

‘Hospital mergers increase death and harm’? Not so fast...

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Summary

Encouraging competition for clinical care in the NHS has been a major feature of policy over the past 30 years to improve performance in the NHS. The policy is contentious and hotly debated, yet might have benefits. Good empirical evidence on the impact of competition in the NHS is crucial to chart future policy, and for national bodies such as the Competition and Markets Authority (CMA) to regulate effectively. Informed and evidence-based coverage of findings reported in the press on the NHS's competition strategy is also critical.

In February 2019 the CMA published a working paper on the impact of hospital competition on rates of patient harm in the English NHS entitled *Does hospital competition reduce rates of patient harm in the English NHS?*¹ While the CMA regularly publishes its own research as working papers that do not necessarily inform the CMA's approach to regulation, the conclusions of the working paper in question were reported widely in the press at the time, and cited in the CMA's evidence to the Health Select Committee on the subject in March 2019.² However the central conclusion of the working paper – that the research provides 'further empirical evidence that competition ultimately benefits patients' – cannot be substantiated from the analysis.

The five main reasons why, which are set out in more detail in the background section of this paper, are:

- an underdeveloped understanding of the context in which the NHS in England operates;
- an underdeveloped theory of change as to how competition might lead to better outcomes;
- use of suboptimal data;
- use of suboptimal methods;
- the conclusions drawn are unjustifiable from the methods or the results.

Of these the two very fundamental problems are as follows. First, quantitative researchers/economists using aggregate data sets are often very distant from the reality (context) in the NHS and may be using relatively narrow theoretical frameworks to construct studies that cannot easily be challenged by people (with more knowledge of context) outside that particular research or theoretical discipline. The risk is that the results of such studies show associations between competition and quality of care that are not causative, with the wrong conclusions drawn, and are used to shape policy inappropriately.

Second, the measure of competition used in this and similar studies is not a measure of competition at all, but of concentration – ie the number of hospitals that are geographically near each other. In fact, the terms 'competition' and 'concentration' are used almost interchangeably in the paper. So if a positive association between 'competition' and quality

of care is found, another way of interpreting the findings might be that more isolated hospitals have higher rates of patient harm or lower-quality care. There are examples of this throughout the NHS, including NHS Trusts in Mid Staffordshire, Morecambe Bay and the Isle of Wight. This may have nothing to do with the extent of competitive pressure, and more to do with its opposite, ie that there is less opportunity for staff in isolated hospitals to collaborate with other health care professionals locally (necessary for learning and professional challenge), or to attract high-quality staff, or ensure a reliable service because of funding pressures and staff shortages.³ The conclusions of the CMA working paper might equally be: 'a lack of collaboration between professional staff across Trusts is associated with lower-quality care'; or 'more isolated hospitals were not able to respond to a range of quality-enhancing policies (which may not include competition)'.

While no study in this area can attain perfection, rigorous well-designed studies to explore the impact of competition can overcome many of the shortcomings we have identified, are feasible and should be undertaken. This paper identifies how such studies might be strengthened, as well as the need for more research on a wider set of questions on how competition is working in the NHS and its impact.

After 30 years of policy in this area it is surprising how little we know about if, how, and in which contexts competition in health care 'works'. This is also the case for several other national policies aiming to enhance quality of care, such as closer integration of service planning and delivery, regulation, and financial incentives for quality. This creates a risk to future policymaking that is entirely avoidable and should receive much further attention.

Introduction

Current proposals to change NHS legislation have once again stirred up debate about the appropriate role of competition in the English NHS. Six years after the passage of the 2012 Health and Social Care Act, NHS leaders are proposing changes that would scrap the role of the CMA in regulating competition and mergers in NHS Foundation Trusts, and reduce requirements for the NHS to tender competitively for clinical services. The aim is to help speed up progress on implementing the NHS Long Term Plan – in particular the collaboration between providers necessary to strengthen integrated care. Responses to the accompanying parliamentary inquiry into the proposed legislative changes have exposed the divisions between proponents and opponents of competition in the NHS for clinical services and the evidence of its impact to date.

A good example of such responses occurred in February this year, when a headline in the media claimed *Hospital mergers increase death and harm, CMA study suggests*.⁴ This followed an empirical research study published in January 2019 by the CMA, *Does hospital competition reduce rates of patient harm in the English NHS?*, which estimated that a hypothetical future merger between two neighbouring hospitals would result in an increase in 41% of incidents of harm to patients and an increase in inpatient mortality. It further concluded that ‘... competition ultimately benefits patients’. This was met with an equally robust response elsewhere in the media that the conclusions were a bad case of ‘overreach’ and had failed adequately to take account of the real-world conditions in which the NHS functions.⁵

Why is the CMA’s research worth examining further?

Policies promoting competition have been a major feature of health policy. Encouraging market incentives in the NHS to improve the quality of clinical care, including competition for clinical care between NHS Trusts as well as between NHS and non-NHS providers, has been a key feature of national policy since the 1990s. Successive policies have aimed to create the conditions for competition to work, for example, developing new ways of paying NHS Trusts for care; promoting choice of care for patients; encouraging independent sector providers to compete for NHS-funded care with the NHS providers; developing publicly available comparative information on the quality of care offered by NHS Trusts; and developing regulatory oversight of competition. These policies were consolidated in the 2012 Health and Social Care Act and are still operating.

The CMA is responsible for overseeing all proposed mergers involving NHS Foundation Trusts; the 2012 Health and Social Care Act built on previous policies in relation to competition and mergers. The Act also significantly altered the regulation of competition and mergers by moving it from sector-specific oversight by NHS bodies and placing it within the remit of national competition regulation law, under the control of the CMA.⁶ The CMA’s remit

currently includes the review of all proposed mergers involving NHS Foundation Trusts (assessing the potential for benefits to patients relative to a potential loss of benefits arising from reduced competition) and the power to block those mergers where insufficient evidence of patient benefit has been demonstrated. To date the CMA has allowed all the NHS mergers it has considered, with one controversial exception: the proposed merger between the Poole Hospital NHS Foundation Trust and the Royal Bournemouth and Christchurch Hospitals NHS Foundation Trust.⁷ NHS England is proposing new legislation to remove this aspect of the CMA's function to review mergers involving NHS Foundation Trusts.⁸

The empirical evidence of the impact of competition specifically on the performance of NHS Trusts is to date mixed,^{9,10,11,12} and existing studies have limitations that make it difficult to interpret the results.^{12,13} At the same time, evidence on the impact of NHS Trust mergers on quality of care is also mixed^{14,15,16}.

The CMA working paper concluded that 'competition ultimately benefits patients'. Yet the working paper has many weaknesses, casting doubt on the conclusions and leaving us no clearer in understanding about the relationship between competition and quality of care. The CMA's paper and other econometric studies in this field use sophisticated methods to try to control for factors beyond competition that might impact on quality of care. However, without knowing more about how and why competition should affect the outcomes under investigation (such as harms in hospital, or mortality among emergency admissions), and how competition and incentives play out in practice, it's difficult to know what the evidence is really telling us.

While the working paper notes in a footnote that '... any opinions expressed may not necessarily represent the views of the CMA', it was nevertheless published by the CMA, is on record, and has been cited as evidence to support the encouragement of competition in health care policy.

This paper has two objectives. Because of the CMA's standing as a regulator, we first look in more detail at the recently published working paper to examine whether the claims that 'hospital mergers increase death and harm' and 'competition ultimately benefits patients' can be made with any confidence. We conclude that they cannot. The second objective is to outline how further investigation might be improved in future. We do this by examining the approach taken in the CMA working paper, which is an approach shared across many similar studies on this topic.

Background

After 30 years there is a growing corpus of empirical quantitative evidence of the impact of policies promoting competition for clinical care in the NHS, much of it based on analyses of administrative data sets¹⁰ and published from the mid-2000s. The evidence, specifically in relation to the impact of competition on the quality of care, is mixed and inconclusive overall,^{9,10,11,12} with some studies finding improvements in some aspects of clinical quality in hospitals facing greater competitive pressure, while others find no change, or even deterioration. Other studies look at the impact of policies to increase patient choice of clinical care.¹⁷ However, where these studies do not also consider the impact of competition, we have not examined them in this paper. In respect of the evidence of the impact of competition policies, we would argue that there are at least five reasons for the mixed picture from these empirical quantitative studies:

- **Underdeveloped understanding of the context within which the NHS in England operates:** Many empirical studies are carried out using aggregate data, and are strongly framed with reference to economic theory and policies aimed to enhance competition. There is very limited exploration of other national or local policies and factors that may also be operating to affect the outcome of interest – ie quality of care – yet these policies and factors may have a stronger influence on the quality of care for patients than competition policies. Such studies do attempt to control for some of these policies and factors, but they are not comprehensive.
- **Underdeveloped theory of change:** This relates to the first reason above. Plausible theories on the mechanism by which specific types of competition between providers for the clinical care of patients might alter the behaviour of clinicians, managers and patients to impact quality of care within the NHS are often absent. For example, while competition policy has focused on elective/planned care, many empirical studies on the NHS have examined the impact on patients admitted to hospital as emergencies.
- **Suboptimal data:** The range and quality of data used to measure the extent of competition, contextual factors and outcomes (ie the quality of care) are often suboptimal – for example, measurement of clinical outcomes for patients is particularly weak.
- **Suboptimal methods:** Examples of methods that are often suboptimal include: the actual measurement of competition and how it changes; how other factors that may have a larger impact on quality of care for patients than competition are analysed; and accounting for ‘endogeneity’. Endogeneity concerns how factors such as concentration measures are influenced by unobserved or (in modelling) unaccounted-for drivers of outcomes (such as harm or other quality measures). One example of endogeneity is the reverse possibility that quality of care might drive competition, not the other way around.
- **The conclusions drawn may be obviously unjustifiable:** For example, some studies take snapshots in time (are cross-sectional analyses) yet postulate longitudinal associations that are unjustifiable; and associations between measures of competition

and quality of care are frequently assumed to be causative (or 'causal' as used in economics literature).

It is critical that research on such an important question as the impact of competition on quality of care should be as rigorous and objective as possible, especially if it is to help shape future policy. Below we look at the working paper published by the CMA, structuring our findings around the five reasons noted above. We begin with an outline of the paper.

The CMA working paper

The CMA working paper summarises the findings of previous similar academic work in the UK and concludes that, to date, ‘the literature generally (but not exclusively) suggests that competition can improve market outcomes’.

The paper examines the extent to which levels of ‘competition’ experienced by NHS Trusts in England in the two-year fiscal period from 2013 to 2015 had an impact on the quality of care for patients. In doing so the authors seek to make two further contributions to the literature: an assessment of the impact of competition on what they describe as a ‘new and broader dimension of quality’, ie four specific and common harms to patients; and an analysis of these harms by reference to eight clinical departments within NHS Trusts (rather than across whole Trusts) to be able better to control for unobservable confounding factors in clinical departments that may influence quality. The authors of the paper selected the period of 2013-2015 because policies on choice and competition were thought to be well developed by then, and the period preceded ‘supply-side pressures’, which have emerged since.

The paper uses two standard measures of competition from economics literature: the Herfindahl-Hirschman Index (HHI); and fascia count. Both take into account the number of NHS and independent providers (the latter accounted for only 4.2% of admissions in the study data series) falling within each clinical department’s catchment area.

As explained above, the authors measured quality of care in the two years under study by reference to four clinical outcomes (‘harms’): the number of in-hospital falls; pressure ulcers; venous thromboembolisms; and urinary tract infections. All four outcomes are combined into a single indicator of ‘harms’ (or adverse events). They investigated these harms for patients admitted in eight clinical specialties: gynaecology; maternity; oncology; general medicine (‘medical grouping’); orthoptics and ophthalmology; trauma and orthopaedics; urology; and general surgery (‘surgical grouping’); and measured the for patients admitted as emergencies and elective admissions combined. The paper examines the variation in the point prevalence of harms across these eight departments within Trusts, as well as across Trust sites. The former allowed the researchers to control for unobservable factors within hospitals that might affect the probability of one of the four ‘harms’ experienced by patients.

The authors used standard econometric techniques (ordinary least squares linear probability model) to assess the impact of competition on the probability of a harm, after controlling for some of the main measurable confounding factors. These include:

- at patient level: age, gender, and comorbidities
- at specialty/department/ward level: number of patients treated in the same ward or department, average rates of comorbidities, emergency admissions, average resource intensity of procedures received, whether the ward or department treats

patients in the community, percentages of patients having a pre-existing diagnosis of pressure ulcers, UTIs or blood clots on admission, and specialty fixed effects (to control for other non-measured factors)

at NHS Trust level: 'fixed effects' by calendar quarter (to control for non-measured factors such as the quality of hospital buildings, deficits or management experience).

The authors acknowledge that 'there remain some unobservables' but state that the various specialty-level and Trust-level fixed-effects variables control for any systematic differences. They also note that, insofar that the impact of national initiatives on harm reduction and data recording of harms may vary by department, some department-specific variation may remain. The authors make the explicit assumption that 'any residual variation is not correlated with concentration, conditional on all the other co-variates'.

The authors carried out a series of sensitivity analyses to check the robustness of the models used. In addition to using the standard OLS model for the analyses, they also attempt to account for the possibility of endogeneity using an 'instrumental variables' approach to the fascia count measure (see appendix 1).

The OLS analysis did not show a significant relationship between the HHI measure of concentration/competition and quality of care. Using the fascia count measure and the standard OLS model, the relationship between concentration/competition and quality of care was small. But using the IV analysis the research finds a significant negative correlation between competition and harms – in other words, the lower the level of competition experienced (by clinical departments in an NHS Trust and by the same clinical departments in other providers), the greater the probability of harm to patients. The researchers conclude that competition ultimately benefits patients, and that mergers can lead to harm.

Critique

Below we offer a critique of the CMA working paper grouped into five areas: context in which the NHS operates; plausible theories of change; quality of the data used; quality of the methods used; the justifiability of the conclusions to the study.

1. Context in which the NHS operates

While the CMA working paper acknowledges ‘a range of other factors’ are important in driving up quality, like many other similar studies the paper is weak in taking account of the context in which the NHS was operating over the two-year study period from 2013 to 2015. While the authors do use standard measures in the analysis to account for these factors (as ‘fixed effects’ variables), the work could be stronger in taking account of context in two key ways. First, a better understanding of context would have helped to question the assumptions (and theory) on which the study was based. This in turn would have influenced the study’s original design, as well as temper the strength of the conclusions implying a causative relationship between competition and quality of care. Second, some contextual factors are measurable and could have been included separately in the modelling rather than grouped together as ‘fixed effects’.

Important policies affecting context may have a significant influence on whether competition was in fact occurring in reality, as well as on the incidence of the four harms measured at specialty level within a Trust. For example:

- **Financial pressures:** The authors assert that ‘the NHS was not subject to the degree of supply-side pressures faced by the service in the years immediately following’ the study period. While it may be true that the financial pressures have increased since 2015, they were already in evidence during the period of study.¹⁸ By the end of the financial year 2014/15, 48% of NHS Trusts in England were in deficit, and 26% in the previous year.¹⁹ These financial pressures may have had differential effects across Trusts and on specific clinical departments within them that could plausibly relate to the degree of concentration of harms occurring in the Trusts/clinical departments.
- **Extent to which hospitals had the capacity to compete:** The financial context is crucial to understand whether hospitals would be in a position to respond to theoretical financial incentives. The authors do note that many hospitals in the study period would be working at full capacity (for example, high bed occupancy, and with elective ‘order books’ completely full) with no slack to respond to extra demand across many if not all specialties. The authors however did not fully explore the financial incentives used to attract more patients: for example, for some hospitals, and for some treatments, the national tariff paid is less than cost, and so there would be a disincentive to attract more demand; and NHS purchasers have fixed budgets and cannot fund above a certain level

of demand. Furthermore, there may be different incentives for tertiary hospitals, which may face stronger incentives than acute Trusts to compete for patients needing specialised services, which are not always funded according to a national tariff.

A hospital's capacity to expand to attract extra demand is also limited by strict national controls on capital spending, as well as the challenges of recruiting the necessary staff, even for hospitals rated as 'outstanding' by the Care Quality Commission (CQC). Even if there were some conditions for competition (as measured to an extent by the HHI and fascia count), the authors did not address whether competition was occurring in reality. The analysis included elective (planned) and emergency admissions combined, yet policies to increase hospital competition from the mid-2000s were aimed at stimulating increased activity and quality only in elective procedures.

- **Strengthened regulation of quality of care:** Since the publication of the Francis Inquiry in 2013, regulatory authorities have increased their focus on improving patient safety, information on the quality of clinical care, and the reporting of harms in hospitals. For example, during the period under study, the CQC, as national regulator for quality of care, undertook the first-ever comprehensive inspections of acute hospitals across England (beginning in September 2013 and rolling out across Trusts thereafter).²⁰ The CQC took strong action where it found failing Trusts, and, in some cases, differential action in particular clinical departments selected for deeper inspection and follow-up. The CQC inspections placed a strong emphasis on safety, and also assessed the quality of data the Trusts collected on harms. As a result, these inspections are likely to have had an effect on reporting, so that staff engagement in improvement programmes are expected to be described in these reports and seen in action by the CQC in some clinical departments.
- **Regulation on the quality of management and performance:** Another regulator – NHS Improvement – took strong action on Trusts with failing performance during the study period, such as deterioration in financial performance; and failure of a Trust to meet the constitutional national targets (the four-hour standard to be seen and treated in A&E, cancer waiting times, and waits for elective care). Other factors that have a bearing on the risk of the four harms to patients, and which the CMA working paper does not discuss, include the shortage of nursing staff at the time, which varied from Trust to Trust as well as from department to department and from ward to ward within the Trusts. Nursing shortages, reliance on agency staff, and the quality of nursing are known to be particularly problematic in rural and isolated hospitals that, by virtue of their location, face less competition. Again, some of this is measurable but not taken into account in the paper.
- **Impact of mergers on management focus:** The authors note there have been very few mergers between NHS Trusts in the past few years (ie over the period of study). But where they have occurred it is well known that the performance of the Trust can dip as

management time is distracted due to managing the organisational merger rather than improving quality. The dip can occur for over a year, depending on the extent of the management task. This suggests that the process of merger might be associated with short-term deteriorations in quality, with improvements taking a while to emerge. This possibility can be explored only if data are examined over a longer time frame. These issues were not adequately taken into account in the analyses.

- **Other factors influencing quality:**

- Volume: The authors selected specialties that included cancer, stroke and vascular services. In each of these areas there is good evidence that higher volumes are associated with better outcomes.²¹
- Professional collaboration: On recognising that low volumes of particular treatments may lead to worse outcomes for patients neighbouring hospitals/Trusts have increased levels of collaboration between themselves through, for example, strong professional clinical networks rather than mergers. Collaboration is likely to be easier in areas of higher concentration. If this occurred, the authors would be falsely attributing higher quality to greater competition when the true mechanism is greater collaboration.
- Partnering for improvement: There is now strong evidence that major improvements in quality of care in the specialties selected have occurred through specific national interventions, for example through mergers/acquisitions or joint management (partnering) arrangements. Examples include Frimley Park/Wexham Park Hospitals, the University Hospitals Birmingham NHS Foundation Trust/Heart of England NHS Foundation Trust, Salford/Pennine Acute Hospitals and Western Sussex/Brighton Hospitals. Some of these occurred during the study period but again are not mentioned or measured in the paper. In each case, according to the CQC and NHS Improvement, the key factors improving the quality of care for patients were strong leadership and good management. One measure of this is the 'well led' scoring as assessed by the CQC of each Trust, and within several sectors within a Trust.
- Professional intrinsic motivation: On the supply side, empirical papers on competition found in the economics literature generally look at competition in or for a market; in other words for financial resources or 'economic rent'. Underexplored in this literature is the power of competition created by professionals who want to achieve reputation rather than economic rent, for example to become the best quality unit, to be at the frontier of developments in a specialty, academic research area or professional college, to lead a network of professionals, or simply to strive for good job satisfaction. All of these ambitions may exert a strong impact on the quality of care for patients. These factors are very difficult to measure empirically but academic

studies could chart this terrain and, in doing so, some measurable factors may be found even if they may be indirect and proxy.

On the demand side, factors not taken into account or discussed include the extent of, or changes in, the funding and availability of local authority funded adult social care available to patients between and within hospitals, which would be highly variable and affect the length of stay of older people in hospital, which would in turn affect the probability of harm. These factors would also have been influenced by wider policies implemented within the study period, such as the Better Care Fund (which aimed to reduce hospital admissions and improve transfers of care between hospitals and community settings). Another key demand factor largely unexplored is the extent to which patients are exercising choice, and if so how far this is due to the quality of care in a hospital. Most evidence²² shows that the strongest influences on patient choice are the advice of family and friends, the referring GP, ease of car parking, distance from home and ease of travel, and possibly waiting time for care – ie not the incidence of harm. The evidence also shows that in any event most patients choose their local hospital for care, in particular older patients and people from more socioeconomically deprived or ethnic backgrounds. Furthermore there is little evidence that NHS Trusts rated by the CQC as inadequate or requiring improvement experience lower demand from patients as a result.

Clearly many empirical studies do try to take account of some of these and other factors in aggregate in their modelling, for example through the use of hospital-level or specialty-level fixed effects and dummy variables to help control for ‘unobservable factors’. However such studies frequently don’t explore the range of plausible unobservable factors, and therefore the extent to which they can be controlled for by using the fixed effects and other co-variables, or the extent that residual variation may be correlated with the extent of competition/consolidation. The CMA working paper shares these weaknesses but does try to control for endogeneity (see below).

Underdeveloped theory of change

Most empirical studies analysing the impact of competition between NHS Trusts try to quantify the relationship between one variable (competition) and another (quality of care) while trying to control for all other conceivable variables (for example, using fixed effects variables). In doing so, many researchers acknowledge the ‘black box’ problem – ie what might be causing the found relationship between competition and quality. But these studies largely leave unexplored what is in the black box, ie the processes by which (a) different competitive stimuli (such as financial incentives or patient choice) might be working and interacting, (b) how these competitive mechanisms interact with other contextual factors (such as the social context within a hospital), and (c) how these competitive stimuli then might affect the delivery of clinical care on the ground. How these processes work (or a theory for how they could work) is often unspecified, and, where they are specified, are often unconvincing. This may be because empirical researchers have frequently approached the

study with a ‘top-down’ hypothesis constructed from economic theory (underpinned by implicit assumptions about the behaviour of economic actors), rather than with a ‘bottom-up’ approach, informed by the context within which the NHS actually operates.

We have already considered in the previous section some of the wider contextual reasons why a competitive stimulus from a market-style incentive may not be effective, or may be too weak to have any impact on the NHS because it is drowned out by other more powerful factors influencing the quality of care. But, assuming that the stimuli designed to generate competitive pressure are effective, how might this pressure plausibly have an impact on the quality of care, in particular the four harms measured in the paper? Mapping out plausible theories of change is likely to be a complex task to do fully. Here we consider three main mechanisms that go beyond those addressed in much of the literature relevant to the NHS.

First, it is worth considering at what level of an NHS Trust’s operations might a competitive economic stimulus have an influence if it is occurring. It is plausible that the board and senior management might want to maximise the income of the Trust by attracting more patients, and therefore actively seek ways to improve the attractiveness of the Trust to patients and their referring GPs. They might consider achieving this by developing and promoting features that patients prioritise, for example better transport to the Trust, accessible car parking and other ‘hotel’ and service-type attributes, such as cleanliness, friendliness and attentiveness of staff, lower waiting times for care, good communication, and efficiency. GPs and patients might also be attracted to the Trust more through better knowledge of and communication with the specialists, and more comparative information about better quality care, for example fewer harms, and better clinical outcomes, such as fewer emergency readmissions, better survival etc. In turn this overall better management might help clinicians provide higher-quality care to patients.

This seems to be the theory of change that the authors subscribe to. They speculate that ‘the mechanisms by which competitive incentives filter down to front line medical staff are not fully clear. As a result, competition could only have an indirect impact on the quality of primary interventions. By contrast, managers often monitor competitors and have clear incentives to respond where there is available capacity by improving processes to attract additional patients and therefore revenue. The effect of these improvements is likely to be manifested in our four harms indicators’. The authors thus consider incentives to medical staff, yet nursing staff may have more influence over the harms measured in the study.

The clinicians directly caring for patients may or may not be aware of a competitive stimulus on the Trust to improve care. The related question arises: If the quality of management of a Trust is in theory the main way that competition might stimulate improvement to care (which is a conclusion from other studies²³), what other factors in the NHS might have a more potent impact on management? Candidates might include the constitutional waiting time targets, or financial position, the related interventions by a regulator as outlined in the sections above, or ongoing training of managers. Given that clinical staff are the care givers

within the NHS, one might expect studies of competition to assess their awareness of the competitive stimulus (either directly or indirectly through pressure on them from management) and how this may or may not be influencing the care provided. Again this is unusual in empirical studies. While specialists and other clinicians may have an interest in working in a successful, growing and better-resourced clinical department, direct personal economic gain will not occur, because hospital clinicians receive a fixed salary. How plausible is it that competition over and above other factors directly improves the clinical care provided?

Second, we should consider the type of care that a competitive economic stimulus might impact. Given that across the NHS, boards and senior management have constrained resources (money, time, skills) it may be that a competitive stimulus would elicit a more targeted response by management on the specific areas of care on which that stimulus is acting. This response will be mainly, if not exclusively, focused on elective care. It would make sense for academic studies assessing the impact of competition to concentrate on these areas of clinical care, and yet many do not. One exception is the recent paper by Moscelli and colleagues from the University of York,⁹ which found as a result of competition a negative impact on the quality of care for elective hip and knee replacements, and an insignificant impact on the quality of care for elective coronary artery bypass graft (CABG) patients. They suggested this may be because hospitals were making a larger financial loss on treatment for hip and knee replacements relative to treatment for CABGs.

Third, we should also consider the type of outcomes, ie quality of care measures. For competition between Trusts to occur, one might expect the factors that affect the attractiveness of one Trust against another (to patients or GPs) to be at least visible and comparable. In the CMA study the outcomes selected were restricted to safety or adverse events: urinary tract infections, venous thromboembolisms, pressure ulcers and in-hospital falls. In the period under study by the CMA, information on these harms was not easily available to patients and it is unlikely that referring GPs would have had the time or inclination to find and use comparative data. Despite this the CMA paper states that the harms index ‘... is more clearly relatable to the impact of competition than those studied so far’. The basis for this statement is unclear.

Suboptimal data

The CMA paper restricts its focus to the four harms taken from the NHS Safety Thermometer. The advantage of this measure, according to the study, is that these ‘harms’ are a risk for almost everyone admitted to hospital, making them a generic measure of safety. The CMA paper states that ‘... this measure is more comparable across different care settings’.

The NHS Safety Thermometer survey tool was designed primarily to support local improvement rather than as a way of measuring performance across Trusts. Data on these

four harms are not considered to be highly accurate or comparable across Trusts, and furthermore cannot distinguish between elective and emergency activities. The 2013/14 annual report produced by the NHS Safety Thermometer states: 'The NHS safety thermometer was designed to measure local improvement over time and should not be used to compare organisations. There are differences in casemix and data collection methods that can invalidate direct comparisons across organisations.'²⁴

In 2017, the data set was declassified as an official statistic after a review by NHS Digital, which concluded 'that the voluntary nature of the collection and the lack of agreed standards for the collection make it unsuitable to be an official statistic'.²⁵

Even if the data were reliable, a wider set of outcomes would be preferable to take into account, for example, the effectiveness of clinical care (using data from the national clinical audits), which the CQC considers to be one of the key measures of quality (safety, effectiveness, experience).

Furthermore, as noted above it isn't obvious that information on harms was available to patients or GPs to influence the choice of where to go for treatment. The data for example are not available on the NHS website, and it is not clear from the NHS Safety Thermometer website how comparisons are made available locally, if at all. This means there is no direct mechanism to explain the relationship between the occurrence of 'harms' after admission to hospital and the extent of competition. Without this, we are left to interpret the results as an association, and yet the authors infer causality (see section on interpretation below).

Suboptimal methods

A serious weakness of the paper is that it uses just two years' worth of data, whereas most studies in this area use a much longer time series. With such a short panel, the modelling approach used cannot solve the time series problem. The reason for using a longer time series is that it might capture changes over time in the variables of key interest (harm, competition) and even better span a period when a bigger competitive stimulus was introduced, allowing for some form of before-and-after natural experiment. The authors note that, over the two years of study, nothing much changes with respect to policy (ie competition policy; they do not consider other policies, which may be quality enhancing), and there were not even many mergers between NHS Trusts. This means that because concentration measures are pretty constant over the two years of the study, we cannot tell whether the observed associations between the concentration measures (HHI and fascia count) are causal or due to other unobserved characteristics.

As noted above, the paper elides two concepts – competition and concentration – and does not always separate the two. The extent of competition clearly depends on a range of factors, such as the degree to which patients are able to exercise choice, the availability of information and the means by which to make a choice, the type of economic incentives and

regulation in place to support competition and choice, and the number, size and distribution of providers. The simple standard measures of 'competition' used in the paper are in fact only measures of concentration – the HHI and fascia counts – and make the assumption that more concentration (ie low fascia count) means less competition. But the authors do not test or question this assumption, or examine it in relation to specific sectors of care. Of course many other similar studies have used these same measures, but most have supplemented them with additional measures of competition, such as the introduction of patient choice or the expanding use of independent sector providers.

A potential strength of the paper is the analysis at department level, which potentially, as the authors state, allows them to 'exploit variation within hospital trusts across departments'. But the authors hardly exploit the analysis of the variation across departments within Trusts or examine the theoretical impact of competition at this level. For example, they barely assess how much competition a department faces, and do not analyse as fully as they could have the relationship between harms and the specialty (see the technical note on methods in the appendix to this paper). If some specialties face very limited competitive pressure but similar rates of harm, reporting the analysis by specialty could have provided a way of disentangling the harm-concentration relationship from other explanatory factors.

The authors use as their basic model a linear probability model at the patient level to capture the relationship between a binary indicator of patient harm and concentration in the catchment area of the patient's chosen hospital. The hypothesis tested is whether higher levels of concentration increases the likelihood of patient harm. A common concern in such outcome-concentration models is that the concentration measure is endogenous, ie that the concentration measure is correlated with unobserved or unaccounted-for drivers of harm.

The CMA paper does explore sources of this endogeneity by suggesting four hypotheses. For example, of the four explanations the first one is that a high-quality hospital might attract patients from farther away, therefore enlarging a hospital's catchment area and thereby increasing the fascia count (ie reducing the measure of concentration). The second explanation given is that low-quality hospitals might have a high fascia count (ie low concentration) if that low quality (such as relatively long waiting times) had attracted independent providers to compete for NHS patients. To help address endogeneity, the authors use a method of modelling called 'instrumental variables' (IV) to estimate the causal relationships because the more common ordinary least squares (OLS) approach to modelling can give biased results (see appendix).

The results of the modelling using HHI as a measure of concentration were not significant. But by using the fascia counts, the modelling results using the IV method contradicted the four hypotheses and so did not, as constructed, appear to work. This left the results from the OLS modelling, which did not take endogeneity into account and, if anything, would be expected to overstate the effect of concentration on harm. For more explanation, see the appendix to this paper.

The conclusions may be unjustifiable

The CMA paper draws confident conclusions from the quantitative analysis:

- 'We find that hospital mergers in concentrated areas without offsetting clinical benefits could significantly increase rates of patient harm.'
- 'Our paper contributes further empirical evidence that competition ultimately benefits patients.'
- '... our empirical work suggests that patient choice and competition between public hospitals can be an important driver of quality.'

Four issues with these conclusions make them unjustifiable as outlined below.

The first issue is the implication that *mergers taking place* could increase rates of patient harm. The CMA study was in fact a snapshot in time – a cross-sectional analysis – and not a study of mergers taking place over the period. Yet the authors postulate longitudinal associations that are unjustifiable. As noted above, the period under study was relatively quiet with respect to the number of mergers, and the CMA study itself did not focus specifically on hospitals that had undertaken a merger over the period. Rather, the analysis simply looked at how much concentration existed, and how far it was associated with patient outcomes (harms).

The second issue is the conclusion that mergers 'could *significantly increase rates of patient harm*'. The authors used 'could', and this should not be interpreted as 'did' (as was reported in the media). That is, the authors found an association between the concentration of hospital facilities and increased harms (even though the strength of that association, we argue, is overstated).

The third issue is the move from describing the association between concentration and outcomes, to making claims about competition and patient choice, and outcomes, which were not under study in the paper. Again this is not uncommon in similar studies. Greater concentration cannot be assumed to mean less competition.

The fourth issue is a lack of any further exploration of the (overstated) finding that greater concentration may lead to worse outcomes. For example, another way of interpreting the findings is that more isolated hospitals have higher rates of patient harm or lower-quality care – there are examples of this throughout the NHS, including NHS Trusts in Mid Staffordshire, Morecambe Bay and the Isle of Wight. This may have nothing to do with the extent of competitive pressure, and more to do with its opposite, ie that there is less opportunity for staff in isolated hospitals to collaborate with other health care professionals locally (necessary for learning and professional challenge), or to attract high-quality staff, or ensure a reliable service because of funding pressures and staff shortages.²⁶ The conclusions of the CMA study might equally be: 'a lack of collaboration between professional

staff across Trusts is associated with lower-quality care'; or 'more isolated hospitals were not able to respond to a range of quality-enhancing policies (which may not include enhancing competition)'.

How might research in this area be developed in future?

Studies on competition and outcomes

How research might be developed further given the experience of nearly 30 years of policy on competition in the NHS is a significant question, deserving a thorough examination of the literature on competition (and its gaps), factors shaping the 'supply' of research in this area, and how this research has been communicated. These questions are beyond the scope of this paper, but – because of their importance to future policymaking in the NHS – are questions the Health Foundation will be examining and publishing on in the next two years.

Our more limited analysis here was focused on five concerns common to the CMA working paper and some similar studies. From this we outline how researchers might develop a more meaningful investigation into this area in the future.

1. Start with context not just theory

Before designing a study, researchers should gain a far greater knowledge of the sector and how it operates in practice from the ground up, rather than relying on an abstract theoretical construct to test pre-conceived hypotheses, particularly using highly aggregated administrative data. This means that, ideally, researchers in health care should identify key informants who would also help to design the study. It would be advisable to use mixed methods – not just quantitative – take in a variety of national and local perspectives, and consider theoretical concepts outside of one academic discipline (economics). As with any research on health services, public/patient and clinician involvement would help ensure more meaningful and well-informed study design and interpretation are achieved.

2. Have a well-developed plausible theory of change

Following on from 1. above researchers might adopt a more sophisticated theory of change, which would help shape the ongoing investigation as well as the conclusions that can be drawn from the findings (particularly claims about causation). For example, studies might focus much more on elective care (which is plausibly more susceptible to influence from competition), and on more robust measures of impact (clinical outcomes). This would help to curb 'overreach', especially on politically contentious areas of applied policy such as competition in public services.

3. Define 'competition' clearly

The CMA study frequently conflated concentration and competition. "Competition" itself was not at all defined, but simply assumed to be a question of how many hospitals were in a

specified geographical vicinity. But competition itself as an active force is likely to have a number of other elements, such as: relevant information to patients, clinicians and managers; regulation to encourage competition; extent of and ability for patient choice; financial or other incentives to act on competitive pressures; supply-side flexibility to allow providers or services to expand to meet market demand; and so on. So one advance in research might be to construct a composite index of competition taking account of some of these factors, rather than rely on one metric. Similarly, more clarity is needed on the unit of analysis for understanding the effects of competition, as competition is likely to have different impacts across NHS Trusts, clinical departments, and sectors within the NHS such as community services.

4. Be much clearer about the weaknesses of the study and communicate them clearly

No study in this area can approach perfection, but it would help if readers (in particular policymakers or staff working in the NHS) could more clearly understand the assumptions underpinning the study, the methodological weaknesses of the approach, and the limits of the data sources. For example, measures of concentration do not necessarily indicate levels of competition. Cross-sectional analyses cannot confidently make longitudinal associations. Sophisticated modelling techniques have weaknesses in claiming causation. Unobserved and confounding variables may not be adequately described, or controlled for. These can be explained clearly for a wider audience, without obscuring points in technical jargon, especially if the findings have policy implications. The weakness of data sources needs also to be explained, acknowledged and, where possible, subjected to sensitivity analyses.

5. Be cautious with quantitative modelling

While it is important to account for possible endogeneity, the validity of instruments needs to be carefully considered, and ideally the robustness of the results to the choice of instruments should be established.

6. Be rigorous about conclusions and avoid ‘overreach’

‘Mergers harm’ may be a headline used in the media to encourage people to take notice of a study, but is likely to be very misleading. Authors should be rigorous to explore their own assumptions and inherent biases in the analyses and clearly explain them. More sophisticated knowledge of the health care sector and how it works in practice will mitigate the tendency to make overbold claims, and for journalists to amplify them.

Studies on competition in the NHS more widely

The CMA plays a beneficial role for the NHS in other areas – for example, in ensuring monopolies do not develop in the pharmaceutical industries supplying the NHS. But it is disappointing that the CMA chose to publish on this topic and at this particular time. Instead

there is a wider research agenda on the topic that the CMA could have set out and explored, which could have much greater relevance to the NHS. For example, we still lack a clear description of and quantification of trends and patterns in choice and competition. It would be useful to understand the divergence in regulated price levels in the NHS and unit costs that exist in a large share of Trusts, and quantify the related ongoing subsidies to Trusts in deficits and the relationship of both to the impact on competition and choice. It would also be interesting to see the CMA compare price-regulated markets with non-regulated markets for NHS-funded services, and Trusts' own use of private sector treatment capacity outside of the regulated tariff regime. Other research questions include: What is the extent of exit of private sector providers and what are the consequences on NHS markets?; and What is the impact of competition in labour markets and its impact on quality and productivity?

If the CMA retains its role in mergers and acquisitions and price regulation, then it will be important for it to address these wider questions in future to inform its decisions.

Conclusion

Encouraging competition for clinical care in the NHS has been a major feature of policy over the past 30 years. The policy is contentious and hotly debated yet may have benefits. Good empirical evidence on the impact of such policies is crucial to chart policy development in the future, and regulation by bodies such as the CMA. Good and informed coverage of such findings in the press is also critical.

The latest study published by the CMA on the impact of hospital competition on rates of patient harm in the English NHS shares weaknesses with previous studies of this kind. Its central conclusion that it provides 'further empirical evidence that competition ultimately benefits patients' cannot be substantiated from this study, for the reasons we describe. While no study in this area can attain perfection, rigorous well-designed studies to explore the impact of competition can overcome many of the shortcomings we identified, are feasible and should be undertaken. This paper identifies how such studies might be strengthened.

After 30 years of policy in this area it is surprising how little we know about the extent to which competition is working and its impact – such lack of knowledge is a risk to future policymaking that is avoidable. This raises more fundamental questions for the NHS as to how significant reforms are assessed, which the Health Foundation will be examining and publishing on in the next two years.

Appendix

Technical note on methodology, findings and conclusions

The authors estimate a linear probability model (LPM) at the patient level that captures the relationship between a binary indicator of patient harm and competition in the catchment area of the patient's chosen hospital. The hypothesis being tested is whether higher competition reduces the likelihood of patient harm.

The dependent variable in the LPM specification is a binary variable that takes value one if the patient experienced harm (falls, pressure ulcers, blood clots and urinary infections, which are all common across many in-patient treatments). The regressor of interest is the fascia count in the catchment area of the chosen hospital.* Under the above hypothesis, the coefficient on fascia count would be expected to be negative: more competition means less harm.

A common concern in such outcome-competition models is that the competition measure is endogenous, ie correlated with the regression error term, because the error term captures unobserved drivers of quality that are correlated with concentration.

The CMA paper provides a detailed discussion of possible sources of endogeneity (pp 19-21).

- (a) With regard to the demand side, the authors point out that endogeneity can arise because high-quality hospitals attract patients from farther away, thus enlarging the hospital's catchment area and thereby increasing the fascia count, ie concentration for high-quality hospitals as measured by the authors would tend to be lower than for low-quality hospitals. This source of endogeneity would stipulate a negative correlation between the fascia count and the regression error term.
- (b) Also on the demand side, an alternative mechanism might be that high-quality hospitals capture a higher patient density because quality dominates other salient attributes, and therefore high-quality hospitals would tend to have a smaller catchment area. While the logic of this hypothesis is unclear (as it seems to turn on quality, and consideration (a) above suggests patients would travel farther in response to high quality), it would suggest a positive correlation between the regression error term and the fascia count regressor.
- (c) With regard to the supply side, the authors focus on low quality as one rationale for hospital mergers. While the authors acknowledge there were not many hospital mergers over their observation horizon, this source of endogeneity would induce a negative correlation between the regression error term and the fascia count regressor.

* The authors also experiment with HHIs but results from the LPM regressions are not statistically significant. Therefore, I focus on the regression specification with the fascia count regressor.

(d) The fascia count regressor that the authors use includes independent sector treatment centres (ISTCs), ie for-profit hospitals that treated eligible NHS-funded patients. The authors point out that ISTC entry may be a supply response in areas around hospitals with long waiting times. If long waiting times are indicative of high quality, then this would induce a negative correlation between the regression error term and the fascia count regressor. If they are indicative of managerial problems and managerial problems were also associated with clinical problems, then this would induce a positive correlation between the regression error term and the fascia count regressor. So the effect of ISTC entry as a source of endogeneity is ambiguous.

So except for the somewhat opaque source (b) above and the ambiguous source (d) above, all the sources of endogeneity mentioned by the authors would suggest a negative correlation between the regression error term and the fascia count regressor. Consequently, one would expect the OLS estimate of the coefficient on fascia count to be downward biased.*

The authors use an instrument variable for fascia count. The method of instrumental variables (IV) is used to estimate causal relationships when controlled experiments are not feasible. IVs are used when an explanatory variable of interest is correlated with the error term, in which case ordinary least squares give biased results. A valid IV affects the explanatory variable but has no independent effect on the dependent variable, allowing a researcher to uncover the causal effect of the explanatory variable on the dependent variable. To construct the instrument, a discrete choice model is estimated at the patient level, using a common distance-based definition of choice set (footnote 45 in the CMA paper) and hospital attributes other than quality. The predicted probability of the chosen alternative is then used as a weight of the number of alternatives in the patient's choice set, and these weighted alternative counts are averaged to form the instrument. By construction, the instrument is uncorrelated with quality and correlated with fascia count.

Table 2 (p 26 of the CMA paper) summarises the estimation results. The authors emphasise (p 27 of the CMA paper) that the IV estimates are larger in absolute value than the OLS estimates. But if the instrument were working properly, then this would contradict the expected bias of the OLS estimator under the hypothesised sources (a), (c) and (d) above. Consequently it appears that the instrument used by the authors does not work.

As a result one is left with the OLS estimates. If the fascia count regressor is endogenous, then these estimates are biased downwards following the reasoning in (a), (c) and (d) above and the true effect is smaller in absolute value; and, if it is not, then they should form the best estimates offered by this analysis. In conclusion, in any event, the absolute value of the OLS estimates would have to be viewed as an upper bound on the absolute value of the true

* The issue of bias, testing for exogeneity and (over)identification is discussed in detail in: Beckert W. *A note on specification testing in some structural regression models*. Centre for Microdata Methods and Practice (CeMMAP); 2019 (www.ifs.org.uk/uploads/cemmap/CW2219_A_Note_on_Specification_Testing.pdf).

effect. Therefore the purported conclusions of the authors are based on estimates that almost certainly are invalid and overestimate the true effects.

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