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A Unique Model of Performance-Based Premium Pay System in the Radiology Departments

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ABSTRACT

Pay-for-performance (P4P) programs offer financial incentives to healthcare providers to improve the quality of care and patient safety. Various modifications of P4P approaches have been thrust into almost all medical specialities, including radiology, despite being a referral speciality. This article introduces a performance-based premium pay system for radiology personnel implemented in the radiology departments of a private health group in Turkey. The main purpose of the system is to enable the radiology personnel (i.e. technicians, rapporteurs and supporting staff) to earn more in parallel with the increase in their workload, to eliminate the imbalance between wages, to increase the institutional loyalty and commitment of radiology personnel, to ensure ownership of their tasks and equipment, to build up a team awareness, to encourage further training and specialization, and consequently, to improve the overall quality of radiology services.

Keywords: Pay-for-performance, Radiology, Performance-based premium pay, Quality, Radiology technicians

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Radyoloji Bölümlerinde Performansa Dayalı Özgün Bir Prim Ödeme Sistemi Modeli

ÖZET

Performansa dayalı ödeme programları, bakım kalitesinin ve hasta güvenliğinin iyileştirilmesi amacıyla sağlık hizmet sunucularına finansal teşvikler sağlamaktadır. Performansa dayalı ödeme yaklaşımlarının farklı uygulamaları, radyoloji de dahil olmak üzere tıbbın hemen tüm uzmanlık dallarında kullanılmaktadır. Bu makale, Türkiye'de özel bir sağlık grubunun radyoloji bölümlerinde radyoloji personeline yönelik olarak uygulanan performansa dayalı prim ödeme sistemini tanıtmaktadır. Sistemin temel amacı, radyoloji personelinin (teknisyen, raportör ve yardımcı personel) artan iş yüküne paralel olarak daha fazla kazanç elde etmelerini sağlamak, ücretler arasındaki dengesizliği gidermek, radyoloji personelinin kurumsal bağlılığını ve sadakatini artırmak, görevlerini ve ekipmanlarını sahiplenmelerini sağlamak, ekip bilinci oluşturmak, eğitim ve uzmanlaşmayı teşvik etmek ve sonuç olarak radyoloji hizmetlerinin genel kalitesini iyileştirmektir.

Anahtar Kelimeler: Performansa dayalı ödeme, Radyoloji, Performansa dayalı prim ödemesi, Kalite, Radyoloji teknisyenleri

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Performance refers to the ability or the level of efficiency and effectiveness of any organization, individual or group to achieve the targeted outcome(s) regarding both quality and quantity (1). It is universally recognized that qualified and motivated health personnel are essential to ensure efficient and equitable health service delivery. Poor performance of service providers stems from various reasons including low salaries, tough working conditions, and inappropriate training; and may hinder access to appropriate care and contribute to reduced health outcomes. Evidence-based approaches and interventions are required to improve workforce performance. These interventions could be grouped as job-related, support-system related and those that create an enabling work environment (2, 3).

In the health sector, the payments of health personnel could be grouped in two simple ways: a fixed payment based on a scheme mutually agreed by the employer and the employee so that both parties know up-front what they are willing to pay or expect to be paid, and an incentive-based payment which links payment to performance (4). At the turn of this century, the reports by the Institute of Medicine (IOM), particularly 'Crossing the Quality Chasm' which called for a shift from rewarding volume-based efforts to rewarding quality-driven health care, emphasized the quality of care and patient safety, and recommended the establishment of financial incentives to healthcare providers to achieve higher levels of quality (5-7).

The system is known as pay-for-performance (P4P) and is used as "an umbrella term covering the initiatives aimed at improving the quality, efficiency, and overall value of healthcare" (8). It basically depends on payments linked to compliance with the safety and quality measures rather than fee-for-service (FFS), daily rates, fee schedules and capitation (9). P4P is founded on the concept that the quality of care will improve if physicians earn bonuses for providing high-quality care (10).

The P4P model has been widely accepted and implemented within the past two decades and new types of health care payment systems have been developed. Various aspects of care or results have been rewarded in different programs, such as using structure, process, outcome, or coordination of care measures with composite measures of quantity and quality (pay for quality); focusing on the validity and reliability of the quality measures and data collection procedures (pay for reporting); rewarding cost reduction or cost containment by using health care utilization measures (pay for efficiency), or rewarding providers for improving quality while keeping cost constant, or reducing cost while maintaining or improving quality (pay for value). The performance measures in P4P programs also vary, such as only clinical process measures of quality; structural measures of information technology investment, use of electronic medical records, and organization of care; outcome measures through patient satisfaction indicators; and cost or resource utilization measures are sometimes included through assessment of drug utilization, the annual cost per patient or per beneficiary, or cost per patient per month (5, 11).

The implementation of P4P programs, which mostly focus on disease management and hospital care, had been challenging for hospital-based radiology. Radiology represents an important segment of the process of care, however, is distant from eventual patient outcomes and rarely receives feedback regarding how imaging affected final patient outcomes, hence lacks observable measures of performance (5).

The current study focuses on a performance-based premium pay system implemented in the radiology departments of a private health group in Turkey. The health group, founded in 1991, currently owns 22 hospitals and 18 medical centres in five countries, offering diagnostic and treatment services in line with the requirements of JCI accreditation and certified health standards.

Overview of the Performance-based Premium Pay System in the Radiology Departments

The performance-based premium pay system was developed in 2006 by the Head of Radiology Department and launched following its approval by the senior management. The purpose is to enable the radiology personnel (i.e. technicians, rapporteurs and supporting staff) to earn more in parallel with the increase in their workload, to eliminate the imbalance between wages, to increase the institutional loyalty and commitment of radiology personnel, to ensure ownership of their work/tasks and equipment, to build up a team awareness, to encourage further training and specialization, and consequently, to improve the overall quality of radiology services.

The system is applied to the radiology personnel including (i) medical imaging technicians (also referred to as x-ray technicians), (ii) Magnetic Resonance Imaging (MRI) technicians, (iii) Computed Tomography (CT) technicians, (iv) angiography (DSA) technicians, (v) radiology nurses (also referred to as medical imaging nurses), (vi) rapporteurs, and (vii) Picture Archiving and Communication System (PACS) officer.

The monthly income of radiology personnel consists of two parts; a base salary and variable pay based on turnover. The base salary depends on the profession of the radiology personnel and is determined by a scale set on the criteria of seniority (i.e. when seniority levels up, the base salary also increases to that of the higher category) and specialization status. The annual increase rate within the hospital is reflected in the base salary. The transition time to the next seniority level differs between radiology technicians and MRI technicians for the first five years of employment, then it evens out. The radiology nurses receive a nurse's salary applied by the hospital, therefore no base salary is defined within this system. The technologist in charge earns the highest base salary (Table 1).

Table 1. The scale of base salary in radiology departments (2019 data)

Seniority within hospital	Base salary	Base points
Technician in charge	2.350	10
3+ years of MRI experience	2.225	10
5+ years of experience	2.225	10
1-3 years of MRI experience	1.900	10
3-5 years of experience	1.900	10
<1 years of MRI experience	1.850	10
1-3 years of experience	1.850	10
Radiology Technician	1.830	10
Radiology Nurse	-	3
Rapporteur	1.830	3
PACS Officer	1.830	3

The variable pay based on turnover (hereby called as premium) constitutes a significant part of the monthly wage and is calculated by using a transparent scoring system, which is communicated to all radiology personnel. Technicians are scored according to certain additional criteria including the years of experience during their employment at the hospital*, years of experience before their current employment, educational status, and responsibilities incurred. Educational status is scored between 1 to 8 points and Vocational School of Health Services graduates get the maximum points. In order to appraise their experience and competency when employed, radiology technicians and MRI technicians get 0.5 and one point respectively for each year of pre-hospital** experience. For each year of experience at the hospital, radiology technologists get one point and MRI technicians receive an additional one point for a maximum of five years. Additional points may be added depending on the personal evaluation by the Head of the Department.

The monthly income of radiology personnel is calculated automatically by using a dashboard as shown in Table 2. The upper left corner cell displays the current date when logged in. The seniority of the personnel and the increase in points in line with the seniority are calculated with the formulas placed in the excel file and change on a daily basis. The general score table consists of 13 columns. The first column shows the names of the radiology personnel. The seniority status of the personnel is calculated automatically in the second column based on the employment dates which are also shown in the third column. The fourth column shows the base points in relation to their job titles and seniority levels (refer to Table 1), and the points regarding their educational status are shown in the fifth column. The seniority within the hospital, as shown in the sixth column, automatically changes depending on the daily calculation in the second column; and the seventh and eighth columns show the pre-hospital experience and pre-hospital MRI experience points which are pre-defined and unvarying. The MRI seniority score in the ninth column increases by one point each year but is limited to a maximum of five. The tenth column is for the use of the Head of Department, where the points will be the result of a more personal evaluation. The points for technologist-in-charge are shown in the eleventh column. The last two columns show the total score and base salary of each employee (refer to Table 1). The resulting total scores on this scoring table form the basis for income sharing (Table 2).

* Hospital" refers to the hospitals of the private healthcare group.
** Pre-hospital" refers to the health institutions that the personnel were employed before

Table 2. The general score table of the radiology department

15.10.2019												
Name, Surname/	**Seniority**	**Employm. date**	**Base**	**Educat. status**	**Seniority within hospital**	**Pre-hospital exp.***	**MRI exp.**	**MRI Exp in Hosp.****	**Perf.**	**Tech in charge**	**Total**	**Base salary**
Tech in charge	20.02	01.09.1999	10	8	20	2,0		5		10	55,00	2.350
MRI Tech 1	15.01	27.09.2004	10	8	15	3,0	5	5			46,00	2225
MRI Tech 2	10.10	22.12.2008	10	8	10	2,0	4	4			38,00	2225
MRI Tekn 3	07.05	24.05.2012	10	8	7	3,0	5	1			34,00	2225
DSA Tech 1	08.04	01.07.2011	10	8	8	0,0		3			29,00	2225
DSA Tech 2	10.08	02.03.2009	10	8	10	5,5		3			36,50	1850
Rx Tech 1	15.07	05.04.2004	10	8	15	2,5					35,50	2225
Rx Tech 2	11.02	08.09.2008	10	8	11	4,0					33,00	1850
Rx Tech 3	07.03	25.07.2012	10	8	7	1,0	1	1			28,00	2225
Rx Tech 4	14.02	21.08.2005	10	8	14	0,5					32,50	2225
Rx Tech 5	04.08	11.03.2015	10	8	4						22,00	1900
Rx Tech 6	03.09	03.02.2016	10	8	3						21,00	1900
Rx Tech 7	02.08	02.03.2017	10	8	2	1,0					21,00	1850
Rx Tech 8	04.02	24.08.2015	10	8	4	7,0		5			34,00	1850
Rx Tech 9	09.01	01.10.2010	10	8	9						27,00	2225
Rx Tech 10	00.07	25.03.2019	10	8	0						18,00	1850
Rapporteur 1	01.08	18.02.2018	3	8	1						12,00	1830
Rapporteur 2	04.12	26.10.2014	3	8	4						15,00	1830
PACS Officer	01.08	14.03.2018	3	5	1						9,00	1830
Nurse 1	06.08	06.03.2013	3	8	6						17,00	
Nurse 2	02.05	15.06.2017	3	5	2						10,00	

*"Pre-hospital" refers to the health institutions that the personnel were employed before
**"Hospital" refers to the hospitals of the private healthcare group

Once the turnover of the radiology department is copied to the relevant field shown in Table 3 by the Head of the Department at the end of each month, the premium totals are reflected in columns on the right. As the radiology technicians do not perform USG, its revenues are not included.

Table 3. Simulated turnover and premium pool of radiology department

Premium pool							
	Revenues (TL)			**2,00**	**Premium (TL)**		
	Jan 19	Feb 19	Mar 19	%	Jan 19	Feb 19	Mar 19
CT Scan	100.000	90.000	95.000	2,00	2.000,00	1.800,00	1.900,00
Direct Rx	100.000	90.000	95.000	2,00	2.000,00	1.800,00	1.900,00
Indirect Rx	100.000	90.000	95.000	2,00	2.000,00	1.800,00	1.900,00
MRI	100.000	90.000	95.000	2,00	2.000,00	1.800,00	1.900,00
Mammography	100.000	90.000	95.000	2,00	2.000,00	1.800,00	1.900,00
Doppler US				0,00	0,00	0,00	0,00
US				0,00	0,00	0,00	0,00
Interventional Procedures	100.000	90.000	95.000	2,00	2.000,00	1.800,00	1.900,00
Rad. Angiography	100.000	90.000	95.000	2,00	2.000,00	1.800,00	1.900,00
Bone densitometer	100.000	90.000	95.000	2,00	2.000,00	1.800,00	1.900,00
Total Revenues	800.000	720.000	760.000		16.000	14.400	15.200

The total premium income data from the premium pool (shown in Table 3) is automatically allocated to each radiology personnel over the ratio of the individual points to the total points. The first column shows the names of the radiology personnel, the second column shows their scores, and the third column shows the percentage of their scores in the total score pool. The columns on the right show the base salaries and the monthly sum of the salaries and premiums (Table 4).

guide their efforts and commitment towards achieving organizational goals (12-14).

Initially, P4P programs were limited to general medical practitioners, and radiology had been ignored. One of the early studies revealed that a prototype P4P program in cervical cancer screening and mammography had a little overall gain in quality and selectively rewarded "high performance" physicians who merely maintained the status quo to receive bonus payments (15).

Table 4. The premiums and total incomes of radiology personnel

Name, Surname	Tech. Score	Premium Pool %	Premium			Base Salary	Premium + Salary		
			Jan 19	Feb 19	Mar 19		Jan 19	Feb 19	Mar 19
Tech in charge	55,0	9,6	1.534,4	1.381,0	1.457,7	2.350	3.884	3.731	3.808
MRI Tech 1	46,0	8,0	1.283,3	1.155,0	1.219,2	2.225	3.508	3.380	3.444
MRI Tech 2	38,0	6,6	1.060,2	954,1	1.007,1	2.225	3.285	3.179	3.232
MRI Tekn 3	34,0	5,9	948,6	853,7	901,1	2.225	3.174	3.079	3.126
DSA Tech 1	29,0	5,1	809,1	728,2	768,6	2.225	3.034	2.953	2.994
DSA Tech 2	36,5	6,4	1.018,3	916,5	967,4	1.850	2.868	2.766	2.817
Rx Tech 1	35,5	6,2	990,4	891,4	940,9	2.225	3.215	3.116	3.166
Rx Tech 2	33,0	5,8	920,7	828,6	874,6	1.850	2.771	2.679	2.725
Rx Tech 3	28,0	4,9	781,2	703,1	742,1	2.225	3.006	2.928	2.967
Rx Tech 4	32,5	5,7	906,7	816,0	861,4	2.225	3.132	3.041	3.086
Rx Tech 5	22,0	3,8	613,8	552,4	583,1	1.900	2.514	2.452	2.483
Rx Tech 6	21,0	3,7	585,9	527,3	556,6	1.900	2.486	2.427	2.457
Rx Tech 7	21,0	3,7	585,9	527,3	556,6	1.850	2.436	2.377	2.407
Rx Tech 8	34,0	5,9	948,6	853,7	901,1	1.850	2.799	2.704	2.751
Rx Tech 9	27,0	4,7	753,3	677,9	715,6	2.225	2.978	2.903	2.941
Rx Tech 10	18,0	3,1	502,2	452,0	477,1	1.850	2.352	2.302	2.327
Rapporteur 1	12,0	2,1	334,8	301,3	318,0	1.830	2.165	2.131	2.148
Rapporteur 2	15,0	2,6	418,5	376,6	397,6	1.830	2.248	2.207	2.228
PACS Officer	9,0	1,6	251,1	226,0	238,5	1.830	2.081	2.056	2.069
Nurse 1	17,0	3,0	474,3	426,9	450,6	0	474	427	451
Nurse 2	10,0	1,7	279,0	251,1	265,0	0	279	251	265
	573,50	100	16.000	14.400	15.200	38.690	54.690	53.090	53.890

DISCUSSION

P4P programs in the health sector aim to link payments to performance. Measuring performance provides an opportunity to improve quality, and when used with clear financial incentives, it is a great tool to reward and motivate health personnel as well as to provide feedback about their performance. The financial incentives, although varying by the situational and/or individual variables, determine the employees' positions within the organization, assist them in judging their success or failure on the job, and

Whether the P4P initiatives are relevant to radiology and radiologists has also been of debate and several studies discussed the validity of P4P programs in radiology, arguing about the barriers and obstacles to overcome and how implementation can easily be abused or mismanaged (16). Some departments have introduced utilization targets for selected imaging studies, and others have suggested patient outcome measures related to measurable improvements in radiologist behaviour regarding key quality and safety parameters, customer satisfaction surveys, peer-review programs, or measured radiologist report turn-around time (16, 17).

However, performance measures in radiology play an increasingly significant role in health care quality assessment and now form the basis for a variety of P4P programs (18). The Centers for Medicare & Medicaid Services, under its 2017 Quality Payment Program, offers clinicians a merit-based incentive payment system based on a composite performance score across four performance categories, i.e. quality, resource use, clinical practice improvement activities and advancing care information and prioritizes addressing specialities and professionals with a limited number of applicable measures including radiology (19, 20). As an attempt to use P4P to promote high-quality care, the American College of Radiology (ACR) also introduced the Imaging 3.0 initiative as a roadmap to move radiology practices from a volume-based fee-for-service care model to a value-based one (21-23).

The perceptions of employees regarding how payments are determined are vital to setting up a fair payment system. The lack of fairness is likely to lead to feelings of dissatisfaction and to perceptions of discrimination (24). The "sliding scale" approach of incentive-based payment, which ties payment to performance, may be regarded with scepticism due to concerns over how and by whom the payment will be calculated. Therefore, individual criteria such as the nature of the job, the required education, experience and expertise, and the working conditions as well as the performance criteria should be transparent and shared with all employees, and all employees within the organization should understand the relationship between performance and payments and that payments they receive may change depending on their performance (12).

Studies have shown that financial compensation has a significant impact on job satisfaction or dissatisfaction (25, 26). A meta-analysis in 2010 found that pay level is positively correlated with both overall job satisfaction and pay satisfaction; and the level of pay bears a positive, although modest, relationship to the job and pay satisfaction (27). However, it was also found that the rise in job satisfaction after a pay increase is only temporary and the effect fades out with time; job satisfaction increases further when an individual's pay increase is more than his/her peers over the same period, and individuals are more satisfied with their jobs by the mere expectation of it even before the effective pay increase. Additionally, it is suggested that pay increases can motivate employees in the long run if implemented under carefully designed conditions, such as if they are implemented in small but regular rather than higher but less frequent raises even if it adds up to an equivalent amount (28).

In order to implement successful and objective P4P programs with fair and equitable payments in radiology, the financial schemes should be designed/developed with a focus on well-defined structure, process and outcome measures. The measures should be phased in over time, uniform across all providers of imaging services, transparent to radiology personnel in terms of both the judging criteria and the data on which reimbursement decisions are made; and not overly burdensome. Performance measures should apply to all radiology personnel who perform and interpret imaging services, regardless of profession and they need to be owned by the personnel. The radiology or hospital administrator can produce a payment schedule for technicians that can prospectively tie specific productivity and quality measures to performance; and to ensure that they are perceived as acceptable, the payment schedule in question must be agreed upon by both parties, the quantitative and qualitative metrics used must be unambiguously defined and reproducible, and any subjective measures must be subject to validation by a "neutral" third party. The system should also be flexible enough to transition, and can also be used as a peer learning tool (4, 5, 23, 29, 30).

A recent cross-sectional study about the perceptions of radiology personnel who are the recipients of the above-mentioned performance-based premium pay system, shows that 52.5% of the participants have enough information regarding how the system works, 64.4% think that the system increases individual performance, 62.4% think that the system increases team performance, 65.3% believe that the system increases employees' sense of ownership of the department and the equipment, and 72.3% find the premium pay systems in general are useful for radiology personnel (31).

This article presents the unique performance-based premium pay system for radiology technicians working in the radiology departments of a private health group in Turkey. The relevance and implementation of P4P to radiology have been globally discussed in recent decades. However, most of the studies are either about the theory or focus on how P4P programs impact the outcomes (15-17, 23, 32). No similar studies regarding the performance-based payments for radiology technicians are found in the literature.

CONCLUSION

P4P programs use financial incentives to reward healthcare providers for achieving higher levels of quality, and have become a well-established part of many disciplines of medical practice, including radiology. Financial incentives need to be created for all radiology personnel, including the technicians, rapporteurs and supporting staff, who are currently reimbursed far less than the radiologists or not reimbursed at all. This unique model shows that an equitable payment system which reflects the individual performance differences in the pay can be successfully implemented in radiology departments, thus proposing a model for other radiology departments. The payment schedule must be linked to the education, seniority, specialization, workload, etc. and agreed upon by all relevant parties. Performance measures should be developed with the involvement of the radiology personnel and communicated clearly with all the stakeholders. The measures should be clearly defined and cover the entire radiology process, including all the individual steps and functions. A performance-based premium pay system that is fair, simple, yet flexible enough to transition, transparent, specific to the workload at the department, rewarding productivity with determining variables well-known and internalised by the radiology personnel, will be a great tool to enable the radiology personnel (i.e. technicians, rapporteurs and supporting staff) to earn more in parallel with the increase in their workload, to eliminate the imbalance between wages, to increase the institutional loyalty and commitment of radiology personnel, to improve motivation and satisfaction levels within the radiology department, to ensure ownership of their work/tasks as well as the equipment, to build up a team awareness, to encourage further training and specialization, and consequently will improve the overall quality of radiology services. A well-designed P4P program will improve the overall quality of radiology services through reimbursements in parallel with the workload, thus eliminating the imbalance between wages; by increasing loyalty and commitment to the department and organization, ensuring ownership of the tasks and equipment, and building up a team spirit.

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Conflicts of Interest/Competing Interests

The authors declare no conflict of interest/Competing interests.

Ethics Approval

Not applicable.

Availability of Data and Material (Data Transparency)

The authors declare that they had full access to all of the data in this study and the authors take complete responsibility for the integrity of the data and the accuracy of the data analysis.

Authors' Contributions

The authors declare that they all meet the following criteria:

1. Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND

2. Drafting the work or revising it critically for important intellectual content; AND

3. Final approval of the version to be published; AND

4. Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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