified health centers (FQHCs) have included physician-level incentives and Medicaid managed care plans implementing P4P (Chien et al., 2012; Coleman, Reiter, and Fulwiler, 2007). Each of these studies noted the need for a significant HIT infrastructure to achieve desired outcomes. Some preliminary evidence suggests

that P4P and HIT independently have the capacity to improve health care processes and outcomes for patients and providers, though most efforts to date have focused on process measures of health care delivery (Helmchen and Lo Sasso, 2010). Although other studies indicate that P4P and HIT independently do little or nothing to improve care quality, especially among early adopters of HIT (Eijkenaar et al., 2013; Crosson et al., 2012). Recently, a cluster randomized study combining HIT with P4P demonstrated that P4P was associated with greater levels of quality improvement in clinics receiving both interventions over those just receiving HIT; this study was also focused on care processes rather than outcomes (Bardach et al., 2013). Given the conflicting evidence of the benefits of P4P and HIT, some researchers hypothesize that improving health care in underserved settings requires a combination of incentives that are better aligned with care quality and stronger HIT infrastructures (Hart-Hester et al., 2008; Coleman et al., 2007).

Another reason to assess the effectiveness of the combination of P4P and HIT is the notion that both interventions are needed to improve care quality in low infrastructure environments like FQHCs serving primarily Asian Americans, Native Hawaiians, and Pacific Islanders (AANHPIs). To our knowledge, no studies have focused on the impact of a combined P4P and HIT intervention to improve health care utilization outcomes among vulnerable, high-risk populations in Hawai'i. While patients served by FQHCs generally live in poverty and disproportionately bear chronic physical and mental health conditions, AANHPIs have even higher rates of poverty and mental health conditions and use health care services differently from their non-AANHPI counterparts (Jimenez et al., 2012; Nguyen, 2010). In Hawai'i (this study's setting), AANHPIs have higher rates of diabetes and cardiovascular disease (CVD) compared to other racial groups (Juarez et al., 2010). In addition to having greater risk for CVD mortality, Native Hawaiians also have more than twice the rate of diabetes and are nearly six times as likely to die from the disease as Whites (OMH, 2014. AANHPIs have higher rates of depressive symptoms than Whites, but Asians also have the lowest utilization rate of mental health services, due to barriers such as language and cultural stigma (Snowden et al., 2011; Sue et al., 2012).

P4P incentives may encourage providers to engage with these hard-to-reach, underserved populations by rewarding them

financially for improving their care quality; HIT has the potential to improve health care quality by identifying patients with chronic conditions in need of more proactive care (Crosson et al., 2012). This paper evaluates the effectiveness of a health-plan-sponsored intervention that provides P4P incentives to reduce ED and hospital utilization in combination with an existing HIT infrastructure in a FQHC setting. ED utilization and hospitalizations were identified as outcomes of interest based on the theory that reductions might occur due to improved management of chronic and complex conditions. The following research question guided this study: What is the effect of the P4P+HIT intervention on annual ED visit rates and hospitalizations among low-income, high-risk patients with psychosocial issues in combination with chronic disease?

Methods

This was an intervention-comparison, pre-post study with patients selected from four Hawai'i FQHCs participating in the P4P+HIT program as the intervention group, and with nine non-HIT+P4P FQHCs serving as the comparison group. The overall design, which received institutional review board approval, enabled comparison of characteristics and trends in utilization measures, before and after the P4P+HIT intervention was implemented.

Intervention

AlohaCare, a Hawai'i-licensed HMO and Medicaid managed care health plan, implemented a P4P+HIT program as an initiative to improve health care quality at FQHCs in the service area. The P4P+HIT program was implemented practice-wide at all of the intervention sites, and P4P+HIT sites submitted quarterly progress reports that outlined current strategies to meet improvement goals.

P4P

The intervention provided bonuses for reducing ED visits and hospitalizations. AlohaCare, as part of their quality improvement initiative, paid FQHCs rewards of up to $358,000, annually. If a clinic reported a decrease in the percentage of patients with ED visits, cash rewards were given by the FQHC to staff for each one percent reduction, with additional incentives paid if the overall ED visit rate was lowered by more than ten percent. Lastly, if a clinic reported a decrease in the percentage of hospitalized patients, cash rewards were given for each one percent reduction with additional

rewards given if the overall hospitalization rate was lowered by more than five percent. Sites were allowed to distribute earned bonuses from AlohaCare as they wished (e.g., three of the four sites gave their provider and support staff $25–$50 gift cards every six months for each improvement made). One site, rewarded both provider teams as well as patients who received gift cards in the amount of $10–$25 every six months if they met targeted improvement goals. The health plan and collaborating clinics were motivated to participate in this initiative by their understanding that (1) the intervention could be effective in reducing ED and hospital utilization for their most complex patients, and (2) the project would help initiate a starting foundation for shared savings among partners. This setting provided an opportunity to study this "natural experiment."

HIT

The HIT component of the intervention included the ability to track patient data through an online reporting system, which allowed staff at intervention sites to identify the high-risk patients who were frequent users of the ED and hospital. As a result, providers and care coordinators could provide patients with the appropriate care needed to better manage their diabetes and in order to reduce ED and hospital utilization. The HIT infrastructure was used differently at each intervention site. For instance, at one site a care coordinator in a hospital setting used the online reporting system to assist in managing care of hospitalized patients at discharge, including information gathering, appointment scheduling, and other enabling services. At another site, the online reports were used during provider care team meetings to review patient needs.

Dataset

AlohaCare administrative databases serve as the primary data for this study so this evaluation is confined to individuals in these FQHCs that were insured by AlohaCare. The dataset included patient demographics (age, sex, race/ethnicity), primary and secondary diagnoses (psychosocial condition, diabetes, CVD), diagnoses codes for other comorbidities, and quality improvement outcomes (ED utilization and hospitalization rates). The pre-intervention period was the year prior to the introduction of the P4P+HIT program at intervention sites (January 1–December 31,

2009); the postintervention period was the year following the start of the P4P+HIT program (January 1–December 31, 2010).

Setting

The intervention group consisted of three urban FQHCs located on the island of O'ahu and one federally designated rural FQHC on the island of Hawai'i (HRSA, 2014). The comparison group consisted of nine FQHCs not participating in the P4P+HIT AlohaCare incentive program. Of the nine comparison sites, three clinics were on O'ahu, two each were on Hawai'i and Maui, and one each were on Kaua'i and Moloka'i. All but two of the comparison group clinics were federally designated rural FQHCs.

Study Population and Patient Selection

Our study population was AlohaCare-insured patients who were continuously enrolled for at least one year as of January 1, 2009, and who had longitudinal data until December 31, 2010. The target population consisted of patients with low socioeconomic status who had at least one psychosocial condition and another common chronic condition. Low socioeconomic status was defined as individuals with incomes equal to or less than two hundred percent of the federal poverty level (FPL). Inclusion criteria for the chronic conditions included a diagnosis of diabetes or CVD. Conditions were determined using the International Classification of Diseases and Related Health Problems, ninth edition (ICD-9). To prevent under-identification, eligible patients were selected if they had at least one clinical visit and an encounter coded with the conditions of interest during the target baseline period (January 1–December 31, 2009) and P4P bonus target period (January 1–December 31, 2010).

Outcome Measures

The outcomes of interest included annual ED visit and hospitalization rates per year, targeted for P4P+HIT incentives. ED utilization was defined as the number of patient visits for low complexity problems. This number of visits was compared to all eligible AlohaCare patients who met the inclusion criteria. Hospitalizations were defined as the number of patient hospitalizations.

Analyses

Descriptive statistics for patients' characteristics were used to determine patient characteristics. Because the baseline characteris-

tics of patients in the intervention group are dissimilar from those in the comparison group, we used propensity score methods to balance potential confounders. Propensity scores were estimated using logistic regression based on age, gender, race, diabetes, CVD, and both diabetes and CVD. Then we included inverse probability of treatment weighting (IPTW) in the regression models. In order to evaluate the intervention effect, generalized linear models with log-link function were developed with an indicator for the P4P+HIT intervention, year, and the interaction between intervention and year. To account for a clustering effect of patients within clinics, we used generalized estimating equations with an exchangeable correlation. All statistical tests used a two-sided .05 level of significance. Analysis was performed with STATA version 12 (StataCorp, College Station, TX).

Results

Table 1 details characteristics of the study populations for the P4P+HIT intervention and comparison group. There were 1,423 and 926 individuals in the intervention and comparison groups, respectively. All (100%) of patients in both intervention and comparison groups met the inclusion criteria for low socioeconomic status and had at least one psychosocial condition. The mean age of the comparison group was older than the intervention group (43.25 vs. 41.61 years old). The intervention group had even representation by gender (50.7% female), while the comparison group had more men included in the sample (43.8% female).

There were fewer Asian and Native Hawaiian individuals and a greater number of White individuals in the comparison group. The intervention group was 37.0% Native Hawaiian, 30.6% White, 12.6% Other Pacific Islanders (11.2% Samoan), and 11.9% Asian (7.9% Chinese and 3.2% Filipino). The comparison group was 43.6% White, 22.8% Native Hawaiian, 13.8% Asian (all of whom were Chinese), and 12.5% Other Pacific Islanders (all of whom were Samoan).

In terms of chronic conditions, 92.6% of the intervention group's patients had CVD, 34.1% had diabetes, and 26.6% had both CVD and diabetes. The comparison group had a percentage of patients with CVD (92.0%), diabetes (29.6%), and both CVD and diabetes (21.6%).

Table 1: Patient Characteristics for the Intervention and Comparison Groups

Patient Characteristics	Intervention		Comparison		p-value
Overall					
Patients	1423		926		
Age (mean, SD)	41.61 (SD=12.67)		43.25 (SD=12.28)		0.0047
Sex, % Female	50.7		43.8		0.0012
Race/Ethnicity	N	%	N	%	
American Indian/Alaskan Native	9	0.6	4	0.4	<0.0001
Asian	169	11.9	128	13.8	
Chinese	112	7.9	128	13.8	
Filipino	45	3.2	0	0	
Black/African American	23	1.6	23	2.5	
Hispanic/Latino	53	3.7	40	4.3	
Native Hawaiian	527	37.0	211	22.8	
Other Pacific Islander	180	12.6	116	12.5	
Samoan	160	11.2	116	12.5	
White	435	30.6	404	43.6	
Other	11	0.8	0	0	
Unknown	16	1.1	0	0	
Comorbidities [a]		%		%	
Cardiovascular Disease		92.6		92	0.6292
Diabetes		34.1		29.6	0.0229
Diabetes and Cardiovascular Disease		26.6		21.6	0.0057

[a] All (100%) of patients in the intervention and comparison groups had at least one psychosocial condition. Psychosocial conditions included alcohol-related disorders; other substance-related disorders; depression and other mood disorders; anxiety disorders, including post-traumatic stress disorder; attention deficit and disruptive behavior disorders; and other mental disorders, excluding drug or alcohol dependence (includes mental retardation).

We tested year-by-intervention group term to evaluate if the patterns of change in the outcome measures are the same between the two groups over time and found no statistical significance (see Table 2). Although there was no significant intervention effect over time in both outcome measures, there was a significant decrease in ED utilization (see Figure 1). From 2009 to 2010, average annual

Figure 1: Annual Rates of Emergency Department (ED) Utilization and Hospitalizations among P4P+HIT Intervention and Comparison Groups in Year 2009 and 2010 for Study Population (N=2349) (Unadjusted Model)

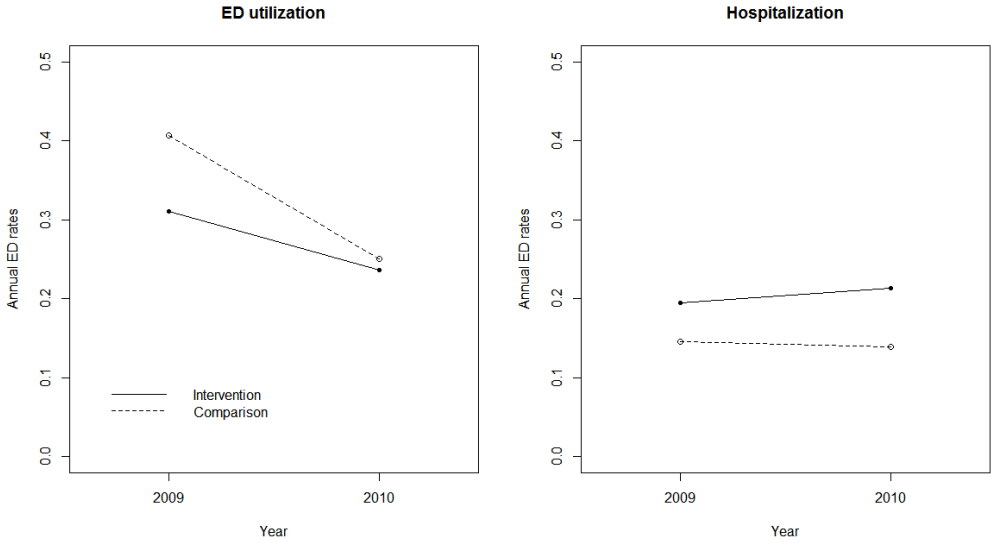

Table 2: Estimated Coefficients (SE) of Generalized Linear Model for Emergency Department (ED) and Hospital Utilization for Study Population (N=2349) [a]

	ED Utilization	p-value	Hospital Utilization	p-value
P4P+HIT intervention				
No (reference)				
Yes	-0.27 (0.14)	.05	0.29 (0.15)	.064
Year				
2009 (reference)				
2010	-0.48 (0.16)	.002	-0.05 (0.20)	.820
Intervention and year interaction	0.21 (0.22)	.336	0.14 (0.24)	.574
Intercept	-0.90 (0.10)	<.0001	-1.93 (0.12)	<.0001

[a] The regression is based on a propensity score analysis that adjusted for age, gender, diabetes, and cardiovascular disease.

visits decreased from 0.36 to 0.24. At the significance level of 0.05, the intervention effect was not significant, but patients in the intervention group had fewer ED visits relative to those in the comparison group (0.27 vs. 0.33; p=0.05). Unlike ED visits, the intervention group had more hospital utilizations than the comparison group, but no differences were detected (0.20 vs. 0.14; p=0.064).

In summary, ED utilization declined significantly for both the P4P+HIT intervention group as well as the comparison group. However, there was no significant difference between the intervention and comparison groups over time. In terms of hospitalizations, there was no change in the intervention group, but there was a reduction in the comparison group; again, there was no significant difference between the intervention and comparison groups.

Discussion

We conducted an evaluation of the effectiveness of a health-plan-sponsored intervention that utilized an existing HIT infrastructure in combination with P4P incentives to reduce ED and hospital utilization at FQHCs serving primarily AANHPI patients. The P4P aspect of the intervention included an organizational-level incentive with a voluntary mix of clinician incentives. For both ED visits and hospitalization, intervention sites on average met two-thirds (66.67%) of their incentive goals. A P4P+HIT intervention in such a medically complex and socioeconomically disadvantaged patient population is particularly important given the lack of such studies with these minority target populations at FQHCs in Hawai'i. Our study showed that ED and hospital utilization improved during our intervention period, but there was no significant difference between the intervention and comparison groups.

Although the AlohaCare intervention encompassed best practices of both P4P and HIT, ED and hospital utilization rates did not fall to a greater degree in intervention versus comparison groups. There are several potential explanations for this lack of difference. First, it is possible that patient-level complexity could not be adequately addressed by the organizational capacity of the FQHCs. A P4P intervention in California found that provider groups that served more disadvantaged patients and that were smaller with fewer resources performed less well on P4P clinical metrics, whereas those in areas with higher socioeconomic status had better performance scores (Geisz, 2014). Second, it is possible

that a one-year intervention period may have been an insufficient amount of time to fully implement the intervention, track progress, and achieve improvements. Longer periods of measurement may be needed to detect a meaningful effect; other P4P evaluations have not shown their effect until the fourth year of their implementation (Chien, Li, and Rosenthal, 2010). Given the robust nature of the intervention and availability of a comparison group, it was reasonable to assess whether change could be observed within a one-year timeframe. Finally, even if providers' responses to P4P+HIT interventions were robust, it is possible that the intervention was not strong enough, given patient complexities. The target patient populations for the intervention were the most complex patients that FQHCs generally care for, and systems for engaging, coordinating, and redirecting their care are an enormous challenge.

Health centers continue to face challenges in making improvements for patients with complex problems who may have hardships related to multiplicative effects of social determinants of health, such as homelessness, poverty, and language barriers. It is difficult to control adherence among complex patients at FQHCs, as quality improvement efforts require systemic commitment from providers, frontline staff, IT support, executive leadership, health plans, and patients themselves to realize meaningful change. Similarly, sustaining patient engagement for those with mental health conditions requires invested efforts of support staff that may not be readily available at some health centers. Future studies should consider whether resources for FQHCs are sufficient to contribute to systemic change and whether investment by FQHCs is required to affect provider and patient behavior change. Such studies should also assess the social determinants of health related to patient adherence in efforts to reduce these barriers from a whole-person approach in the management of care (Coleman et al., 2007).

Limitations

Our study had three main limitations. First, our study focused on the 1,423 patients who met our eligibility criteria and were insured by AlohaCare, so it is possible that our study lacked the power to find the changes that we observed to be significant. Intervention FQHCs focused on all patients, not just AlohaCare patients, so our results may differ if we had been able to include all patients affected by the program. Our analysis was limited to pa-

tients who were continuously enrolled for one year, thus possibly missing more complex patients who may be periodically without insurance. In addition, it may have been easier for the comparison FQHCs that were smaller in size to maintain the relationship and trust with complex patients that is necessary to motivate improvements. Second, although we used the best methods available in accounting for patient complexity across our study arms, it is still likely that there are unaccounted differences between the patients in our case and comparison arms. Third, our study relies on claims data, which is essential for examining utilization outcomes but gives less information about the degree to which other aspects of care quality may have changed for our patient population (e.g., care coordination, mental health screenings). Lastly, since our intervention was multifaceted, it is difficult to discern whether P4P or HIT should be strengthened or whether additional strategies are required.

Conclusion

This is the first study to focus on the impact of a combined P4P and HIT intervention to improve health care utilization outcomes among high-risk, vulnerable populations in Hawai‘i. Findings showed a significant decrease in ED visits in both the P4P+HIT intervention and comparison groups, which can be partially attributed to the secular trend toward improvement. However, other P4P studies that have focused on health care processes rather than utilization have found no improvement in outcome measures (Chien et al., 2010; Geisz, 2014). Interestingly, another study found that P4P programs implemented in healthier populations were more effective than those serving high-risk populations with complex diseases (Freidberg et al., 2010; Millett et al., 2009). It is possible that low-income, complex AANHPIs patients with multiple comorbidities may require greater investments in HIT, P4P, or time to positively affect ED and hospital utilization.

It is evident that much work needs to be done to evaluate the effectiveness of incentive programs at FQHCs. Limited resources in staff and IT as well as competing priorities are just some of the barriers faced by health centers that typically serve a greater proportion of high-risk patients than traditional providers, and thus expend more resources on enabling services (e.g., financial counseling/eligibility assistance for uninsured patients, case man-

agement, interpretation, transportation services) to manage their patients' compounding social determinant of health-related risks. Regardless, this project helped to serve as a foundation and stepping-stone for further incentive program research at FQHCs serving high-risk, low-income AANHPI patients. Lastly, future studies should consider motivating factors for staff at FQHCs. Monetary incentives might not be the best motivators for providers who are invested in the care of patients within their local community. Other considerations include incentivizing FQHCs for the quality of care provided and patient experience.

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Alyna T. Chien, MD, MS, is a physician and health services researcher based at Boston Children's Hospital and Harvard Medical School. She seeks to advance our understanding of how to best align payment incentives with quality or high-value health care, especially for vulnerable populations. Dr. Chien's research draws upon the disciplines of medicine, public policy, and economics.