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ANALYSIS

Does competition between hospitals improve clinical quality? A review of evidence from two eras of competition in the English NHS

Gwyn Bevan and Matthew Skellern review evidence on the effects of hospital competition on quality of care within the English NHS and question whether they support government proposals to extend competition

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The health secretary, Andrew Lansley, has proposed changes to the English National Health Service (NHS) that will extend the hospital market introduced by “New Labour” in the 2000s.^{1 2} This was the second era of hospital competition within the NHS; the first, the “internal market,” applied throughout the UK from 1991 to 1997. Studies of the NHS markets have generally used one of two paradigms,^{w1} either analysing the effects of the market on the various players³⁻⁷ or using econometric methods to test the relation between competition and outcomes.⁸⁻¹² A recent review encompasses both kinds of study.¹³ The different types of study have come to different conclusions, and findings from recent econometric studies^{10 11} have proved intensely controversial.^{w2-w7} We outline the key features of the two eras of hospital competition and review the literature and debates, focusing on the effects of hospital competition on the quality of care rather than on the costs (such as transaction costs) of competition⁷ or other effects.

Two eras of hospital competition in the English NHS

During 1991-97, a period of limited growth in NHS funding, an “internal market” was introduced throughout the United Kingdom.^{9 13 14 15} It changed health authorities’ responsibilities by separating the roles of purchaser and provider of healthcare. Hospitals were made independent of health authorities, typically as directly managed units, which became NHS trusts regulated by the Department of Health. Health authorities contracted selectively with providers and constrained general practitioners’ referral options. However, general practitioners who opted for various forms of general practice fundholding^{w8-w10} were allocated cash budgets to contract for elective care and could choose where to refer their patients. Competition was between

NHS trusts and private providers. NHS trusts were expected to avoid financial deficits but could not retain financial surpluses and hence arguably lacked strong incentives to increase market shares (table 1). There was little information on, and no external regulatory oversight of, quality of care.^{w11 w12}

From 1997, the new Labour government abolished general practice fundholding and strongly discouraged competition in favour of a more cooperative model.^{14 15} Nevertheless, the distinction between purchasers and providers was retained, thus preserving scope for competition via selective contracting by purchasers (primary care trusts or PCTs).

The “New Labour” hospital market, which applied only to England, was developed from 2002 onwards, a period of sustained increases in NHS funding (about 5% per year).^{14 15} Under this model PCTs contracted selectively with providers. Within the PCTs, practice based commissioners, which could be thought of as an extension of the general practice fundholding model,^{w10} also contracted with providers but had indicative budgets only. Competition was again between providers, but there were more of them: NHS trusts, private providers, independent sector treatment centres, and NHS foundation trusts. Foundation trusts were high performing trusts that met Department of Health criteria for autonomy and were subject to approval and oversight by a new regulator, Monitor. They were allowed to retain financial surpluses and hence arguably had incentives to increase market shares.

The performance of NHS hospitals against targets, and on other measures of clinical and financial performance, was published and centrally managed; quality was regulated through inspections. Providers’ prices were fixed and set by the Department of Health so that competition would in principle be on quality, not price. Patient choice of hospital for elective

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Extra references, w1-w27, supplied by the author (see <http://www.bmj.com/content/343/bmj.d6470/suppl/DC1>)

surgery was formally introduced from 2006. From 2007, a website provided information on hospital quality, such as waiting times, hospital standardised mortality ratios (HSMRs), infection rates, and admission levels for various procedures.

Compared with the earlier internal market, the New Labour market was better structured to encourage improvements in clinical quality through the elimination of price competition; the provision of greater information on quality; the introduction of patient choice; and the provision of stronger incentives for providers (particularly foundation trusts) to increase market shares (table 1⇓).

Studies of market impacts on the different players

In their evaluation of the impacts of the internal market on purchasers and providers, Le Grand and colleagues observed that: "Perhaps the most striking conclusion . . . is how little overall measurable change there seems to have been related to the core structures and mechanisms of the internal market."³ Their explanation for this was that "the incentives were too weak and the constraints were too strong." Evaluations found that only a few GP fundholders made material gains for their patients^{7 w9 w10} and that health authorities were largely ineffective purchasers.^{3 7}

Studies of the effects of the New Labour market found little hard evidence of systemic improvements attributable to competition arising from patient choice or selective contracting by purchasers.^{4-7 13} Indeed, some suggested that any improvements in quality were due to policies other than competition.^{4 5} Studies of patient choice identified difficulties in its implementation and a paucity of detailed, consistent, and reliable information on quality of care.^{4 6} Dixon et al provided evidence that patients made little use of the limited information available, and relied on personal experience and their general practitioners⁶; yet general practitioners did not have access to trustworthy or reliable information on quality, and hence relied on their own knowledge of providers.⁶ It is thus unclear to what extent patients' choices were informed by information on quality of care.

Econometric studies

Table 2⇓ outlines five econometric studies that estimate the causal effects of competition on outcomes. All face three methodological challenges.

The first is measuring the intensity of competition. A simple approach is to count the number of hospitals in the market, but the Herfindahl-Hirschman index (HHI) is a better measure because it takes account of the relative size of competitors. The challenge is defining the size of a hospital's market without creating problems of "endogeneity" or reverse causality. For example, the "variable radius measure" defines a hospital's market as consisting of all hospitals within the circular area required to encompass (say) 90% of its patients. The problem is that hospital quality is likely to influence patient behaviour—for example, better hospitals may attract patients from further afield and thus seem to operate in more competitive markets—so quality is determining the estimated intensity of competition, not the other way around. A good way of tackling this problem is to predict patient behaviour based on exogenous geographical and demographic variables, and construct measures based on predicted (not actual) patient behaviour.¹⁶

The second problem is how to measure quality of care. The studies in table 2⇓ measure clinical quality using hospital

mortality rates after acute myocardial infarction or from all causes.¹¹ Both measures have their problems. As hospitals do not compete for patients who have had a myocardial infarction, who are generally taken to the nearest appropriate hospital, it is not clear that hospital deaths should decrease in response to competition. However deaths after acute myocardial infarction are used because they are seen as a good proxy for quality of care throughout a hospital^{10 11} and also mitigate endogeneity problems.¹⁰ Although all cause mortality rates include deaths from elective surgery, perioperative deaths are so rare that outcome measures that go beyond mortality are required.¹⁷ Patient reported outcome measures (PROMs) of health gain (mobility gain, pain amelioration, etc) after surgery have been available in England only since April 2009.^{w13}

The third challenge is how to estimate the causal effect of competition on quality. One reason for the controversy over recent econometric papers^{10 11} is disagreement about the econometric method of establishing causation. Econometricians seek to establish causation by showing that variation in the treatment variable (intensity of competition) is exogenous with respect to the outcome variable (hospital quality): given exogenous variation of the treatment variable, causality can be inferred from correlation. An overriding focus of the studies in table 2⇓ is on overcoming problems of "endogeneity" due to reverse causality and omitted variables, in order that causal inferences may be made. Two of the studies use variation between hospitals to estimate the effects of competition.^{8 12} To do this they need to separate differences in outcomes resulting from competition from pre-existing differences between high and low competition markets. Bloom et al seek to control for these differences by assuming that hospitals in government held marginal seats are less likely to be closed and hence that markets in these areas will contain more hospitals than they would have done if they had not been in marginal areas.¹² Thus marginality, they argue, is an "instrument" that provides exogenous variation in competition intensity and hence permits causal inference. The other three studies⁹⁻¹¹ measure the effects of competition using difference-in-difference estimation, which compares differences in outcomes between hospitals before and after a change in the competitive environment. The validity of their estimates is premised on the claim that this change provides exogenous variation in competition intensity thus allowing causal inferences to be drawn. The difference-in-difference design controls for pre-existing differences by assuming that any change in outcome for those exposed to more competition over and above the change in outcome for those exposed to less competition is due to the (exogenous) increase in competition.

The 1990s internal market

Propper et al estimated the effect of competition (measured by the number of competitors) on quality of care (measured by hospital mortality after myocardial infarction, data for which were published retrospectively in 1999).^{8 9} The first study, averaging over three years, found that more intense competition led to slightly higher mortality.⁸ The second study used difference-in-difference to compare five years of competition ("treatment") with four of "control."⁹ It found that more intense competition led to higher observable quality (increased elective admissions and shorter waiting times), but lower unobservable quality (higher mortality after acute infarction). They conclude that these excess deaths "more than matched the fall in death rates due to technological innovation."

The 2000s New Labour market

Bloom et al¹² estimate the effects of competition (measured by the number of competitors) on hospital management quality and hospital mortality rates after myocardial infarction in 2005-6, when selective contracting was in place but before the introduction of patient choice. They find that the addition of one rival hospital increases management quality (by 0.4 standard deviations) and decreases mortality rates (by 9.5%). They conclude that competition increases hospital quality, but other plausible explanations exist—for example, eliminating the threat of closure in marginal constituencies may provide greater institutional stability and lead to improved outcomes.

Patient choice of hospital for elective surgery was progressively introduced from 2006. Cooper et al¹⁰ and Gaynor et al¹¹ both estimate the effect of the increased competition resulting from this reform on hospital quality. Cooper et al use 13 measures of intensity of competition and find that introducing patient choice (where it was offered) led to fewer deaths from acute myocardial infarction. This finding is robust to different measures of competition, and different functional form assumptions about the relation between competition and outcomes. Gaynor et al seek to avoid endogeneity by calculating Herfindahl-Hirschman indices based on predicted patient flows. They find that patients exercised choice when it was offered—an important finding in itself, given the difficulties in the implementation of patient choice^{4,6}—and that introducing patient choice led to lower mortality rates from myocardial infarction and all causes. They estimate that the reform saved about 4800 life years each year.

A valid difference-in-difference estimator must control, firstly, for pre-existing differences in trends between more and less competitive hospitals, and, secondly, for other changes occurring contemporaneously with patient choice, which may have affected the outcome variable. Cooper et al¹⁰ and Gaynor et al¹¹ control for the first, but the second is problematic because the policies of the 2000 national service framework for coronary heart disease^{w14 w15} have been credited with major reductions in mortality from myocardial infarction. Gaynor et al address this concern by showing that more intense competition led to lower all cause mortality rates even when deaths from myocardial infarctions are subtracted from the measure. This suggests there was something going on beyond the effects of the national service framework. They also sought to control explicitly for the framework's effects by including as control variables uptake of primary angioplasty; use of thrombolytics; ambulance response times; and prescription of various drugs on discharge. They find that doing so increased the estimated beneficial effects of competition because the principal driver of reductions in mortality from acute myocardial infarction was increased use of thrombolytics, which mainly occurred in rural (generally less competitive) areas.

Discussion

Studies examining market effects on various players generally conclude that both eras of competition were ineffective and highlight how difficult it has been to design and implement effective competition.^{3-7 13} However, those using econometric analyses of the internal market found that competition reduced clinical quality as measured by hospital mortality rates after myocardial infarction, while also reducing waiting times.^{8 9} When combined with other studies showing that prices also fell,^{w16-w18} the implication is that the internal market resulted in lower prices and improvements in observable quality (shorter waiting lists), at the expense of unobservable quality (hospital

mortality rates). These findings were uncontroversial, as they were consistent both with other evidence that the internal market had produced few benefits, and with predictions from economic theory.^{w19-w22} They seem to have had a key role in Mr Lansley's decision to abandon initial plans for price competition.^{w23-w25}

The three econometric analyses of the New Labour market all show a seemingly causal relation between greater competition and lower hospital mortality (myocardial infarction and all cause) that is robust to a range of alternative specifications and explanations.⁹⁻¹¹ The econometric studies of patient choice^{10 11} have proved highly controversial,^{w2-w7} partly because their estimates cut against the grain of the findings on the internal market and earlier studies of the New Labour market. These two econometric studies are serious and rigorous responses to the challenge of estimating the effects of competition on hospital outcomes. Nevertheless, we have two observations on their findings.

Firstly, these studies^{10 11} of patient choice for elective surgery do not provide evidence of its effect on the quality of elective surgery. This is because there is widespread evidence of variation in quality of care within a hospital; mortality rates of any form do not, therefore, provide a good measure of the quality of elective surgery. Inspections of clinical governance in the English NHS in the early 2000s found acute hospitals typically had “a mix of good and poor services, often with a dysfunctional clinical team.”^{w13 w12} Moreover, evidence from the United States shows substantial variations in mortality rates between individual surgeons and procedures within cardiac surgery at the same hospital.¹⁸ The figure plots, for English NHS hospitals in 2009-10, the relation between hospitals' standardised mortality ratios^{w26} and the quality of their elective surgery procedures, as measured by its PROMs for hernia repair and hip replacement.^{w13} No significant relation exists between these measures. We therefore conclude that the effect of patient choice for elective surgery on the quality of elective surgery is not captured by studies that use hospital mortality as an outcome variable and can be tested only by using measures that are specific to elective surgery, such as PROMs. Although no PROMs data exist for before the introduction of patient choice, they could potentially be used to measure the effect of competition within the English NHS by comparison with the other UK countries.

Secondly, the studies both assume that competition in the electives market provides incentives for hospitals to improve elective surgery and that delivering such improvements requires a general tightening up of hospital management in ways that lead to across the board improvements in hospital quality.^{10 11} It is equally plausible, however, that such competition for elective surgery might, through diversion of management effort, have negatively affected the quality of other hospital services.^{w22} The chain of causation is not adequately understood; as Propper has argued elsewhere,¹⁹ there is a “black box” in our understanding of exactly what purchasers, managers, and clinical practitioners do in response to competition that affects outcomes. Given the plausibility of both of the above possible outcomes, we believe that a key finding of these two econometric studies is that introducing patient choice for elective surgery in the New Labour market did not reduce quality elsewhere in hospitals.

Conclusions and policy implications

Like Le Grand,²⁰ we believe there are strong grounds for introducing patient choice into the NHS as an end in itself, given its potential to empower patients and give them greater control over the conditions of their care.^{w27} Gaynor et al¹¹ show that,

when patients were offered choice, they exercised it, and hence provide evidence of the desirability of patient choice as part of the policy mix on these grounds. Nevertheless, how patient choice has affected outcomes in elective surgery remains an open question; the exact role it should play in the policy mix is therefore unclear. Other open questions include: what is the cost effectiveness of competition, and how does this compare with other policies for increasing hospital quality? Furthermore, how might quality of care be improved in rural areas (eg, Cornwall)⁴ where competition is unalterably weak, or for types of care for which it is more difficult to design effective competition? More research is required before conclusions can be drawn about the effect of recent reforms on hospital quality, let alone about the merits of Mr Lansley's proposals further to extend competition.

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Contributors and sources: GB published, in 1984, a paper proposing that the funding of NHS hospitals would follow choices made by GPs in a simulated market and was part of a team evaluating the extension of general practice fundholding in the 1990s. He was director of the Office for Information on Healthcare Performance at the Commission for Health Improvement prior to its abolition in 2004; he had lead responsibility for CHI's analyses that informed reviews of clinical governance and its contribution to, and development of, star ratings of the English NHS. MS is conducting research on the impacts of markets on provision of public services. GB took the lead in describing the structure of the two markets and reviewing studies of their impacts on the different players. MS took the lead in reviewing the econometric studies. GB is the guarantor.

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Tables

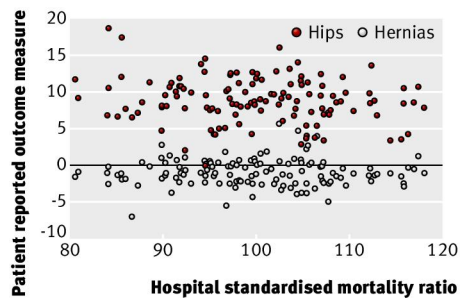
Table 1 Structure and regulation of the two English hospital markets

	Internal market (1991-97)	New Labour market (2002-09)
Providers	Directly managed units NHS trusts Private providers	NHS trusts From 2003, independent sector treatment centres From 2004, NHS foundation trusts From 2006, private providers (subject to conditions)
Purchasers	Health authorities Varieties of general practice fundholding	Primary care trusts From 2006, practice-based commissioning
Patient choice	None	From 2006, the "Choose and Book" system enabled patients to choose between providers
Prices	Not publicly known (except for extracontractual referrals)	From 2004, fixed hospital prices were introduced under Payment by Results
Quality	Information on waiting lists but not on outcomes such as hospital mortality rates for acute myocardial infarction	From 2007, the NHS Choices website provided limited information on quality to help patients choose
Regulation	NHS hospitals required to avoid deficits Purchaser efficiency index: health authorities required to reduce costs per episode by 3% a year No external regulatory oversight of quality	2002 to 2005: inspection of NHS hospitals for implementation of the systems and processes of clinical governance and publication of aggregate performance in annual "star ratings"; private providers subjected to registration requirements and regular inspections 2006 to 2009: annual publication of performance of NHS hospitals in the annual "health check" in two domains, finance and quality, backed by "light touch" inspections; foundation trusts were also regulated by Monitor; private providers subject to registration and "light touch" inspections

Table 2 | Studies of competition in the English NHS

Study	Reform	Main measure(s)		Years studied*		Main findings
		Degree of competition	Quality	Treatment	Control	
Propper et al ⁸	Internal market	No of hospitals within 30 minutes' drive (including controls for population density)	30 day in-hospital mortality rate for acute myocardial infarction in over 50s	1995-6 to 1997-8	None	Increasing competition from the 25th to the 75th percentile increases mortality rates by 1%
Propper et al ⁹				1992-3 to 1996-7	1991-2, and 1997-8 to 1999-2000	Hospitals exposed to competition increased elective admissions and decreased waiting times but had increased mortality. Overall effect was to save 1.32 million person months of waiting time, and lose around 11 800 life years due to earlier death. Costs exceed benefits on any reasonable valuation
Cooper et al ¹⁰	New Labour market (patient choice)	Various GP centred HHIs: area encompassing 95% of general practice's patients (actual and predicted patient flows); hospitals, within a 30 km radius and 30 minutes' drive	30 day in-hospital mortality rate for acute myocardial infarction	April 2006 to Dec 2008	Jan 2002 to March 2006	A one standard deviation increase in competition led to a 0.31% fall in mortality annually between April 2006 and December 2008, off a 2005 baseline of 13.96%. Overall effect was about 300 fewer deaths from acute myocardial infarction a year
Gaynor et al ¹¹	New Labour market (patient choice)	Hospital centred HHIs using patient flows predicted on basis of exogenous hospital and patient characteristics	30 day all location mortality rate for acute myocardial infarction among 35-74 year-olds 28 day in-hospital all cause mortality rate	2007-8	2003-4	A 10% fall in the HHI decreases acute myocardial infarction mortality rates by 2.91% and all cause mortality rates by 0.99%. This implies a 0.3% decrease in the average hospital's mortality rate, or around 4800 life years saved
Bloom et al ¹²	New Labour market (selective contracting)	No of hospitals within 30 km radius	28 day in-hospital mortality rate after acute myocardial infarction Management quality (from survey)	2005-6	None	Adding a rival hospital increases management quality by 0.4 standard deviations and decreases mortality rates by 9.5%

Figure



Relation between hospital standardised mortality ratios and patient reported outcome measures for hernia repair and hip replacement surgery in English NHS hospitals^{w13 w26}