ANNALS OF FAMILY MEDICINE

Online Supplementary Material

Gillam SJ, Siriwardena AN, Steel N. Pay-for-performance in the United Kingdom: impact of the Quality and Outcomes Framework—a systematic review. *Ann Fam Med*. 2012;10(5):461-468.

http://www.annfammed.org/content/full/10/5/461

Supplemental Table 3. Impact of Quality of Outcomes Framework (QOF) on Equity: Description of Studies Reviewed

Study	Condition	Study Period, Design	Data Source	Sample Size, Setting	Results
Ashworth (2006)[1]	Deprivation	2004-2005 Cross-sectional study	QOF data for each practice in England and linked these with census-derived data	English general practices	Three characteristics were independently associated with higher QOF scores: training practices, group practices. and practices in less socially deprived areas. In a regression model, these 3 factors explained 14.6% of the variation in QOF score. Higher list sizes per GP, turnover of registered patients, chronic disease prevalence, proportions of elderly patients or patients born in a developing country did not contribute to lower QOF scores in the final model
Ashworth (2007)[2]	Multiple conditions	2004-2006 Serial cross-sectional study	QOF data	8,480 (2004-2005) and 8,264 practices (2005-2006) general practices England	Overall differences between primary care quality in deprived and prosperous communities were small. Geographical differences were less in group and training practices
Ashworth (2007)[3]	CHD	2004-2005 Cross-sectional study	QOF data for each practice in England linked with census-derived data	General practices England	The most powerful predictors were higher social deprivation, higher prevalence of CHD, and achievement of cholesterol targets for diabetics. Negative regression coefficients were demonstrated for proportion of elderly and, to a lesser extent, South Asian and Afro-Caribbean patients. Statin prescribing was higher in more deprived communities but lower for elderly and possibly for ethnic minorities
Ashworth (2008)[4]	Blood pressure	2005-2007 Retrospective longitudinal survey	QOF data	8,515 General practices England	The initial gap of 1.7% between mean blood pressure recording levels in practices located in the least deprived fifth of communities compared with the most deprived fifth, narrowed to 0.2% 3 years later. Achievement of target blood pressure levels in 2005 for practices located in the least deprived communities ranged from 71.0% (95% CI, 70.4%-71.6%) for diabetes to 85.1% (84.7%-85.6%) for CHD; practices in the most deprived communities achieved 68.9%

Copyright © 2012 The Annals of Family Medicine, Inc

Study	Condition	Study Period, Design	Data Source	Sample Size, Setting	Results
					(68.4%-9.5%) and 81.8% (81.3%-82.3%) respectively. Three years later, target achievement in the least deprived practices had risen to 78.6% (78.1%-79.1%) and 89.4% (89.1%-89.7%), respectively. Target achievement in the most deprived practices rose similarly, to 79.2% (78.8% to 79.6%) and 88.4% (88.2% to 88.7%), respectively. Similar changes were observed for the achievement of blood pressure targets in hypertension, cerebrovascular disease, and chronic kidney disease
Crawley (2009)[5]	CHD, diabetes, and hypertension	2003 and 2006 Cross-sectional survey	Secondary analysis of national survey data for respondents with CHD and diabetes and hypertension	Diabetes (611 in 2003, 562 in 2006); CHD (861 in 2003, 557 in 2006); hypertension (3,717 in 2003, 2,996 in 2006) England	The quality of chronic disease management in England was broadly equitable between socioeconomic groups before this major pay-for-performance program and remained so after its introduction
Dixon (2010)[6]	Health inequalities	2004-2006 Cross-sectional study	Secondary analysis of QOF data	General practices England	The QOF may be having a positive impact on reducing area-based health inequalities, albeit a small one, and that area-based initiatives have not yet had an observable impact on deprived practices
Doran (2008)[7]	Multiple – 11 conditions	2004–2007 Retrospective longitudinal survey	NHS Quality Management and Analysis System (QMAS)	7,637 General practices England	In year 1, area deprivation was associated with lower levels of achievement, with median achievement ranging from 86.8% (82.2-89.6) for quintile 1 (least deprived) to 82.8% (75.2-87.8) for quintile 5 (most deprived). Between years 1 and 3, median achievement increased by 4.4% for quintile 1 and by 7.6% for quintile 5, and the gap in median achievement narrowed from 4.0% to 0.8% during this period. Increase in achievement during this time was inversely associated with practice performance in previous years ($P < .0001$), but was not associated with area deprivation ($P = .062$)
Doran (2010)[8]	Clinical activities	2004-2007 Longitudinal analysis	Practice QOF data	7,502 Family practices England	The smallest practices (< 2,000 patients) had the lowest median reported achievement rates (83.8% of eligible patients). Performance improved for practices of all sizes over time, but the smallest practices improved at the fastest rate, and by year 3 had the highest median reported achievement rates (91.5%). Improvement was not achieved by additional exception reporting. There was more variation in performance among small practices than larger ones

Copyright © 2012 The Annals of Family Medicine, Inc

Study	Condition	Study Period, Design	Data Source	Sample Size, Setting	Results
Guthrie (2006)[9]	Deprivation	2004–2005 Retrospective analysis of data	QOF data	903 GMS general practices Scotland	Payment is poorly related to workload in terms of the number of patients on the disease register, with up to 44-fold variation in payment per patient on the disease register for practices delivering the same quality of care. Practices serving deprived populations are systematically penalized under the implemented payment system, compared with one based on true prevalence
McGovern (2008)[10]	Diabetes	2004-2005 Serial cross-sectional study	Scottish Programme for Improving Clinical Effectiveness (SPICE)	310 General practices Scotland	One-year post-contract women were less likely than men to have HbA_{1c} (OR = 0.85, 95% CI, 0.80-0.91), serum creatinine (OR = 0.90, 95% CI, 0.84-0.96), and cholesterol recorded (OR = 0.83, 95% CI, 0.77-0.90) or achieve HbA_{1c} (≤10.0%; OR = 0.87, 95% CI, 0.82-0.91) and cholesterol targets (≤5.0 mmol/L; OR = 0.83, 95%CI, 0.77-0.90)
McGovern (2008)[11]	CHD	2004-2005 Serial cross-sectional study	Primary data collection	310 General practices Scotland	The recording of CHD-related quality indicators and prescribing increased dramatically (mean absolute increase of 17.1%) after the introduction of the GMS contract. Postcontract, disparities between patient subgroups continued for certain components of care. Women were less likely to be recorded than men in 9 of 11 components of care, with older patients (7 of 11 components of care) and the most deprived (4 of 11 components of care) also less likely to have a record than the youngest and least deprived, respectively
McLean (2006)[12]	Deprivation	2005 Retrospective analysis	Publicly available QOF data	1,024 General practices Scotland	Little systematic association was found between payment quality and deprivation. For 17 of 33 indicators examined, delivered quality falls with increasing deprivation. Absolute differences in delivered quality are small for most simpler process measures, such as recording of smoking status or blood pressure. Greater inequalities are seen for more complex process measures, such as diagnostic procedures, some intermediate outcome measures, such as glycemic control in diabetes, and measures of treatment, such as influenza immunization
Millett (2007)[13]	Diabetes	2003-2006 Retrospective longitudinal study	Wandsworth Prospective Diabetes Study data	32 General practices Wandsworth, England	The increases in the reached targets for HbA_{1c}, blood pressure, and total cholesterol were broadly uniform across ethnic groups, except for the black Caribbean group, which had improvements in HbA_{1c} and blood pressure control that were significantly lower than in the white British group. Variations in prescribing and achievement of treatment targets between ethnic groups evident in 2003 were not attenuated in 2005

Copyright © 2012 The Annals of Family Medicine, Inc

Study	Condition	Study Period, Design	Data Source	Sample Size, Setting	Results
Millett (2007)[14]	Deprivation	2004 Cross-sectional study	Publicly available QOF data	8,970 General practices England and Scotland	Smaller more deprived practices had higher prevalence of diabetes than larger more affluent practices (3.8% vs 2.8%). Practices with large patient lists had the highest quality scores, even after stratifying for deprivation. However, with the exception of retinal screening, peripheral pulses, and neuropathy testing, differences in achievement between small and large practices were modest (< 5%). Small practices performed nearly as well as the largest practices in achievement of intermediate outcome targets for HbA_{1c}, blood pressure, and cholesterol. Deprivation had a negative effect on the achieved scores and was more pronounced for smaller practices
Millett (2008)[15]	Hypertension, ethnicity	2005-2006 Cross-sectional study	Practice electronic medical records	16 Family practices Southwest London	Black patients with hypertension were significantly less likely to achieve treatment targets for blood pressure control than white or South Asian patients (adjusted OR = 0.86; 95% CI, 0.74-0.99). Prevalence of cardiovascular disease was higher among South Asian patients with hypertension than among their white or black counterparts. The presence of 2 or more cardiovascular comorbidities was associated with significantly improved blood pressure control among white patients but not among black or South Asian patients. South Asian patients with poorly controlled hypertension were prescribed fewer antihypertensive medications than their black or white peers
Millett (2009)[16]	Diabetes	2000-2005 Retrospective longitudinal study	Wandsworth Prospective Diabetes Study data	15 General practices Battersea and Wandsworth, England?	After the introduction of the pay-for-performance incentive, reductions in mean systolic and diastolic blood pressure were significantly greater than predicted by underlying trends in improvement. Reductions in HbA_{1C} levels were significantly greater than those predicted by the underlying trend in the white group (–0.5%) but not in the black (–0.3%) or South Asian (–0.4%) groups. Ethnic group disparities in annual measurement of blood pressure and HbA_{1C} were abolished before the introduction of pay for performance

Copyright © 2012 The Annals of Family Medicine, Inc

Study	Condition	Study Period, Design	Data Source	Sample Size, Setting	Results
Millett (2009)[17]	CHD	2003-2005 Serial cross-sectional survey	General practice records	32 General practices Wandsworth, England	Improvements in blood pressure control were greater in blacks compared with whites, with disparities evident at baseline being attenuated (black 54.8% vs white 58.3% reaching target in 2005). Lower recording of blood pressure in the South Asian group evident in 2003 was attenuated in 2005. Statin prescribing remained significantly lower ($P < .001$) in the black group compared with the south Asian and white groups after the implementation of pay-for-performance (black 74.8%, south Asian 83.8%, white 80.2% in 2005)
Saxena (2007)[18]	CHD, hypertension, and stroke	2004-2005 Cross-sectional study	Publicly available QOF data	General practices England and Scotland	Despite variations in list sizes and deprivation, prevalence was remarkably consistent (CHD, LVD, hypertension, and cerebrovascular disease was 3.7%; 0.45%; 11.4%, and 1.5%, respectively). Quality of care for cardiovascular disease, was consistently high regardless of caseload or size with a few exceptions: practices in affluent areas had higher referral for further investigation; small practices achieved lower scores than large practices for referral for exercise testing and specialist assessment of patients with newly diagnosed angina
Shah (2011)[19]	Care homes	2008-2009 Retrospective case control study	The Health Improvement Network (THIN) database	326 General practices England and Wales	After adjustment for age, sex, dementia, and length of registration, attainment of quality indicators was significantly lower for residents of care homes than for those in the community for 14 of 16 indicators. Largest differences were for prescribing in heart disease (β-blockers in CHD and monitoring of diabetes). Monitoring hypothyroidism, blood pressure in people with stroke, and electrolytes for those receiving loop diuretics showed smaller differences. Attainment was lower in nursing homes than in residential homes. Residents of care homes were more likely to be identified by their doctor as unsuitable or nonconsenting for all QOF indicators for a condition, allowing their exclusion from targets
Sigfrid (2006)[20]	Diabetes	2004-2005 Cross-sectional study	QOF data	49 General practices Brighton and Hove, England	The standardized diabetes prevalence was 26% higher ($P < .001$) in the highest compared with the lowest quintile of deprivation. Correlations between exception reporting and deprivation were seen for 10 of 15 diabetes indicators. Practices with a more deprived patient population were more likely to report exceptions for QOF indicators, although there was no such relationship with the achievement of QOF targets

Copyright © 2012 The Annals of Family Medicine, Inc

Study	Condition	Study Period, Design	Data Source	Sample Size, Setting	Results
Simpson (2006)[21]	Stroke or transient ischemic attack	2004-2005 Serial cross-sectional study	SPICE	310 General practices Scotland	Large increase in the documentation of quality indicators among the oldest patients (>75 years) and the most affluent patients, which tended to attenuate age-group differences and to exacerbate differences between deprivation groups. Women tended to have larger increases in documentation than men, but sex differences persisted, with women less likely than men to have smoking habits recorded (adjusted OR = 0.87; 95% CI, 0.81-0.95) or to receive antiplatelet or anticoagulant therapy (adjusted OR = 0.93; 95% CI, 0.86-0.99)
Simpson (2007)[22]	Stroke or transient ischemic attack	2005 Cross-sectional study	SPICE	312 Primary care practices Scotland	Patients recorded as unsuitable for inclusion in the contract were more likely to be female, older, and have dementia when compared with those patients without such a code. Patients were less likely to be older and were more likely to be from the most deprived areas of Scotland if they refused to attend for review or did not reply to letters asking for attendance at primary care clinics. Patients with multiple comorbidities were more likely to have exclusions for achieving diagnostic clinical targets, such as cholesterol control
Strong (2006)[23]	CHD	2004–2005 Ecological study	Practice QOF data	38 General practices contracting with Rotherham PCT United Kingdom	Practice-level CHD prevalence showed a positive correlation with deprivation as did one of the 11 quality-of-care indicators (recording of smoking status). The remaining 10 quality-of-care indicators showed no significant correlation with deprivation
Tahrani (2008)[24]	Diabetes	2004-2006 Longitudinal study	National Diabetes Audit and QOF data	66 General practices (16,858 patients with diabetes) Shropshire, England	Achievement of glycemic control targets was better before the QOF for larger compared with smaller practices. This difference disappeared after QOF implementation. Repeated measures analysis showed significant improvement in achieving glycemic control targets after QOF implementation in both large and small practices. The study failed to reveal an impact of practice size on achieving the target $HbA_{1c} \leq 7.4\%$ ($P = 0.1$) by this analysis. However, it did show an impact on reaching the target of $HbA_{1c} < 10\%$ ($P = .04$) in favor of smaller practices. There was a significant difference in favor of smaller practices for achievement of prescription of angiotensin-converting enzyme inhibitors ($P = .001$)

CHE = coronary heart disease; GP = general practitioner; HbA_{1c} = glycated hemoglobin; GMS = General Medical Services; LVD = left ventricular failure; OR = odds ratio; PCT = Primary Care Trust; SPICE = Scottish Programme for Improving Clinical Effectiveness.

Copyright © 2012 The Annals of Family Medicine, Inc

References

1. Ashworth M, Armstrong D. The relationship between general practice characteristics and quality of care: a national survey of quality indicators used in the UK Quality and Outcomes Framework, 2004-5. *BMC Fam Pract.* 2006;7:68.
2. Ashworth M, Seed P, Armstrong D, Durbaba S, Jones R. The relationship between social deprivation and the quality of primary care: a national survey using indicators from the UK Quality and Outcomes Framework. *Br J Gen Pract.* 2007;57(539):441-448.
3. Ashworth M, Lloyd D, Smith RS, Wagner A, Rowlands G. Social deprivation and statin prescribing: a cross-sectional analysis using data from the new UK general practitioner 'Quality and Outcomes Framework'. *J Public Health (Oxf).* 2007;29(1):40-47.
4. Ashworth M, Medina J, Morgan M. Effect of social deprivation on blood pressure monitoring and control in England: a survey of data from the quality and outcomes framework. *BMJ.* 2008;337:a2030.
5. Crawley D, Ng A, Mainous AG III, Majeed A, Millett C. Impact of pay for performance on quality of chronic disease management by social class group in England. *J R Soc Med.* 2009;102(3):103-107.
6. Dixon A, Khachatryan A. A review of the public health impact of the Quality and Outcomes Framework. *Qual Prim Care.* 2010;18(2):133-138.
7. Doran T, Fullwood C, Kontopantelis E, Reeves D. Effect of financial incentives on inequalities in the delivery of primary clinical care in England: analysis of clinical activity indicators for the quality and outcomes framework. *Lancet.* 2008;372(9640):728-736.
8. Doran T, Campbell S, Fullwood C, Kontopantelis E, Roland M. Performance of small general practices under the UK's Quality and Outcomes Framework. *Br J Gen Pract.* 2010;60(578):e335-e344.
9. Guthrie B, McLean G, Sutton M. Workload and reward in the Quality and Outcomes Framework of the 2004 general practice contract. *Br J Gen Pract.* 2006;56(532):836-841.
10. McGovern MP, Williams DJ, Hannaford PC, et al. Introduction of a new incentive and target-based contract for family physicians in the UK: good for older patients with diabetes but less good for women? *Diabet Med.* 2008;25(9):1083-1089.
11. McGovern MP, Boroujerdi MA, Taylor MW, et al. The effect of the UK incentive-based contract on the management of patients with coronary heart disease in primary care. *Fam Pract.* 2008;25(1):33-39.
12. McLean G, Sutton M, Guthrie B. Deprivation and quality of primary care services: evidence for persistence of the inverse care law from the UK Quality and Outcomes Framework. *J Epidemiol Community Health.* 2006;60(11):917-922.
13. Millett C, Gray J, Saxena S, Netuveli G, Khunti K, Majeed A. Ethnic disparities in diabetes management and pay-for-performance in the UK: the Wandsworth Prospective Diabetes Study. *PLoS Med.* 2007;4(6):e191.
14. Millett C, Car J, Eldred D, Khunti K, Mainous AG III, Majeed A. Diabetes prevalence, process of care and outcomes in relation to practice size, caseload and deprivation: national cross-sectional study in primary care. *J R Soc Med.* 2007;100(6):275-283.
15. Millett C, Gray J, Bottle A, Majeed A. Ethnic disparities in blood pressure management in patients with hypertension after the introduction of pay for performance. *Ann Fam Med.* 2008;6(6):490-496.
16. Millett C, Netuveli G, Saxena S, Majeed A. Impact of pay for performance on ethnic disparities in intermediate outcomes for diabetes: a longitudinal study. *Diabetes Care.* 2009;32(3):404-409.
17. Millett C, Gray J, Wall M, Majeed A. Ethnic disparities in coronary heart disease management and pay for performance in the UK. *J Gen Intern Med.* 2009;24(1):8-13.
18. Saxena S, Car J, Eldred D, Soljak M, Majeed A. Practice size, caseload, deprivation and quality of care of patients with coronary heart disease, hypertension and stroke in primary care: national cross-sectional study. *BMC Health Serv Res.* 2007;7:96.
19. Shah SM, Carey IM, Harris T, Dewilde S, Cook DG. Quality of chronic disease care for older people in care homes and the community in a primary care pay for performance system: retrospective study. *BMJ.* 2011;342:d912.
20. Sigfrid LA, Turner C, Crook D, Ray S. Using the UK primary care Quality and Outcomes Framework to audit health care equity: preliminary data on diabetes management. *J Public Health (Oxf).* 2006;28(3):221-225.
21. Simpson CR, Hannaford PC, Lefevre K, Williams D. Effect of the UK incentive-based contract on the management of patients with stroke in primary care. *Stroke.* 2006;37(9):2354-2360.
22. Simpson CR, Hannaford PC, McGovern M, et al. Are different groups of patients with stroke more likely to be excluded from the new UK general medical services contract? A cross-sectional retrospective analysis of a large primary care population. *BMC Fam Pract.* 2007;8:56.
23. Strong M, Maheswaran R, Radford J. Socioeconomic deprivation, coronary heart disease prevalence and quality of care: a practice-level analysis in Rotherham using data from the new UK general practitioner Quality and Outcomes Framework. *J Public Health (Oxf).* 2006;28(1):39-42.
24. Tahrani AA, McCarthy M, Godson J, et al. Impact of practice size on delivery of diabetes care before and after the Quality and Outcomes Framework implementation. *Br J Gen Pract.* 2008;58(553):576-579.

Copyright © 2012 The Annals of Family Medicine, Inc