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<th>Study, Year (Reference)</th>
<th>Study Design</th>
<th>Incentives</th>
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<th>Analysis and Results</th>
<th>Overall Effect†</th>
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</table>
| Norton, 1992 (37)       | RCT (2 arms); November 1980 to April 1983; 36 SNFs (18 study facilities; 18 control facilities) | Level: payment system  
Type: bonus  
Duration: admission incentive up to 4 y; outcome and discharge incentives 1 to 2 y  
Admission incentive: per diem bonus for type D ($5) and E ($3 to $28) patients (vs. $36 reimbursement)  
Outcome incentive: improved health status within 90 d (measured by ADL classification); $126 to $370 per case (range of bonus)  
Discharge incentive: timely discharge and resident did not return within 90 d; $60 to $230 (range of bonus); type A patients not eligible  
Payment frequency: NS | Access; outcome | Markov model  
Experimental homes admitted more type D and E patients (sicker patients) than control homes  
Patients in experimental homes were more likely to be discharged to home or to an ICF and had less likelihood of hospital admission or death ($P < 0.001$) | Positive | 3 |
| Shen, 2003 (38)         | CBA; FY 1991 to 1995; 5552 clients (2367 OSA clients; 3185 Medicaid clients) | Level: payment system  
Type: PBC  
Duration: FY 1993 to 1995  
Description: additional funds based on efficiency, effectiveness, and service to special populations  
Efficiency: minimum service delivery (% of contracted amount); minimum service to primary clients (% of units delivered)  
Effectiveness: abstinence/drug-free 30 d before termination; reduction of use of primary substance abuse problem; maintaining employment; employability; employment improvement; reduction in number of problems with employer; reduction in absenteeism; not arrested; participation in self-help during treatment; reduction of problems with spouse/family members  
Special populations: female; age 0 to 19 y; age ≥50 y; corrections; homeless; concurrent psychological problems; history of IV drug use; polydrug use | Access | Probit specification (regression)  
Significant decrease in the likelihood that an OSA patient was a “most severe user” after PBC implementation compared with the likelihood of a Medicaid (control) patient; coefficient $= -0.74$; $t$-value $= 3.26$, $P = 0.01$ | Negative | 2 |
| Clark et al., 1995 (43) | CBA; July 1992; 7 CMHCs; 185 clients (95 in TCM and 90 in CTT) | Level: provider group  
Type: enhanced FFS  
Duration: NA  
Description: CMHCs received $15.75 per 15 min spent in community settings delivering MIMS  
Payment frequency: FFS | Access | Student $t$-test for paired comparisons; MANOVA  
Student $t$-test: average weekly time spent in community treatment per client increased after the payment change (30.71 min vs. 38.61 min; $P < 0.05$)  
Office-based case management weekly time per client decreased (32.96 min vs. 23.31 min; $P < 0.001$)  
Total case manager average weekly time per client was not significantly different (63.68 min vs. 61.93 min)  
MANOVA: after the payment change, center-based treatment time decreased ($F$-value $= 10.41$; $P = 0.001$). The increase in community minutes had an $F$-value of 3.72 ($P = 0.055$).  
Program type and Medicaid status were not associated with change in time in community vs. mental health center | Partial effect | 2 |
| Hillman et al., 1998 (39) | RCT (2 arms); 1993 to 1995; 52 PC sites (26 intervention; 26 control) | Level: provider group
Type: bonus
Duration: 18 mo
Description: compliance with cancer screening for women age ≥50 y; aggregate compliance scores and improvement in scores over time; full and partial bonuses (20%; 10% of capitation); range of bonus per site, $570 to $1260
Payment frequency: every 6 mo | Process: Repeated-measures ANOVA
Absolute increase in total mean compliance scores for intervention group from baseline was 26.3%; control group was 26.4%.
No significant differences between the groups | No effect | 3 |
| Koides et al., 1998 (42) | RCT (2 arms); September to December 1991; 54 solo/group practices (27 intervention; 27 control) | Level: provider group
Type: bonus
Duration: 4 mo
Description: influenza immunization rate ($8 standard fee); if rate >70%, bonus of $0.80 per immunization; if rate >85%, bonus of $1.60
Payment frequency: one time (end of study) | Process: Linear regression
Absolute increase in immunization rates (from 1990 [baseline] to 1991) was 6.8%; P = 0.03 | Positive | 3 |
| Hillman et al., 1999 (40) | RCT (3 arms); 1993 to 1995; 49 PC sites (19 FB I; 15 FBO; 15 control) | Level: provider group
Type: bonus
Duration: 18 mo
Description: pediatric immunizations; well-child visits; bonuses based on total compliance score for quality indicators; full and partial bonuses (20%; 10% of site’s total 6-mo capitation for pediatric members age ≤6 y); 3 highest-scoring sites received full bonus; next 3 received partial bonus; most improved sites received partial bonus; average bonus, $2,000 (range, $772 to $4682)
Payment frequency: every 6 mo | Process: Repeated-measures ANOVA
Absolute increase in total mean compliance scores from baseline: FB I, 17.2%; FBO, 22.6%; control, 22.6%
Differences in compliance score improvement between groups: FB I vs. control, 5.9%; FBO vs. control, 11.3%
No significant differences between the groups | No effect | 3 |
| Christensen et al., 2000 (44) | RCT (2 arms); February 1994 to September 1995; 200 pharmacies (110 intervention; 90 control) | Level: provider group
Type: enhanced FFS
Duration: 20 mo
Description: $4 for cognitive services interventions (≤6 min); $6 for ≥6 min; cognitive services are judgmental or educational services provided by the pharmacist to the patient, such as consulting the prescriber about a suboptimal dose
Payment frequency: FFS | Process: Student t-test
Mean rate, 1.59 interventions per 100 Medicaid prescriptions (study pharmacies) vs. 0.67 (controls); P < 0.001 | Positive | 2 |
| Casalino et al., 2003 (46) | Cross-sectional survey; September 2000 to September 2001; 1040 physician organizations (no patient-level data included) | Level: provider group
Type: better contracts with health plans; bonuses
Duration: not ascertained in survey
Description: not ascertained in survey
Payment frequency: not ascertained in survey | Process: Multivariate linear regression
Receiving better contracts for quality was associated with an increase of 0.74 CMP implemented (P = 0.007)
Receiving a bonus for scoring well on quality measures was not associated with CMP implementation (P = 0.08) | Partial effect | 1 |
<table>
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<tr>
<th>Study</th>
<th>Design</th>
<th>Sample</th>
<th>Level</th>
<th>Type</th>
<th>Duration</th>
<th>Description</th>
<th>Outcome</th>
<th>Payment Frequency</th>
<th>Process</th>
<th>Outcome</th>
<th>Payment Frequency</th>
<th>Notes</th>
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<tbody>
<tr>
<td>McMenamin et al., 2003 (45)</td>
<td>Cross-sectional survey; September 2000 to September 2001; 1104 physician organizations</td>
<td>Provider group</td>
<td>Financial incentives; additional income; better contracts with health plans</td>
<td>Not ascertained in survey</td>
<td>Not ascertained in survey</td>
<td>Not ascertained in survey</td>
<td>Not ascertained in survey</td>
<td>Partial effect</td>
<td>1</td>
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<tr>
<td>Roski et al., 2003 (41)</td>
<td>RCT (3 arms); May 1999 to June 2000; 37 PC sites (13 incentive + registry; 15 control)</td>
<td>Provider group</td>
<td>Bonus</td>
<td>12 mo</td>
<td>75% of patients with smoking status identified/documented at the last visit; 65% of patients with quitting advice documented at the last visit (targets set at approximately 15% above the average from 2 y before study); bonuses, $5000 for sites with 1–7 providers and $10 000 for sites with ≥8 providers</td>
<td>7-d sustained abstinence from smoking (not associated with financial incentive)</td>
<td>One time (end of study)</td>
<td>Logistic regression, clustering at the practice level</td>
<td>Partial effect</td>
<td>2</td>
<td></td>
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<tr>
<td>Rosenthal et al., 2005 (47)</td>
<td>CBA; October 2004; 163 provider groups contracted with PacificCare Health Systems in California (provider groups in the Pacific Northwest were the comparison group)</td>
<td>Provider group</td>
<td>Bonus</td>
<td>July 2003 to April 2004 (10 mo)</td>
<td>Incentive payout based on provider’s groups ability to reach or exceed target rates for cervical cancer screening, mammography, and hemoglobin A₁c testing for diabetic patients</td>
<td>Improvement in cervical cancer screening rates before and after the quality incentive program was statistically significant between the intervention and comparison groups (difference, 3.6%; P = 0.02). Improvements in mammography screening rates and hemoglobin A₁c testing were not statistically significant</td>
<td>Quarterly</td>
<td>Differences-in-differences analysis using generalized estimating equations</td>
<td>Partial effect</td>
<td>2</td>
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<tr>
<td>Grady et al., 1997 (51)</td>
<td>RCT (3 arms); 1 year (NS); 61 community-based primary care practices</td>
<td>6 mo</td>
<td>&quot;token&quot; reward, based on the percentage referred for mammography during quarterly audit</td>
<td>Repeated-measures ANOVA</td>
<td>No effect 2</td>
</tr>
<tr>
<td>Fairbrother et al., 1999 (48)</td>
<td>RCT (4 arms); July 1995 to July 1996; 60 physicians</td>
<td>12 mo</td>
<td>Bonuses: $1000 (20% improvement from baseline); $2500 (40% improvement); $5000 (80% up-to-date)</td>
<td>Linear and logistic regression</td>
<td>Partial effect 3</td>
</tr>
<tr>
<td>Safran et al., 2000 (50)</td>
<td>Cross-sectional survey; January to April, October 1996; physicians in 8 IPA/network HMOs (2761 patients)</td>
<td></td>
<td></td>
<td>Linear regression</td>
<td>Partial effect 1</td>
</tr>
<tr>
<td>Fairbrother et al., 2001 (49)</td>
<td>RCT (3 arms); July 1997 to July 1998; 57 physicians</td>
<td>16 mo</td>
<td>Both the bonus and the enhanced FFS groups improved significantly in documented up-to-date immunization status, with an overall change of 5.9% (P &lt; 0.05) and 7.4% (P &lt; 0.01), respectively, compared with the control group</td>
<td>Linear and logistic regression</td>
<td>Positive 3</td>
</tr>
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Appendix Table—Continued

| Beaulieu and Horrigan, 2005 (53) | Cross-sectional survey; January to May 2002; PCPs contracted with Medicaid HMOs in 8 California counties with the highest rates of Chlamydia trachomatis infection and Medicaid HMO enrollment | Level: physician | Type: bonus | Process; intermediate outcome | Before-and-after comparison, specific test not described | Patients treated by physicians in the demonstration project had statistically significant improvement (final – baseline performance) on the following process and outcomes measures (P < 0.001 unless otherwise noted): second hemoglobin A\(_1C\) test (25.5\% difference); LDL cholesterol test (18.3\% difference); diabetic retinal examination (25.6\% difference); nephropathy test (37.0\% difference); foot examination (45.4\% difference); hemoglobin A\(_1C\) level < 9.5\% (13.9\% difference); LDL cholesterol level < 2.59 mmol/L (<100 mg/dL) (10.5\% difference); LDL cholesterol level < 3.37 mmol/L (<130 mg/dL) (23.5\% difference); BP < 130/80 mm Hg (6.3\% difference; P < 0.05). No significant improvement on performing 1 hemoglobin A\(_1C\) test | Partial effect | 1 |
| | | Description: meeting target CS of ≥6.23; CS of ≥6.86; or overall 50\% improvement in composite score. CS based on PCP’s performance of process and outcome measures for diabetes care (e.g., LDL test, dilated retinal examination, LDL cholesterol level <2.59 mmol/L (<100 mg/dL) | Incentive rewards: CS ≥6.86, $3.00 PMPM (Medicare), $0.75 PMPM (commercial); CS ≥6.23, $1.50 PMPM (Medicare), $0.37 PMPM (commercial); 50\% improvement and CS ≤6.23, $0.75 PMPM (Medicare), $0.18 PMPM (commercial) | Payment frequency: at the conclusion of the study | |
| Pourat et al., 2005 (52) | Cross-sectional survey; January to May 2002; PCPs contracted with Medicaid HMOs in 8 California counties with the highest rates of Chlamydia trachomatis infection and Medicaid HMO enrollment | Level: physician | Type: better contracts with health plans | Process | Chi-square, logistic regression | Positive studies were those for which all measures of quality demonstrated a statistically significant improvement with the financial incentive. Partial effect studies showed improved performance on some measures of quality but not others. Negative studies were those for which all measures of quality demonstrated a statistically significant decrease with the financial incentive. | Positive | 1 |
| | | Description: HMO contracts included reimbursements for quality-of-care dimensions, including patient satisfaction or peer review | Payment frequency: not ascertained in survey | Payment frequency: not ascertained in survey | | |

* Study inclusion criteria were that the article must be an original report providing empirical results and the study must assess the relationship between an explicit financial incentive and a quantitative measure of health care quality. Articles were excluded if there was no concurrent comparison group, or if there was no baseline, preintervention analysis of the groups on the quality measure. ADL = activities of daily living; ANOVA = analysis of variance; BP = blood pressure; CBA = controlled before and after; CMHC = community mental health center; CMP = care management process; CS = composite score; CTT = continuous treatment team; FB = feedback and incentive; FBO = feedback only; FFS = fee for service; FY = fiscal year; HMO = health maintenance organization; ICF = intermediate care facility; IPA = independent practice association; IV = intravenous; LDL = low-density lipoprotein; MANOVA = multivariate analysis of variance; MIMS = mental illness management services; NA = not applicable; NS = not specified; OR = odds ratio; OSA = Office of Substance Abuse; PBC = performance-based contracting; PC = primary care; PCP = primary care physicians; PMPM = per member per month; RCT = randomized, controlled trial; SNF = skilled nursing facility; TCM = traditional case managers.
† Positive studies were those for which all measures of quality demonstrated a statistically significant improvement with the financial incentive. Partial effect studies showed improved performance on some measures of quality but not others. Negative studies were those for which all measures of quality demonstrated a statistically significant decrease with the financial incentive.
‡ Graded on a scale of 1 (poor) to 4 (excellent).