

## Improvements in quality of clinical care in English general practice 1998-2003: longitudinal observational study

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### Abstract

**Objective** To measure changes in quality of care for three major chronic diseases (coronary heart disease, asthma, and type 2 diabetes) between 1998 and 2003.

**Design** Longitudinal cohort study.

**Setting** 42 general practices in six geographical areas of England (Avon, Bury/Rochdale, Enfield, Oldham, Somerset, South Essex).

**Participants** Medical record data for 2300 patients with diabetes, asthma, or coronary heart disease in 1998, and 1495 patients in 2003.

**Main outcome measure** Quality of care assessed against predefined evidence based review criteria.

**Results** Between 1998 and 2003, quality of care improved markedly in terms of maximum possible scores on the review criteria, from 60.5% to 78.1% for coronary heart disease (change = 17.6, 95% confidence interval 13.9 to 21.4;  $P < 0.001$ ), 60.1% to 70.3% for asthma (10.2, 4.6 to 15.8;  $P = 0.001$ ), and 70.4% to 77.7% for diabetes (7.3, 3.5 to 11.1;  $P = 0.001$ ). Important changes occurred to several indicators potentially related to improved health outcomes. These included improved control of serum cholesterol (to  $\leq 5$  mmol/l) from 17.6% to 61.4% in coronary heart disease and from 21.5% to 52% in diabetes, and control of blood pressure to  $\leq 150/90$  in coronary heart disease from 47.3% to 72.2% and to  $\leq 145/85$  in diabetes from 21.8% to 35.8%. A small, non-significant improvement in glycaemic control occurred among diabetic patients (37.9% to 39.7% with  $HbA_{1c} < 7.4\%$ ). Significant improvements also occurred in the recording of exercise capacity and diet and weight advice for patients with coronary heart disease; of smoking advice, peak flow, and symptoms for patients with asthma; and of creatinine, weight, and  $HbA_{1c}$  for patients with diabetes. Over the five years, more improvement in coronary heart disease care occurred in large practices and practices in affluent areas.

**Conclusions** Substantial improvements were seen in quality of care for the three conditions studied between 1998 and 2003, a time of systematic quality improvement initiatives in the NHS. The changes were most marked for coronary heart disease. English general practices could be expected to achieve high clinical quality scores in the initial year of a new contract, which provides financial incentives for high quality care from 2004.

### Introduction

Improving quality of care has been a major focus of UK government policy since 1997, including the introduction of clinical governance as part of a 10 year strategy to improve quality of care.<sup>1-2</sup> The government introduced several national guidelines that set minimum standards for health services in England, including care for patients with coronary heart disease in 2000 and diabetes in 2002.<sup>3-4</sup> The National Institute for Health and Clinical Excellence (NICE) also published guidance on clinical interventions, including some aspects of coronary heart disease in 2001 and type 2 diabetes in 2002. Most recently, financial incentives for improved chronic disease management have been introduced as part of a new contract for general practitioners starting in April 2004.<sup>5</sup> Initial evidence suggested that the government's quality improvement strategy was having broadly positive effects,<sup>6</sup> including in primary care.<sup>7</sup> We now present the results of the first five years of a longitudinal study of quality of care for coronary heart disease, asthma, and diabetes.

### Methods

#### Design

Quality of care for coronary heart disease, asthma, and type 2 diabetes was measured in a stratified random sample of 60 general practices in England in 1998.<sup>8</sup> Forty two (74%) of these practices are taking part in a longitudinal study of quality of care until 2007.<sup>9</sup> These are located in six areas of England: Avon, Bury/Rochdale, Enfield, South Essex, Oldham, and Somerset.

#### Data collection

We extracted data to assess the quality of clinical care for coronary heart disease (15 indicators), asthma (13 indicators), and diabetes (22 indicators). Data were collected from medical records by using evidence based review criteria.<sup>10-11</sup> We included additional indicators from guidance in the national service frameworks for coronary heart disease and diabetes (levels of blood pressure, cholesterol, and  $HbA_{1c}$ ). Data were collected

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**Table 1** Change in clinical quality scores 1998-2003

Condition	1998		2003		Change (95% CI) in scores, 1998 to 2003	P value*	Improvement (% maximum possible improvement)
	No of patients	Mean (SD) quality score	No of patients	Mean (SD) quality score			
Coronary heart disease (41 practices)	737	60.5 (23.1)	487	78.1 (18.7)	17.6 (13.9 to 21.4)	<0.001	45
Asthma (42 practices)	785	60.1 (29.2)	504	70.3 (27.5)	10.2 (4.6 to 15.8)	0.001	26
Diabetes (42 practices)	776	70.4 (21.7)	504	77.7 (18.5)	7.3 (3.4 to 11.1)	0.001	25

\*From regression analysis using patient level data, allowing for clustering of patients within practices.

in 1998 and 2003. We randomly selected patients from those receiving relevant drugs on repeat prescription within the previous six months, drawing separate samples in 1998 and 2003. We verified patients' conditions by checking individual records.

**Data analysis**

Overall "quality of care" scores were the ratio of the number of chronic disease indicators for which care was provided, divided by the number of indicators for which care should have been provided. Expressed as a percentage, the score represents the percentage of "necessary care" provided to each patient, within a range from 0% to 100%. We calculated practice scores as the average of individual patients' scores within each practice.

We analysed patient level results for individual indicators by using logistic regression, and patient level quality scores by using ordinary regression. We used regression analysis to investigate several practice level predictors of the change in quality scores from 1998 to 2003 (see [bmj.com](#)).

**Results**

Table 1 shows summary statistics from the regression analyses for the patient level quality scores with the comparison between time points. Table 2 gives standard deviations and ranges, together with Pitman's *t* test for correlated variances. The table on [bmj.com](#) shows scores for individual indicators in the two time periods.

**Coronary heart disease**

Significant improvements in coronary heart disease care occurred between 1998 and 2003 ( $P < 0.001$ ; 95% confidence interval of change 13.9 to 21.4) (table 1). In 1998, patients received, on average, 60.5% of the necessary care (that is, 60.5% of the coronary heart disease indicators that applied to the individual patient were met). By 2003 this figure had increased to 78.2%, or 45% of the maximum possible improvement on the 1998 figure. The variance in practice level mean scores for coronary heart disease did not change between 1998 and 2003 (table 2).

The table on [bmj.com](#) shows that the percentage of necessary care provided increased significantly for 11 of the 15 coronary heart disease indicators—for example, measurement of serum cholesterol (from 63% to 89%,  $P < 0.001$ ), control of serum cholesterol to 5.0 mmol/l or below (from 17.6% to 61.4%,  $P < 0.001$ ),

and control of blood pressure to 150/90 mm Hg or below (from 47.3% to 72.2%,  $P < 0.001$ ). These are changes in care that are likely to be associated with significant impacts on health.<sup>12</sup> In 1998 only four out of 15 indicators were achieved for more than two thirds of patients. By 2003 this had increased to 10.

**Asthma**

Table 1 shows that a significant overall improvement occurred in asthma care ( $P < 0.001$ ; 95% confidence interval of change 4.6 to 15.8). In 1998 asthma patients received, on average, 60.2% of necessary care, which increased to 70.3% in 2003—26% of the maximum possible improvement on the 1998 figure. The variance in practice level mean scores for asthma did not change between 1998 and 2003 (table 2).

The percentage of necessary care provided increased significantly for four out of 13 indicators. These were action taken in relation to exercise induced bronchospasm ( $P < 0.001$ ) and recording of smoking advice ( $P < 0.001$ ), peak flow ( $P < 0.01$ ), and symptoms ( $P < 0.01$ ). The increase in smoking advice represented 67% of the total possible gain between 1998 and 2003.

**Diabetes**

A significant overall improvement ( $P < 0.001$ ; 95% confidence interval of change 3.4 to 11.1) occurred in diabetes care (table 1). In 1998 diabetes patients received, on average, 70.4% of necessary care, compared with 77.7% in 2003—25% of the maximum possible improvement on the 1998 figure. The variance in practice level mean scores for diabetes did not change between 1998 and 2003 (table 2).

The percentage of necessary care provided increased significantly for seven out of 22 indicators (see table on [bmj.com](#)). These included the measurement of serum cholesterol (from 74.9% in 1998 to 97.6% in 2003,  $P < 0.001$ ), control of serum cholesterol to 5.0 mmol/l or below (from 21.5% to 52%,  $P < 0.001$ ), control of blood pressure to 140/85 mm Hg or below (from 21.8% to 35.8%,  $P < 0.001$ ). The increase in recording of cholesterol represented 90% of the entire potential for gain, whereas the improvement in the control of cholesterol and blood pressure represented 39% and 18% of the potential for gain.

**Predictors of quality change**

We found no significant associations between any predictor and the change in asthma care or the change in diabetes care. The change in care for patients with coronary heart disease was positively associated with practice size ( $P = 0.012$ ) and negatively associated with socioeconomic deprivation score ( $P = 0.02$ ). Number of whole time equivalent general practitioners explained around 12% and deprivation around 3% of the variation in coronary heart disease care in 2003 unexplained by care in 1998.

**Table 2** Change in variance in practices' quality scores 1998-2003

Condition	SD; range in 1998	SD; range in 2003	Pitman's <i>t</i> test of correlated variances		
			<i>t</i>	df	P value
Coronary heart disease (41 practices)	9.68; 37.36-75.67	11.10; 44.8-94.8	0.84	39	0.41
Asthma (42 practices)	16.47; 20.6-85.5	15.93; 35.8-96.6	-0.23	40	0.82
Diabetes (42 practices)	13.74; 35.0-88.9	11.44; 43.2-93.4	-1.34	40	0.19

## Discussion

Quality of care for the three major chronic conditions studied increased substantially, including statistically significant improvements for 22 of the 50 indicators across the three conditions. We saw improvements in various types of care, including recording of symptoms and advice, in-house procedures and test ordering, action taken in response to symptoms, and control of blood pressure and cholesterol. However, across the 42 practices, as much variation existed between the highest and lowest performing practices in 2003 as in 1998.

### Limitations of the study

Power analysis determined that the 2003 sample would provide 90% power to detect a six point deviation in the overall quality score in 2005 away from the trend before that point. A direct comparison between 1998 and 2003 has power to detect only large to moderate effects. We found highly significant changes despite these power limitations.

As a result of practices leaving the study, the original nationally representative sample of 60 practices in 1998 was reduced to 42 practices in 2003. Single handed practices were more likely to leave the study. Overall mean 2003 scores adjusted for this factor were not substantially different from the unadjusted score for any of the three conditions, suggesting that attrition did not bias the results. A limitation is that the analysis assumes that the reasons why practices left the study were not related to their performance. Although we have no information about the performance of these practices in 2003, quality scores in 1998 did not predict non-participation in 2003.

### Implications for policy and practice

In a rapidly changing healthcare system, we cannot attribute these changes with certainty to any one intervention. We found improvements in care as great for asthma, where the main national quality improvement thrust was from the British Thoracic Society, as in coronary heart disease and diabetes, which were subject to major initiatives by central government and primary care trusts.<sup>13</sup> These various interventions may have interacted. Improvements may also have been associated with general improvements in the standard of data recording in practices. However, these indicators are based on ratings from expert panels, and indicators were included only if more than 80% of nurses and doctors in the sample reported that they recorded them on a routine basis.<sup>11</sup>

Successful quality improvement is likely to require a focus on close team working within practices,<sup>14</sup> clinical and organisational approaches, and strategies that include the practice team, the primary care trust, and central government initiatives.<sup>15</sup> What our findings clearly show is that the quality of care for all three conditions studied increased substantially over a five year period.

The variation in care between practices did not change between 1998 and 2003. We cannot say whether these results are due to parallel improvements in all practices or if the pattern of change is more complex. If the trend towards improvement continues in the future, however, a reduction in practice level variation is to be expected, because some practices will begin to hit the ceiling of quality scores.

## What is already known on this topic

Previous research shows widespread variation in the quality of general practice care

## What this study adds

Substantial improvements occurred in clinical quality of care for coronary heart disease, diabetes, and asthma between 1998 and 2003

These changes took place at a time of widespread government and professional initiatives to improve quality of care

The improvements that occurred between 1998 and 2003 suggest that practices are well placed to respond to the quality incentives offered in the 2004 contract

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