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Review Article

Impact of Pay-for-Performance on Efficiency and Effectiveness in Hospitals: A Systematic Review

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Abstract

Purpose: Pay-for-performance (P4P) refers to the transfer of money on taking a measurable action or achieving a predetermined performance target. In this systematic review, we will present the results of P4P impacts based on published articles.

Methods: A systematic review of literature was done using following databases and search engines: PubMed, Web of knowledge, ScienDirect, The Cochrane library, MagIran and SID. Keywords used were, Pay-for-performance, P4P, output based payment, result based payment, financial incentives, value based purchasing, effectiveness, efficiency, cost, quality, patient satisfaction, provider satisfaction, mortality, length of stay, clinical outcomes, charges, access, hospitalization, equity, patient outcome, outcome of care. No limitations were considered for time of publishing studies, and searching articles was continued until February 2013. Only impact of P4P on physicians and nurses in hospitals were considered. The literature search yielded 7172 records, of which 34 met our inclusion criteria.

Results: Thirty-four studies were included in this systematic review taking part in different countries and settings with different type of studies. P4P effects can be judged to be encouraging or disappointing, depending on the design choices and characteristics of the context in which it was introduced.

Conclusion: The impact of P4P targeting physicians and nurses seems to be positive on most of the effectiveness and efficiency indicators. However, implementation of P4P should be accompanied by robust evaluation plans.

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Introduction

Public health systems are not always satisfactory in low-income countries. Coverage of needs, equity, quality of care, responsiveness to users and efficiency are usually performed poorly. In most rural populations, without major changes, it is impossible for the health status to achieve the significant improvements that are needed to meet the Millennium Development Goals. The most usual explanation for this weak performance has always been that there are not enough budgets reaching the health system [1]. To handle these health care issues, several enterprises have been introduced [2]. Financial incentives, sometimes called pay-for-performance schemes (P4P), raises as an important tool for improving effectiveness and quality of health care [3, 4]. P4P is a payment method that encourages health care providers in achieving predefined goals by financial incentives [5-7].

Nowadays in the health system of high-income countries

including the USA, UK, Canada, Australia, New Zealand, Germany, the Netherlands, and Spain, P4P is used increasingly [4, 8-10]. P4P programs in England are used mostly on family physicians and primary health care. These programs in this country had lead to improved immunization, and screening services. In addition, quality of care had been increased due to P4P in England [11, 12]. In California P4P programs were started from 2001. Results from the first years of program showed physicians improved their performance in clinical quality, patient experience and information technology usage [13-15]. Studies showed that Canadian public health care organizations weren't successful in adopting P4P programs because of lack of performance evaluating systems [16]. Also in Rwanda there are positive effects on child preventive care, pre-natal services financial accessibility and staff motivation reported due to P4P programs [17, 18].

Despite wide adoption of P4P programs by many countries and

health plans, the evidence to support their use is indecisive and it is still dubious whether P4P is a successful strategy to enhance the quality of care, since the effectiveness of P4P and its main target varies among programs. The differences among P4P programs may be one of the reasons. In current programs, incentives are various in terms of professional standards, number and type of indicators, and quality domains (patient experience, clinical care, organization of care). Different P4P programs and experiences achieved through them have led to a framework for design options considering the P4P approach [19]. Attempts are performed to assess the impact of P4P programs as the number of these programs expands [20].

This paper presents the results of a systematic review of P4P impacts on efficiency and effectiveness in hospitals based on peer reviewed articles.

Methods

Inclusion and exclusion criteria

Types of studies

In this review we first searched randomized controlled trials and before and after studies. These types involved studies, which evaluate the impact of P4P on efficiency and effectiveness of care. In addition, we extended our criteria to include non-randomized studies that assess the impact of P4P on efficiency and effectiveness of health care. Articles and original texts, which introduced P4P and didn't surveyed the impact of it, also comments, editorials, letters, news and conference presentations were excluded from this study.

Types of participants

We examined the impact of P4P on physicians and nurses in hospitals. Other target population (primary care providers, acupuncturists, informal health care providers, herbal physicians, traditional physicians) and settings (primary care setting) were excluded. With physicians, we mean general physicians, specialists, and other health care providers in hospitals such as physiotherapists, radiotherapists, chemotherapists, etc.

Types of interventions

In this review, only pay for performance was considered as intervention that is known by payment by results, payment by outcomes, value based purchasing, financial incentives, etc. other types of payments such as bonus payments, fee-for-service were excluded from this research.

Types of outcome measures

A study must evaluate at least one of following outcomes to be included: effectiveness, quality, patient and provider satisfaction, mortality, outcome of care, efficiency, cost of care, length of stay, and access to care.

Search strategy

Electronic searches

Published articles were searched in following databases and search engines: PubMed, Science direct, Web of knowledge, The Cochrane library, MagIran and SID, with these keywords: "pay-for-performance", P4P, "output-based payment", "result-based payment", "financial incentives", "value-based purchasing", in combination with: effectiveness, efficiency, cost, quality, patient satisfaction, provider satisfaction, mortality, length of stay, clinical outcomes, charges, access, hospitalization, equity, outcome of care. Word "hospital" was applied in all searches. No limitations were considered for time of publishing studies. Only articles in English and Persian were included in research.

Bibliographic searching

We attempted to identify further studies from the reference lists of identified relevant studies or reviews. The full texts for relevant references were obtained. Where necessary we attempted to contact investigators for more information.

Figure 1 shows the summery of evidence search and selection.

Data collection

One researcher screened articles based on titles and abstracts to identify studies, which met our inclusion criteria. We obtained and assessed full-texts of all potentially eligible studies and reviewed them in details. We corresponded with investigators to clarify study eligibility, methods and other questions if necessary. The researcher prepared the final list of included studies.

Data extraction and management

We extracted data from studies using data extraction forms. These forms included the following items: indicator, number of studies, country, setting, how indicators were measured, citation, types of studies, and final results. As in previous systematic review, we didn't conduct a meta analyses because of heterogeneity of studies. Content analysis was used to summarize the impacts of P4P on efficiency and effectiveness in included studies.

Results

Description of studies

The literature search yielded 7172 records, of which 34 match our inclusion criteria: one randomized trial, thirteen controlled trial, eleven before and after studies, seven systematic reviews, one cohort, one observational, and one longitudinal study. [Appendix Table 1](#) indicates the results of included studies on impact of P4P in hospitals. Context of studies were different. There was a wide range of targets used in interventions; although, it was same in five studies that surveyed the impact of P4P on mortality and access to care in AMI, heart failure, Pneumonia, and CABG services (USA and England). Targeted services also varied. Three studies focused specifically on diabetes care (USA and Taiwan); and Two on tuberculosis (Taiwan). A mixture of settings was used in thirty-four studies. Twenty-one studies took place in hospitals; others were undertaken in radiology, ophthalmology, clinical laboratory, nursing home, community mental health care, physician organizations, physician groups, preferred provider organizations, tobacco quit-line clinics, and department of health. Type of interventions varied among studies; only thirteen studies mentioned their intervention types. [Appendix Table 2](#) presents the characteristics of payments in these studies.

Findings regarding the impact:

From thirty-four studies, 13 had surveyed the impact of P4P on quality, 4 in effectiveness, 3 in patient satisfaction, 2 in provider satisfaction, 4 in mortality, 5 in outcome of care, 1 in efficiency, 5 in cost of care, 2 in length of stay, and 5 in access to care.

Effectiveness

All of the four studies were done in hospitals and showed that P4P program has led to significant improvement in effectiveness [21-24]. Effectiveness was measured differently in four studies, using default rate, cure rate, length of treatment, Clinical effectiveness, and Quality Adjusted Life Years (QALY) for measurement.

Quality

Thirteen studies evaluated the impact of P4P on quality of care. Of these, ten found positive effects of P4P on measures of quality [25-34], from which four were done in hospital, others were in radiology, health department, tobacco quit-line clinic, health sector and physician organization. Two studies [35, 36] showed that P4P had small & non-significant effect on quality of care. Both of these two studies were done in Massachusetts. The reason of decreased quality with P4P was referred to magnitude of incentives, recognition of incentives and low level of quality before intervention that was difficult to be improved.

Also 1 systematic review showed that the impact of P4P on quality of care remains largely uncertain [37].

Patient satisfaction

Three studies had investigated the effect of P4P on patient satisfaction, all undertaken in hospital settings. Two of them which measured patient satisfaction with questionnaire, found small & non-significant effects [38, 39] and 1 Cochrane systematic review found inconclusive results [29].

Provider satisfaction

One study reports feedback from managers and health providers [29], which showed inconclusive results.

Mortality

Four studies took place in hospitals surveyed the effect of P4P on mortality. Payment mechanisms and health conditions (AMI, Heart failure, Pneumonia and CABG) were similar in all of them. Two of the four studies found that rate of mortality has decreased significantly after P4P programs [40, 41], and in two studies [42, 43] P4P had a partial effect.

Outcome of care

Of five studies reporting health outcomes for patients, three found that P4P had positive effects on outcome of care [29,31,44] which were undertaken in hospital, different levels of health system, and department of health, while two showed small & non-significant difference [45, 46].

Efficiency

Only one study reported the impact of P4P on efficiency of care, which found scarce and inconclusive results [47].

Cost of care

Four of five studies that were done in ophthalmology, diabetes care setting, clinical laboratory and hospital found that P4P had reduced total health care costs [24, 48-50]. P4P had no significant effect on hospital financials based on results of one study [51].

Access to care

In three of five studies [23, 34, 44], P4P programs was resulted in a statistically significant improvement in the measures of access to care. Little evidence about effect of P4P was found in one study [52]. Also one systematic review found that P4P in rural areas, are likely to increase disparities in quality of care and health outcomes [53].

Length of stay

Two studies, both carried out in hospitals showed that P4P programs decreased the length of stay and so improved the efficiency of care [38, 54].

Detailed results are presented in [Appendix Table 1](#).

Discussion

Our review analyzed thirty-four research articles that addressed the question of "what is the impact of P4P on effectiveness and efficiency in hospitals?"; comparing P4P programs that target nurses and physicians before and after intervention, and between intervention and comparison groups. Based on the results of this study, compared to no incentives, paying for performance at different levels in the secondary care provider units might have positive effect on quality, effectiveness, outcome of care, cost of care and access to care. Little evidence and conflicting results were available regarding efficiency of P4P schemes, patient and provider satisfaction, length of stay and rate of mortality with implicating of P4P in

hospitals. The impact of the P4P is likely to depend on a range of factors. The main factor is the magnitude of incentives with more great incentives more likely to change behavior [29]. Prior research suggests that as little as an additional 5% of a physician's capitation income could influence his or her behavior [55]. Other factors include how the program is designed, the context in which P4P takes place, what targets are used, how targets are measured, the level of rewards targets attract, length of the intervention, and different service types (child curative care, Diabetes care, Breast cancer, etc.). The results of the P4P program are different between primary versus secondary health care setting. One P4P study in primary care setting was not successful at reaching targets. The reason was that physicians participated in many plans, so the bonus for healthcare management alternatives members alone may not have had the necessary impact on physicians' overall income [56]. In some P4P systems, physicians are rewarded for high delivery of care with no punishment, whereas other programs put the physician in risk with not paying until the physician achieves the predefined target [57].

Although P4P programs are designed to encourage providers to provide high-quality in a cost-effective manner, even so, on the other hand, some questions such as the lack of effect, unintended outcomes, adverse selection, disparities, ethical issues, etc. have been elevated in several studies [58]. Results of one study showed that providers whom participated in P4P programs, were engaged in activities to attract less severe clients because these clients were easier to treat in order to improve their performance. This problem can be resolved with considering client severity level in paying for performance [59]. Also in P4P system, physicians preferentially locate to areas where patients are healthier and better educated and where the targets are easier to achieve [60]. One research in England showed that improvement of quality because of P4P program, was probably due to selection bias in which physicians selected patients based on the presence or absence of treatment with relevant drugs, and those who were untreated or who did not comply with treatment were excluded from the analysis of study. This selection bias could have resulted in overestimation of the quality of care although the trends in quality should have been unaffected [61].

Conclusion

It is important to note that financial incentives and health care payment systems have an important, although not exclusive, influence on the provision of health services. The effectiveness and efficiency of P4P programs are highly variable among different settings. Although in this systematic review we found few informative studies of P4P impact despite extensive implementation of it, the results suggest some positive effects of financial incentives on efficiency and effectiveness in hospitals. Future high-quality researches including randomized, controlled trials and observational studies with control groups is required in order to address the issues where evidence is absent or conflicting and also for guiding implementation of financial incentives for health care quality and evaluating their cost effectiveness.

Limitations of the study: Our systematic review had some limitations, only one researcher screened the articles in order to identify studies, which met the inclusion criteria, and extracted the data. Articles were not quality assessed.

Conflict of interests: The authors declare no Conflict of interest.

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Appendix Table 1. Summary of findings from studies on impact of pay-for-performance on effectiveness and efficiency in hospitals.

Indicator	No of study	Country	Setting	How indicators are measured	Type of study	Final results	
						Control group	Intervention group
Effectiveness	4	Taiwan USA	Hospital	Default rate* [21]	Before & after	15.56%	11.37%
				*: The percent of patients who interrupt the treatment regime for 2 months or longer	Controlled trial	12.7%	10.67%
				Cure rate [22]	Before & after	46.9 %	63%
					Controlled trial	42.4%	68.1%
				Length of treatment [22]	Before & after	62.73%	53.71%
					Controlled trial	58.3%	55.4%
Quality	13	Massachusetts Hawaii Philippines USA Low and middle income countries Minnesota	Radiology	Radiologist Report Turnaround Time (RTAT) [25]	Before & after	52.7 h	20.7 h
			Hospital	• Glycosylated hemoglobin and low-density lipoprotein cholesterol testing)	Longitudinal study	Patients in intervention group were more likely to receive quality care and so had less hospitalization rate	
			Hospital	• Hospitalization rates [26]	controlled trial	Incentives improved quality scores by 10%	
			Acute care hospitals	Clinical quality [27]	controlled trial	6.7 %	9.3 %
			Hospital	Clinical quality [28]			
				quality of care [29]	Systematic review (3 studies)	6 %	10%
				local clinical guideline		Improvement in intervention group	
				quality of care outcome		No change for intervention area	
			Tobacco cessation clinic		RCT	441 (4.2 %)	1483 (11.4 %)
				Smokers referred to telephone counseling [30]			

Indicator	No of study	Country	Setting	How indicators are measured	Type of study	Final results	
						Control group	Intervention group
Quality		Taiwan	Hospital	Quality of care (Breast cancer) [31]	Controlled trial	63 %	70 %
		Hawaii					
		California	preferred provider organization	Heart failure Mammography Hb A1C testing [32]	Controlled trial	- 0.9 % + 0.2 % + 8.2 %	
		Massachusetts	physician organizations	mammography Hemoglobin A1c testing [33]	Controlled trial	0.2 % 2.1 %	1.9 % 2.1 %
			Hospital	Meeting hospital defined goals for JCAHO targets [34]	Controlled trial	Compliance with most quality indicators improved to a greater extent	
			physician group	• Antidepressant medication management • Asthma medication use, Comprehensive diabetes care [35]	Quasi experimental Controlled trial	P4P contracts were not associated with greater improvement in quality	
			acute care hospitals	quality of care for pneumonia surgical infection prevention [36]	Controlled trial	- 0.67 % - 0.12 %	
Patient satisfaction			Individual health care providers	- [37]	Systematic review	Effect of P4P on quality of care for individual providers is uncertain	
	3	Hawaii	Hospital	P. satisfaction of care (using questionnaire) [38]	Before & After	EDS: 71 %	75%
		Iran (Yasuj)		P. satisfaction of care (using questionnaire) [39]	Semi experimental (B&A)	ICS: 78%	79%
		Low and middle income countries			Systematic review (5 studies)	29.94 %	32.34%
				Patient satisfaction [29]		The view from patients is mixed	

Indicator	No of study	Country	Setting	How indicators are measured	Type of study	Final results	
						Control group	Intervention group
Provider satisfaction	1	Low and middle income countries	Hospital	Provider satisfaction [29]	Systematic review (4 studies)	The provider perspectives are mixed	
	4	2 in USA England Boston	Hospital	30 day mortality [40] 30-day in-hospital mortality [41] in-hospital mortality [42] 30 day mortality [43]	Retrospective cohort Before & After (18 months) observational Controlled trial	10.76% 20.1 % 4.06 % 11.82%	10.31% 18.4% 3.93% 11.74%
Mortality	5	Taiwan Low and middle income countries New York	Hospital, different levels of the health system, Department of Health, nursing home	Likelihood of hospital admission or death [29] Recurrence (breast cancer)	Systematic review (1 study) Controlled trial	5.3 %	8.5%
				Patient survival (5 year) (breast cancer) [31] Improved management of common childhood illnesses [44] outcome of care [45] Diabetes outcomes [46]	Systematic review literature review Quasi experimental	17.3%	13.6%
Outcome of care						The results were inconsistent across the 4 measures that were used in the study.	
						Pay-for-performance improved the process and to a lesser extent the outcome of care	
Efficiency	1	-	Economic evaluation of P4P	Hospital [47]	Systematic review (9 studies)	LDL-C b100 mg/dL: +12 HbA1c b9: was not reported BP b130/80: was not reported	
						Evidence on the efficiency of P4P is scarce and inconclusive	

Indicator	No of study	Country	Setting	How indicators are measured	Type of study	Final results	
						Control group	Intervention group
Cost of care	5	USA Taiwan Boston	Hospital	Cost per QALY (heart related care) [24]	Before & after	\$30,081	\$12,967
			Ophthalmology	Global health plan expenditure [48]	Retrospective Before & after	\$2,316,929	\$2,049,780
			diabetes care	Cost of specific examinations and tests [49]	Controlled trial	Patients in the intervention groups spent more than the comparison group in the first year; but less in the subsequent years.	
			Clinical laboratory	Cost saving [50]	Before & after	Substantial cost savings were achieved	
			Hospital	Hospital revenues and costs (AMI) [51]	Controlled trial	No effect of P4P on hospital financials	
Access to care	5	Philadelph ia Mississipp i USA	Hospital	<18:1 Patient: physician ratio 24/7 in house coverage [34]	Controlled trial	After the contract, the group maintained an 18:1 or less patient: physician ratio. And provided 24/7 coverage	
			community mental health care	Average time spent in community treatment per client (1 study)	Systematic review	31 minutes	39 minutes
			Nursing homes	Admitting ill patients (2 studies)[44]		intervention nursing homes admitted more ill patients, intervention nursing homes didn't admit ill patients	
			Hospital	Access & equity of care [23]	Systematic review (28 studies)	P4P did not have negative effects on patients of certain age groups, ethnicity, or socio-economic status, or patients with different comorbid conditions	
			Hospital	Access to minority patients [52]	Before-after	little evidence that the PHQID reduced access for minority patients	
				Literature review	P4P in rural areas, are likely to increase disparities in quality of care & health outcomes.		
				Disparities in quality [53]			

Indicator	No of study	Country	Setting	How indicators are measured	Type of study	Final results	
						Control group	Intervention group
Length of stay	2	Hawaii	Hospitals	Surgical & obstetrical risk-adjusted length of stay [38]	Before & After	27%	15%
		Sweden	Hospitals	Average length of stay [54]	Controlled trial	The average length of stay was about one day shorter in Stockholm than in the other 11 county councils.	

Appendix Table 2. Characteristics of payment mechanisms in studies on impact of pay-for-performance.

Name of the program		Payment Characteristics
1	-	Clinics that referred 50 smokers would receive a \$5000 performance bonus. Clinics would also receive \$25 for each referral beyond the initial 50 [30].
2	-	Participants in physician groups received a quarterly bonus of approximately \$0.23 per member per month for each performance target that was met or exceeded [33].
3	PHQID	Paid a 2 percent bonus to hospitals performing in the top percentile of a composite quality measure, and a 1 percent bonus for hospitals performing in the second percentile. Penalties were administered to hospitals with exceptionally poor performance [28, 38, 40-43, 52]
4	Hudson health plan	Providers were offered specific amount for each clinical tests [46].
5	-	Additional 1.5– 7.5% of participating physician’s base fees to perform quality care processes. Later, an additional bonus of up to US\$3,000 was added for practitioners who improved their quality scores over time [32].
6	-	Bonus payments (over and above base salary) of \$2,500 were to be made in 6-month intervals (total \$5,000 annually) if the radiologists met their P–F (generating a subsequent preliminary radiology report - finalizing that report) RTAT goals [25].
7	The Advancing Quality program	At the end of the first year: Hospitals that reported quality scores in the top quartile received a bonus payment equal to 4% of their revenue. For hospitals in the second quartile, the bonus was 2% [41].
8	-	The size of the incentives tied to quality performance on each measure ranged from a low of approximately \$200 to a high of approximately \$2,500 per physician [35].
9	-	Monetary rewards were offered to personnel who directly produce cost savings in their area of responsibility [50].