**Supplementary files**

**Table 1. Search strategy output for Cochrane database**

|  |  |
| --- | --- |
| **Database** | **Cochrane**  |
| Host | http://onlinelibrary.wiley.com/cochranelibrary/ |
| Date of search | January 2012-June 2014 last date searched: 26/6/14 |
| Years covered | 1990-2014 no date restrictions |
| Search Strategy | Key word search: Financial incentives, Pay for performance, Performance based financingThere are 20 results from 8524 records for your search on 'financial incentive or pay for performance or performance based financing in Title, Abstract, Keywords in Cochrane Reviews'There are 12 results from 30299 records for your search on 'financial incentive or pay for performance or performance based financing in Title, Abstract, Keywords in Other Reviews'There are 3 results from 16096 records for your search on 'financial incentive or pay for performance or performance based financing in Title, Abstract, Keywords in Economic Evaluations' |
| Language restrictions | None  |
| Number of citations | 35 |
| Relevant reviews  | 8: Huang et al., 2013, Gillam et al., 2012, Reda et al., 2012, Chaix-couturier et al., 2012, Hamilton et al., 2013, Witter et al 2012, Scott et al 2011, Petersen et al 2006, |
| **Database** | **Medline** |
| Host | <http://www.ncbi.nlm.nih.gov/sites/entrez> (Pubmed) |
| Date of search | January 2012-June 2014 last date searched: 26/6/14 |
| Years covered | 1990-June 2014 (no date restrictions) |
| Search Strategy | 1. Search (((((((financial incentive\*) OR performance based financing) OR pay for performance) OR paying for performance) OR incentive\*) AND Review[ptyp] AND Humans[Mesh] AND English[lang])) AND health
 |
| Language restrictions | None  |
| Number of citations | 1453 |
| Relevant reviews  | 12: Van Herck P et al 2010, de Bruin SR, et al 2011, Witter et al 2012, Scott et al 2011, Petersen et al 2006, Eijkenaar 2012, Christianson et al 2008, Reda et al., 2012, Hamilton et al., 2013, Houle et al., 2012, Gillam et al., 2012, Andrew D Oxman and Atle Fretheim, 2009 |

**Table 2. Summary of identified reviews**

| **Reviews**  | **P4P evaluation studies**  |
| --- | --- |
| 1. OXMAN, A. D. & FRETHEIM, A. 2009a. Can paying for results help to achieve the Millennium Development Goals? A critical review of selected evaluations of results-based financing. *J Evid Based Med,* 2**,** 184-95.
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5. DE BRUIN, S. R., BAAN, C. A. & STRUIJS, J. N. 2011. Pay-for-performance in disease management: A systematic review of the literature. *BMC Health Services Research,* 11.
6. EIJKENAAR, F. 2012. Pay for performance in health care: an international overview of initiatives. *Med Care Res Rev,* 69**,** 251-76.
7. GILLAM, S. J., SIRIWARDENA, A. N. & STEEL, N. 2012. Pay-for-performance in the United Kingdom: impact of the quality and outcomes framework: a systematic review. *Ann Fam Med,* 10**,** 461-8.
8. HAMILTON, F. L., GREAVES, F., MAJEED, A. & MILLETT, C. 2013. Effectiveness of providing financial incentives to healthcare professionals for smoking cessation activities: systematic review. *Tob Control,* 22**,** 3-8.
9. HUANG, J., YIN, S., LIN, Y., JIANG, Q., HE, Y. & DU, L. 2013. Impact of pay-for-performance on management of diabetes: a systematic review. *Journal of evidence-based medicine* 6**,** 173-84.
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11. PETERSEN, L. A., WOODARD, L. D., URECH, T., DAW, C. & SOOKANAN, S. 2006. Does pay-for-performance improve the quality of health care? *Ann Intern Med,* 145**,** 265-72.
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15. WITTER, S., FRETHEIM, A., KESSY, F. L. & LINDAHL, A. K. 2012. Paying for performance to improve the delivery of health interventions in low- and middle-income countries. *Cochrane Database Syst Rev,* 15.
 | 1. An LC, Bluhm JH, Foldes SS, Alesci NL, Klatt CM, Center BA (2008). A randomized trial of a pay-for-performance program targeting clinician referral to a state tobacco quitline. Archives of Internal Medicine; 168(18):1993-1999.
2. Armour BS, Friedman C, Pitts MM, Wike J, Alley L, Etchason J (2004). The influence of year-end bonuses on colorectal cancer screening. Am J Managed Care; 10(9):617-624
3. Ashworth M, Lea R, Gray H, Rowlands G, Gravelle H, Majeed A (2004). How are primary care organizations using financial incentives to influence prescribing? Journal of Public Health; 26(1):48-51.
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10. Calvert M, Shankar A, McManus RJ, Lester H, Freemantle N. (2009). Effect of the quality and outcomes framework on diabetes care in the United Kingdom: retrospective cohort study. BMJ; 338:b1870.
11. Campbell S, Reeves D, Kontopantelis E, et al. (2007). Quality of primary care in England with the introduction of pay for performance. N Engl J Med ;357:181e90.
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 |
| 1. Hamilton et al., 2013
2. Houle et al., 2012
3. Huang et al., 2013
4. Petersen et al., 2006,
5. Reda et al.,
6. Scott et al., 2011
7. Van Herck P et al., 2010,
8. Witter et al., 2012
 |

**Table 3. Search strategy output for economic theories to inform the P4P typology**

|  |  |
| --- | --- |
| Database | **PubMed, PsycINFO, EconLit,**  |
| Host | http://ovidsp.tx.ovid.com/sp-3.13.1a/ovidweb.cgi |
| Date of search | January 2012-June 2014 last date searched: 26/6/14 |
| Years covered | 1990-2014 no date restrictions |
| Search Strategy | **You searched:**((behavioural economics or behavioural theories or incentive theories or economic theories) and incentive).mp. [mp=hw, ab, ti, ct, sh, tn, ot, dm, mf, dv, kw, nm, kf, px, rx, an, ui, tc, id, tm]***-****Search terms used:** behavioural
* behavioural economics
* behavioural theories
* economic
* economic theories
* economics
* incentive
* incentive theories
* theories
 |
| Language restrictions | None  |
| Number of citations | 170 |

**Table 4. Application of the typology on selected identified P4P schemes**

| **Program**  | **Perceived risk**  | **Incentive size**  | **Who receives the incentive** | **Fines or bonuses** |
| --- | --- | --- | --- | --- |
| Advancing Quality United kingdom2008 | High riskAnnually (long time lag)Mostly within Physicians control (2 final outcomes and 26 processes)Relative measure | Small2-4% | Group | Bonuses  |
| ClalitIsrael, 1998 | Low risk Annually (long time lag) Mostly within Physicians control (10 processes and 8 intermediate outcomes)Absolute measure | Large Dependent on budget savings | Groups | Bonuses |
|
|
|
| Clinical Practice Improvement Pay (CPIP)Australia, Queensland (started 2008) | Low risk Semi-annually (long time lag)Within physicians control (12 structures and 7 processes)Absolute measure | Large8-10% | Group | Bonuses |
| MACCABIIsrael 2001 | High riskAnnually (long time lag)Mostly within Physicians control (12 processes and 5 intermediate outcomes)Relative measure  | Most likely largeSize not reported | Group | Bonus  |
| National Health Insurance P4P (NHI-P4P)Taiwan 2004 | High risk Monthly and annually 12 structures, 3 final outcomes, and 2 intermediate outcomesAbsolute and relative measures | LargeUp to 20% | Individuals and groups | Bonuses  |
| Primary care P4P (PC-P4P) Netherlands | High risk Annually (long time lag)Within physicians control (31 processes)Relative measures | Large8-10% | Individual and groups  | Bonuses  |
| Primary Care Renewal Models (PCRM)Canada OntarioStarted 2007 | Low riskAnnually Within physicians control (12 processes)Absolute measure  | Small2-4%  | Individual and groups  | Bonuses  |
| Physician Integrated Network (PIN)Canada Manitoba2004 | Low risk Immediately after performance measure (short time lag)Within physicians control (only processes)Absolute | Maximum payment unknown but likely large | Groups  | Bonuses |
| Practice Incentive Program (PIP)Australia 1998 | Low risk Quarterly, semi-annually and annually, Within physicians control (only structures and processes)Absolute measure  | Size not reported relative to income but likely small | Group  | Bonuses |
| Quality and Outcomes Framework (QOF) | Low risk Annually (long time lag)Mostly within physicians control (85% processes)Absolute measure  | LargeUp to 30-40% | Group  | Bonuses |
| Western New York Physician Incentive Program (WNY-PIP)USA | Low risk Annually (long time lag)Mostly process: 6 Process and 3 outcomesIntermediate outcomeAbsolute measure  | Size of varied from $3,000 till $12,000large | Individuals | Bonus |
|
| Kouides et al., 1998Rochester, New York, USA | Low riskAnnually (long time lag)ProcessAbsolute measure  | Size‘Modest’ for just one process?  | Group | Bonus |
| Ashworth et al., 2004UK 2004 | Low risk Annually (long time lag)Process/structureAbsolute measure  | up to £5000 per GP(large)Up to 5% | Groups but money trickled down to individuals | Bonus |
| Cattaneo et al., 2001Italy 1998-1999 | Low risk Yearly (long time lag)ProcessAbsolute measure  | Small 0.5% of annual revenue deducted | Groups | Fines |
| Fairbrother et al., 1999New York12 months | Low risk Annually (long time lag) ProcessAbsolute measure  | $1000 Large | Individuals | Bonus plus feedback |
| Fairbrother et al., 2001USA16 months | Low riskOne off payment after 16 months (long time lag)ProcessAbsolute measure  | 1000 usd | Individual | Bonus  |
| Grady et al., 1997USA | Low risk Quarterly payments (short time lag)ProcessAbsoluteMeasure  | TokenSmall?, i.e., $50 for a 50% referral rate. Small up to 1% | Groups | Bonus with education  |
| Hillman et al., 1998 | Low risk Every 6 months (long time lag)Process Absolute measure | Large Up to 20% of capitation fees | Individuals and groups | Bonus and feedback 18 months: no effect |
| LeBaron et al., 1999USA | Not enough information reported on the costs and nature of incentives |  |  | Bonuses  |
| Rooski et al., 2003USA | Low risk 3 month time lag in paymentProcessAbsolute measure | Size: up to $10,000 not reported relative to practice budget/incomeMost likely large. | Groups | Bonuses |
| Ritchie et al., 1991Scotland: UK | Low risk Quarterly payments (short time lag) Process Absolute measure  | Not enough information reported on size | GroupsClinical practices | Bonuses |
| Hillman et al., 1999USA | Low riskProcessAbsolute and relative reallyPayment frequency: every 6 months | Bonuses based on total compliance score for quality indicators; full and partial bonusesAverage bonus, $2,000 (range, $772 to $4682) | Payments to provider groups | Bonuses Feedback |
| Hillman et al., 1998USA | Low riskPayment frequency: every 6 months (long time lag)Process Absolute measure  | $1260Large: up to20% | Provider group | Bonuses  |
| Chien et al., 2012 Hudson Health Plan's P4P program in New York  | High riskBoth process and outcomesYearlyAbsolute | 300$ per patient  | Groups  | Bonuses |
| Harries et al., 2005Malawi National Tuberculosis Control Programme(four year program/0  | Low risk 6month (short time lag)processabsolute measure  | Size: up to 100% of usual reimbursement | Individual physicians | Bonuses |
|  Gavagan, et al., 2010USA | Low riskAnnually (long time lag)ProcessesAbsolute Measure | Small approximately 3% to 4% of aprovider’s total salary | Individual physicians | Bonuses  |
| An et al., 2008USA | Low riskAnnual (long time lag)ProcessAbsolute measure | Small5000$ onetime payment at the end of the programme | Groups | Bonuses  |
| Glickman et al.,2007USACMS Premier program | High risk Yearly (long time lag)Process and outcomesRelative   | Small 2%  | Groups (hospitals)  | Bonuses  |
| [Mandel](http://www.ncbi.nlm.nih.gov/pubmed?term=Mandel%20KE%5BAuthor%5D&cauthor=true&cauthor_uid=17606827) et al., 2007Cincinnati USA | Can’t tell: not enough information reportedProcess  | Large7% fee schedule increase | Practices (groups) | Bonuses  |
| Greenberg et al., 2008 | Low risk Payment every three months (short time lag)Process | Not enough informtion reported  | Individuals | Bonuses  |
| Levin et al., 2006USA | Low riskPaid monthly (short time lag)ProcessRelative measure | Up to 20% of budget/salary | Groups  | Bonuses  |
| Christensen et al., 2000USA | Low risk Timing of payment not reported ProcessAbsolute measure  | $4 for cognitive services  | Provider group | Bonuses |
| Fagan et al., 2010 | Low risk Timing of payment not reported Process and structuresAbsolute measure  | Large Up 20%  | Groups | Bonuses  |
| Yao H et al., 2008China  | Not enough information reportedProcess | $31 694 for spreading TB knowledge in villages | Doctors Individuals  | Bonuses  |
| Jha et al., 2012CMS | High risk Yearly (long time lag)Process and outcomesRelative measure  | 2% | Groupshospitals | Bonuses  |
| Basinga et al., 2011Rwanda | Low risk Monthly and quarterly payments (short time lag)ProcessesAbsolute measure  | Large 22-38% of usual budget and salary | Individuals and groups |  Bonuses  |
| Chien et al., 2010USA  | Low risk Timing of payment not reported Process Absolute measure | Large  | Individuals  | Bonuses  |
| Lynch et al.,1995 | Annually Paid quarterly Absolute (tournament) it would between 70% and 89%; rates below 70% do not qualify for these payments. Low risk |  | Paid to GP practicesGroups  | Bonuses  |
| Sussman et al., 2000 Boston, MassachusettsUSA | Low risk Yearly (long time lag)ProcessAbsolute measure  | Large Size: up to 10% of salary | Bonuses  | Groups  |
| Norton et al.,1992  | High risk Can’t tell Timing of payment not reported: yearly Outcomes Absolute measure  | Large $126 to $370 | Groups  | Bonuses  |
| Shen et al., 2003 Maine, USA | Low risk Annual payment (long time lag)ProcessAbsolute measure  | Not enough reported about size | Groups  | Bonuses  |
| Werner et al., 2012 CMS USA | High risk Yearly (long time lag)Process and outcomesRelative measure YearlyHIGH RISK | Small 2% | Groups  | BONUSES  |
|  Canavan A. and Swai G. (2008)Tanzania | Low risk Payment every 6 months (long time lag)ProcessesAbsolute measure | Large 5-10% of hospital budget and clinicians salary  | Individuals and groups |  Bonuses  |
|
| Sulku, 2011Turkey | Low riskMonthly payments (short time lag)Process and outcomes Absolute measure  | LargeUp to 80% of budget and salary  | Individuals and groups |  Bonuses  |
|
| Vergeer and Chansa, 2008.Zambia | Low risk Absolute measure Quarterly payments (short time lag)/Processes  | Up to 100% of salary  | Individuals and groups |  Bonuses  |
| Cutler et al., 2007 USA (California P4P) | High risk Annual payments (long time lag)Processes and intermediate outcomesRelative measure  | Large Up to 5% of budget  | Groups  | Bonuses  |
| Ssengooba et al., 2012.Uganda  | Low risk 6monthly payment (long time lag)ProcessAbsolute measure  | Large up to 11% of hospital budget  | Groups  |  Bonuses  |
| Gilmore et al., 2007Hawaii Medical Services Association  | High risk Annual (long time lag)RelativeOutcomes  | LargeUp to 7% of salary  | Individuals  | Bonuses  |
| Young et al., 2007 | High risk Annual (long time lag)ProcessesRelative measure  | Large 5% of physician fees was at risk | Individuals | Fines  |
| Schauffler et al., 1999CaliforniaUSA | Low risk Annual (long time lag)Processes Absolute measure  | Small up to 2% of premiums at risk | Groups | Fines |
| Twardella and Brenner, 2007 | High risk Annual (long time line)Outcome Absolute measure | Unclear  | Individuals  | Bonuses  |
| Kouides et al., 1993 | Low risk Annual payment (long time lag)Processes Absolute | Unclear  | Individuals  | Bonuses  |
| St Jacques et al., 2004 | low risk Monthly paymentProcesses Relative  | Large Up to 500 dollars per month | Individuals  | Bonuses  |
|
|
| Salize et al., 2009  | High riskPayment after a yearOutcomes (quit rate)Absolute  | financial incentive of (€130) | Individuals  | Bonuses  |
| McMenamin et al., 2003 | Low risk ProcessAbsolute  | Not reported  | Groups  | Bonuses  |
| Chee et al, 2007GAVI Incentives for national governments | Low riskTime lag not clearProcesses Absolute measure | Up to 15% increased immunization funding(large) | National government: institutions/groups  | Bonus |
| Eichler et al., 2007Haiti: RBF for NGO | Low risk Quarterly paymentsProcesses Absolute measure | Up to 15% of previous budget of NGO(large)  | NGOs: groups/institutions | Bonus |
| CORT 2007 | Low riskPayment every three monthsProcesses Absolute measure  | $4.94 to $34.58(large as per Indian standards)  | health professionals (ASHA’s) (individuals) | Bonuses |
| Chen et al., 2010 | Low risk AnnuallyProcessesAbsolute  | Large Up to 7.5% of salary  | Individuals  | Bonuses  |
| Armour et al., 2004 | Low riskEnd of the year paymentsProcessesAbsolute measure  | Size unknown | Individuals  | Bonuses  |
| Bardach et al., 2014 | Low riskUnclear timing of paymentProcesses Absolute measure  | large | Groups  | bonuses |
| Greene et al., 2004  | HighYearly Process and outcomesRelative  | Large Up to 20% of capitation fees  | Individuals  | WithholdsFines  |
| Bischoff et al, 2012  | Low riskPayment after a yearProcessesAbsolute  | Unclear  | Groups  | Bonuses  |
|
|
| Boland et al., 2010 | Low riskPayment at 6 months intervalsProcesses Absolute measure | Up to $5000 annually Large  | Individuals  | Bonuses  |
|
| Kruse et al., 2013 | Low riskPayment after 2 yearsProcessesAbsolute | LargeApproximately 5% | Groups  | Bonuses  |
| Peabody et al., 2011 | Low risk Payment date no knownProcessAbsolute | Large approximately 5% of clinicians salary | Groups and individuals  | Bonuses  |

**Table 5 P4P studies used in testing the inter-rater reliability of the P4P typology**

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| 1. An, L.C., et al., *A randomized trial of a pay-for-performance program targeting clinician referral to a state tobacco quitline.* Arch Intern Med, 2008. 168(18): p. 1993-9.2. Ashworth, M., et al., *How are primary care organizations using financial incentives to influence prescribing?* Journal of Public Health, 2004. 26(1): p. 48-51.3. Basinga, P., et al., *Effect on maternal and child health services in Rwanda of payment to primary health-care providers for performance: an impact evaluation.* The Lancet, 2011. 377(9775): p. 1421-1428.4. Beaulieu, N.D. and D.R. Horrigan, *Putting smart money to work for quality improvement.* Health Serv Res, 2005. 40(5 Pt 1): p. 1318-34.5. Catteneo, A., B. Giulio, and S. Giorgio, *Breasfeeding by objectives.* European Journal of Public Health, 2001. 11: p. 397-401.6. Fairbrother, G., et al., *The impact of physician bonuses, enhanced fees, and feedback on childhood immunization coverage rates.* American Journal of Public Health, 1999. 89(2): p. 171-175.7. Fairbrother, G., Hanson, K.L., Butts, G.C., Friedman, S., *Comparison of preventive care in medicaid managed care and medicaid fee for service in institutions and private practices* Ambulatory Peadiatrics, 2001. 1: p. 294-301.8. Harries, A.D., et al., *Performance-related allowances within the Malawi National Tuberculosis Control Programme.* The International Journal of Tuberculosis and Lung Disease, 2005. 9(2): p. 138-144.9. Jha, A.K., et al., *The Long-Term Effect of Premier Pay for Performance on Patient Outcomes.* New England Journal of Medicine, 2012. 366(17): p. 1606-1615.10. Kirschner, K., et al., *Assessment of a pay-for-performance program in primary care designed by target users.* Fam Pract, 2013. 30(2): p. 161-71.11. Kouides, R.W., et al., *Performance-based physician reimbursement and influenza immunization rates in the elderly.* American Journal of Preventive Medicine, 1998. 14(2): p. 89-95.12. Li, Y.H., et al., *The effects of pay-for-performance on tuberculosis treatment in Taiwan.* Health Policy Plan, 2010. 25(4): p. 334-41.13. Gavagan, T.F., et al., *Effect of Financial Incentives on Improvement in Medical Quality Indicators for Primary Care.* J Am Board Fam Med, 2010. 23: p. 622– 631.14. Roski, J., et al., *The impact of financial incentives and a patient registry on preventive care quality: increasing provider adherence to evidence-based smoking cessation practice guidelines☆☆Surveys available upon request from corresponding author.* Prev Med, 2003. 36(3): p. 291-299.15. Ssengooba, F., B. McPake, and N. Palmer, *Why performance-based contracting failed in Uganda – An “open-box” evaluation of a complex health system intervention.* Social Science & Medicine, 2012. 75(2): p. 377-383.16. Sutton, M., et al., *Reduced mortality with hospital pay for performance in England.* N Engl J Med, 2012. 367(19): p. 1821-8.17. Werner, R.M., R.T. Konetzka, and D. Polsky, *The effect of pay-for-performance in nursing homes: evidence from state Medicaid programs.* Health Serv Res, 2013. 48(4): p. 1393-414. |

**Table 6 Rater population**

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| The rater population consisted of five PhD students, four Master’s students, and three health service researchers (with a Master’s degree being their highest qualification). Four of the raters had between zero to one year of research experience, seven raters had between two to four years of research experience, and one rater had over five years of research experience. Three of the raters had previous research experience in or were currently working on P4P schemes in healthcare. A training manual was developed to train the volunteer raters. This included clear and concise decision rules (with examples where needed) to accompany the guidance for applying the tool to the P4P schemes. Volunteer raters were trained face to face or over skype on how to use the typology to categorize P4P schemes. The raters were asked to rate the studies independently. |

**Table 7 Sources of disagreement**

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| Sources of disagreements between the raters were random and not specific to any particular rater. The sources of disagreement in the third and fourth item (size of incentive and perceived risk of not earning the incentive) reflected subjective rater judgement. Table 8 illustrates raters’ responses to judging the size of incentive in a P4P study, which according to the typology guideline should be considered small if less than 5% of usual salary or budget and large if 5% or more than usual salary or budget. Item 4 (‘risk’) consist of three design variables (timing of payment, domain of performance, and performance measure), therefore, there is higher likelihood of disagreement between the raters because differences in judgement of just one of the design features led to different categorisations regarding the fourth item. Table 9 shows examples of sources of disagreement on item 4 (risk). Both raters agreed on categories of domain of performance and performance measure, but one of the raters was unclear about the timing of payment and had indicated that he/she judged subjectively (the typology states that timing of payment should be considered short if payment is made anytime within four months of measurement of performance, while payments made after 4 months is considered long). The lack of clarity as pointed out by the raters reflects lack of clarity and structure in reporting design features in the P4P papers, which supports our argument for the need for a uniform reporting template and the adoption of our developed tool-the Healthcare Incentives Reporting Framework (HISReF).  |

**Table 8 An example of source of disagreement between raters (risk)**

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| **Quote/extract from study (Werner et al. 2011)**[**67**](#_ENREF_67) |
| **Rater 1** | **Time lag: short or long** | **Perceived risk of not earning the incentive: high or low risk** |
| **Domain of measurement: within the clinicians control or out of clinicians control** |
| **Performance measure: absolute or relative measure** |
| Unclear**:** The study does not specify the time lag between performance measure confirmation and payouts. It might have been a short time lag | Low risk |
| Processes (within clinicians control); For two of the three clinical conditions we studied, Medicare’s composite measures are based exclusively on process measures.  |
| Partially relative; Two additional payment incentives were introduced in the fourth year (fiscal year 2007). Hospitals that attained a target performance level (defined as median performance two years previously) received an incentive. In addition, of the hospitals attaining that level, those that were in the top 20 percent in terms of improvement received another incentive. |
| **Rater 2** | Long time lag: The first two years of the demonstration project (fiscal years 2004 and 2005), financial bonuses were distributed to the top 20 percent of hospitals.  | High risk  |
| Processes (within clinicians control): Participating hospitals received higher payments for treating medicare patients with certain condition- acute myocardial infarction, heart failure, pneumonia, coronary artery bypass graft and knee and hip replacements. |
| Relative: Two additional payment incentives were introduced in the fourth year (fiscal year 2007). Hospitals that attained a target performance level (defined as median performance two years previously) received an incentive. In addition, of the hospitals attaining that level, those that were in the top 20 percent in terms of improvement received another incentive |