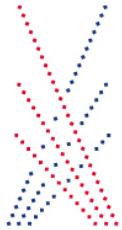

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Quality in Care: A study of Factors Impacting the Performance of Care Homes in an Evolving Environment

Abstract

This paper investigates management practices across a broad sample of care homes in the United Kingdom. It studies their determinants, and the relationship between such practices and care-quality outcomes. The results are confirmed using factor analysis, revealing that care quality is broadly associated with good management, but that some management practices are more relevant than others. Significantly, we found that although competitive pressure is indirectly associated with good care quality and good management practices, a direct negative association with the quality of resident care outweighs this positive association.

Keywords Social care; Care homes; New Public Management; Competition; Management practices; Performance

Introduction

Care homes and nursing homes are residential facilities providing care, primarily to older adults with chronic or long-term conditions. Approximately 25% of all people in developed countries can expect to require residential care at some point during their lifetime (WHO 2014). Like most developed countries, the UK population is aging rapidly, and The UK Office of National Statistics (2010) estimates that by 2034 the population older than 85 will double compared to today's numbers, reaching 3.2 million. As a result, the ability to provide high-quality care to a rapidly increasing number of people is one of the great challenges faced by our society.

The care home sector in the UK has also undergone significant change to its management and ownership over the last three decades, shifting from a primarily publicly owned and run model towards a model that emphasises private ownership and management with public commissioning of bed spaces (Bartlett & Phillips 1996; Simonet 2015; Comondore et al. 2009). The premise for such change was the theory of New Public Management and its implicit belief that private-sector management practices are more effective than those in the public sector (Dunleavy & Hood 1994; Andersson & Jordahl 2011; Simonet 2015). Yet few initiatives are based on a reliable evidence base (Calò et al. 2018).

This paper investigates the under-researched link between management and care quality in residential care homes, focussing on an adaptation of the approach introduced by Bloom and Van-Reenen (2007) to study manufacturing.

The econometric approaches employed (ordered probit, factor analysis, ordinary least squares) provide results which suggest that care-quality outcomes may be positively associated with the quality of management, but that this effect is not equally sensitive to all types management practices. More surprisingly, we find little evidence to support a direct

association between care-quality outcomes and a range of other factors one might expect to be relevant. Furthermore, with the exception of staffing intensity, the only other relevant variable with a statistically significant effect on outcomes is the manager's perception of competition – which perversely has a negative association. Further regression analysis of management quality against a range of variables indicates a number of statistically significant associations, indicating that these factors (such as management education, size, perceived competition) may have an impact on care-quality outcomes – but only indirectly through their effect on management.

The next section of this paper provides a more formal introduction to the care home sector in the UK and the prevailing model of provision, before introducing our research strategy and the nature of the data we analysed. This is followed by a description of the analytical results before a final discussion and conclusion with implications for policy and further research.

Background to New Public Management and care homes

Beginning in the 1980s, a burgeoning critique of public administration, felt across multiple sectors, challenged the existing care provision model in the UK with perceptions that public-sector productivity and quality management practices were worse than those in the private sector (Dunleavy & Hood 1994; Bartlett & Phillips 1996; O'Neill et al. 2003). Additionally, as part of the broader economic agenda at that time, it was proposed that the cost of public spending posed a risk of fiscal crisis, and that the expenses of the state were exceptionally oppressive to the economy (Girth et al. 2012; Baines & Cunningham 2015).

This dissatisfaction with public-sector performance drove governments to look for alternative public delivery models that could incorporate the innovation and efficiencies of the private sector. A common label for the diverse ideas and proposals designed to achieve this end was New Public Management (NPM), whose objective was to promote private-sector

management practices for public-sector organisations by separating policy creation and execution activities from service delivery, and by introducing practices such as competitive tendering and performance measurement (Dunleavy & Hood 1994; Hood 2007; Dan & Pollitt 2015). The adoption of best practices in private-sector management was encouraged, with the assumption that these practices were superior across the board to those developed by public agencies (Boyne 2002; Pollitt 2012).

Until the 1980s, care provision in the UK relied on a single provider model with more than 80% of adult residential care provided by the public sector. But this share has dropped sharply, with only 8% of available beds (a common measure of industry capacity) now provided directly by the state and an increasing emphasis on self-funded care (Barron & West 2017). In effect, residential and nursing care outside of hospitals in the UK has been transformed into a form of quasi-market, where the state retains its role as sole central funding authority for individuals eligible for state-supported care, but where service provision is provided by a range of different agencies from public, private and third-sector organisations serving both publicly-funded and self-funded individuals (Le Grand 2011). Under the driving assumptions of NPM, competition resulting from the introduction of multiple service-delivery agencies should improve management, innovation, and performance (Girth et al. 2012; Barron & West 2017).

There is evidence that the development of hybrid delivery models for public services can both reduce costs and improve performance outcomes (Andersson & Jordahl 2011; Forder & Allan 2014; Bovaird 2014). However, numerous studies point out the potential issues associated with this strategy. Andersson et al (2011) claim that the increased complexity of these arrangements require greater levels of regulation, and that their structural ambiguity tends to impose a condition of uncertainty. Other studies have highlighted that it can be difficult to evaluate the quality of service delivery in this sector (Girth et al. 2012), have identified the

perception that entering into a free-market economy is a 'Trojan Horse' for cost cutting (Baines & Cunningham 2015), and have shown that this type of model does not effectively anticipate change (Atkinson et al. 2018). Ultimately, the concern of most critiques is the lack of an evidence base to support NPM policy initiatives (Shine & Bartley 2011; Calò et al. 2018). This body of critical research provides the motivation for our appraisal of the association between management and care quality, and the drivers of good management.

Management and performance in care homes

There is an extensive body of evidence and knowledge, derived from the Bloom and Van-Reenen (2007) approach, which examines the link between management practices and performance, and suggests that good management is associated with lower costs and better quality (Bloom et al. 2006; Bloom et al. 2012; McCormack et al. 2014; de Waal & Kourtit 2013). This body of research has shown that differences in management practices can explain differences in performance. This type of qualitative investigation, focusing on the management practices and conditions affecting operational level management (rather than focusing on the strategic leadership or financial performance), provides a distinct and informative insight into potential drivers of improved organisational performance. It is particularly important because improvements to management behaviour can provide a more cost-effective and low-risk strategy for improving an organisation's efficiency and effectiveness, relative to strategies focusing on changes to material or staffing.

This operational-level research has been performed in a number of industrial sectors, such as manufacturing (Bloom et al, 2012), hospitals (Bloom et al 2017), universities (McCormack, et al, 2014), secondary schools (Bloom et al, 2015) and local government (Bourne et al, 2016). It has not, however, been applied in the care sector, which is distinctive due to its relative size, fragmented ownership structures, and the rapid pa e of change as it has shifted

from publicly owned and operated to predominantly the private provision of care (Barron & West 2017; Simonet 2015).

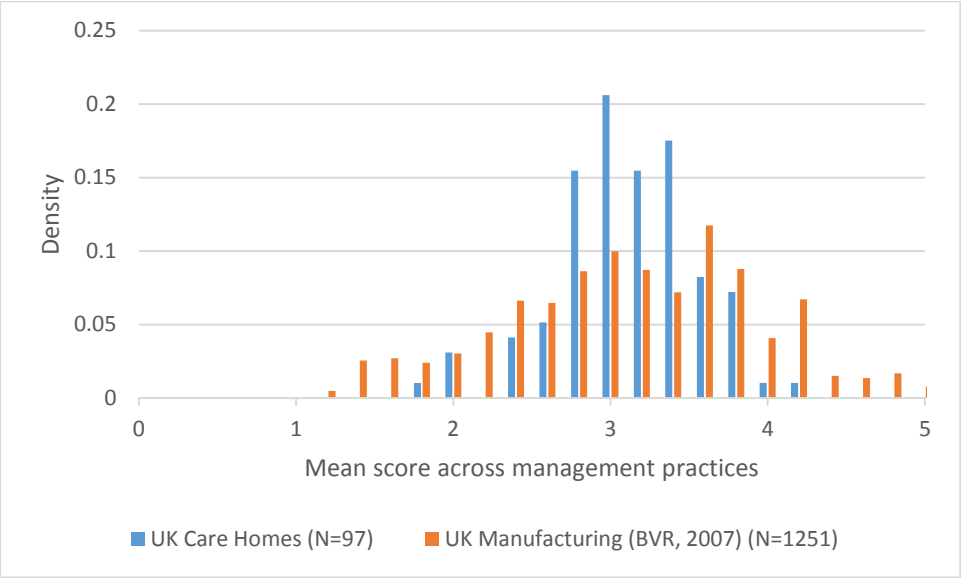

Figure 1Distribution of care home management practices compared to UK manufacturing.

Here we address this shortfall in research and contribute a number of findings, which improve our understanding of the link between management practices and performance in the care home sector. Our work draws on research carried out by the University of Bristol between 2009 and 2010, in which the approach of Bloom and Van-Reenen (2007) was adapted to the specifics of the UK care sector. This research yielded measures of management quality (Figure 1) in addition to a broad selection of relevant variables around home characteristics and market conditions. By categorising management practices on a scale of 1 (bad) to 5 (good), like previous studies in other sectors, the collected data suggested that the average quality of management follows a relatively normal-shaped distribution. Given the established association between management and performance in other sectors, such a management-score distribution would suggest there may be underperforming care homes, with clear implications for resource allocation and, of course, resident and staff wellbeing.

Like previous studies, herein we use a number of econometric approaches to measure the association between management data and the quality of care offered by homes, as well as

investigating potential drivers of good management. Next, we provide an overview of the dataset and its collection, before describing the analysis and its results.

Data and methodology

In this paper, we apply a number of regression techniques to discern the relationship between management and care quality, and to extract the determinants of management quality from a sample of 97 geographically dispersed UK care homes.[1] The data used in this empirical analysis are drawn from a number of sources, including a qualitative (and subsequently quantified) survey of care home managers carried out by the University of Bristol in 2010, and independent quality assessments from the Care Quality Commission (the UK's independent regulator of care homes). The following sections introduce this dataset, focussing on the method of collection of management data and the challenges associated with transferring techniques employed in other studies to the particularities of the UK care sector.

Evaluating management practices

The data on management practices in care homes were collected during 2009 and 2010 by researchers at the University of Bristol. The method of data collection follows and adaptation of the qualitative interview approach set out by Bloom and Van Reenen (2007) in their pioneering cross-country study of management practices in manufacturing. Using a panel of interviewers trained at the London School of Economics (which carried out the original Bloom and Van-Reenen study), the interviewed managers were asked a series of open-ended questions regarding everyday management situations within the home. Each of these

[1] Missing data for some other covariates lead to the minor attrition of this number under some econometric model specifications.

situations reflected a different, specific aspect of management.[2] In total, interviewees were asked 21 questions, associated with five key themes or characteristics of the management within the care home: leadership; lean management and processes; performance management; target management; and talent management.

Because the questions were qualitative and open-ended, the interviewer was required to award a management quality score of between 1 (lowest) and 5 (highest) to the response, where the allocated score was based on sample benchmark answers.[3] The themes are summarised in Table 1, which also provides descriptive statistics for each of the individual management practices. These statistics exhibit little variation between the mean scores for each of the management practices, suggesting there are few management themes where care homes, overall, had poor-quality management practices. Only question 15 (clarity and comparability of targets), and question 20 (retaining talent) produced a mean lower than 3, with the other practices achieving a mean score across all homes of 3–3.57.

Appendix B indicates relatively low levels of correlation between the different management practice scores. Therefore, if a care home received a high score for one practice, it did not lead to the automatic conclusion that it would score highly in other areas. The correlation between management-category means (Appendix C) exhibits a larger degree of correlation

[2] Managers were not told upon which specific aspect of management they were being examined, only instructed to answer the question as it was put to them.

[3] The full survey, with associated benchmark responses, can be found in appendix A, and the correlation matrix for the individual management practices within each care home is provided in appendix B. Appendix C examines the correlation matrix between the within-theme mean scores for each home.

between the intra-category means and the overall score, reflecting the smoothing effect of the aggregation of individual values within each category, which exhibited limited correlation.

Throughout our analysis, we frequently refer to the ‘overall management score’ for care homes. This is the unweighted mean of management scores across the different management practices. Similarly, any reference to category averages reflects the unweighted mean of practice scores for each of the individual management themes.

Table 1Summary statistics for management questions

Category	Question	Summary	N	Mean	Std. Dev.	Min	Max
LEADERSHIP/ VISION	Q1: Transformational Leadership, Vision and Strategy	Tests whether the agency has a clearly-defined "vision" and clearly-defined objectives, how the vision and the objectives are developed and how they are communicated within and outside the organisation	97	3.443	0.790	2	5
LEAN MANAGEMENT	Q2: Effective Care Management Processes and personalisation	Tests how the motivation and impetus behind changes to operations and what change story was communicated and how well the care management process is configured	97	3.186	0.565	2	5
	Q3: Rationale for introducing operational improvements	Tests motivation and impetus behind changes to operations and how the change story was communicated	97	3.247	0.764	1	5
	Q4: Standardisation and alignment of Case Management Processes	Tests how well processes are structured and standardised and how CMP is applied and monitored systematically	97	3.567	0.660	2	5
	Q5: Continuous improvement	Tests process for and attitudes to continuous improvement and whether there is a process for learning and for innovating	97	3.423	0.705	2	5
PEFORMANCE MANAGEMENT	Q6: Performance tracking	Tests whether performance is tracked using meaningful metrics and with appropriate regularity	97	3.412	0.774	1	5
	Q7: Performance review	Tests whether performance is reviewed with appropriate frequency and communicated with staff	97	3.454	0.722	1	5
	Q8: Performance dialogue	Tests the **quality** of review conversations	97	3.124	0.820	1	5
	Q9: Consequence management	Tests whether differing levels of (personal) performance lead to different consequences (good or bad)	97	3.361	0.739	1	5
TARGET MANAGEMENT	Q10: Target balance	Test whether there are meaningful targets for the organisation	97	3.021	0.829	1	5
	Q11: Target inter-connection	Tests whether targets are linked to overall objectives and how well they cascade down the organisation	97	3.268	0.848	1	5

	Q12: Time horizon of targets	Tests whether organisation has a rational approach to planning and setting targets	97	2.969	0.883	1	5
	Q13: Target stretch	Tests whether targets are appropriately difficult to achieve	97	3.031	0.742	1	5
	Q14: Clearly defined accountability of leadership for care home managers	Tests whether there are formal leadership roles and accountability for care home managers to deliver targets	97	3.237	0.851	1	5
	Q15: Clarity and comparability of targets	Tests how easily understandable performance measures are and whether performance is openly communicated	97	2.649	0.693	1	4
TALENT MANAGEMENT	Q16: Rewarding high performers	Tests whether good performance is rewarded proportionately	97	3.062	0.876	1	5
	Q17: Removing poor performers	Tests whether organisation is able to deal with underperformers	97	3.485	0.663	2	5
	Q18: Promoting high performers	Tests whether promotion is performance based	97	3.268	0.670	1	5
	Q19: Managing talent	Tests what emphasis is put on talent management	97	3.113	0.762	1	5
	Q20: Retaining talent	Tests whether organisation will go out of its way to keep its top talent	97	2.907	0.765	1	5
	Q21: Attracting talent	Tests how strong the employee value proposition is	97	3.330	0.688	1	5

Measuring performance

A central pillar in previous sector-specific studies of management practices has been the validation of the study by showing that, in the relevant sector, there is a positive correlation between management quality and performance. These studies have used a number of performance measures specific to their target sector. For example, Bloom and Van Reenen (2007) studied manufacturing and used labour productivity, return on capital employed (ROCE), Tobin's *q*, the probability of exit by a firm (on account of the panel data they had at their disposal), and also growth in sales. In the study of public-sector management, in which our investigation is seated, Bloom et al. (2015) used mortality from heart attacks[4] as a measure of hospital quality outcomes.

The care home sector is a regulated industry, and many of the organisations responsible for the management of care homes do not have a profit incentive. Thus, the metrics utilised in studies of industry are not appropriate. To remedy this, we follow Forder and Allen (2014) in using care-quality data from inspections carried out by the Care Quality Commission, which regularly assesses care homes to ensure they provide the expected level of care by assigning one of four overall care quality ratings equivalent to a four-point scale (*Table* 2) In the next section, in order to include quality in ordinal regression models, we have allocated each category an ascending numerical score between 1 (worst) and 4 (best).

[4] Acute myocardial infarction is a common measure when measuring quality outcomes in hospitals.

Table 2 Care Quality Commission (CQC) management scores.

CQC score	Frequency	Percent
Excellent	17	18.89
Good	54	60
Adequate	19	21.11
Poor	-	-
Total	90	100

Source: UK Care Quality Commission

Characteristics of care homes

In addition to information on management practices, the survey also gathered information on the characteristics of the care home and its patients. Descriptive statistics for these characteristics are shown in *Table* 3.

Table 3 Care home and patient characteristics. FTE = full-time-equivalent.

Variable	N	Mean	Std. Dev.	Min	Max
Number of beds	95	60.726	19.122	40	137
Occupancy rate (%)	96	91.260	11.398	53	100
FTE staff	97	26.082	28.230	3	150
Staff per patient	94	0.478	0.481	0.078	1.817

The number of beds was included as a proxy for the size of a care home, which varied between 40 and 137. The occupancy rate and the number of full-time-equivalent staff was used to create a variable for staffing intensity:

$$StaffPerPatient_i = \frac{FTEstaff_i}{(OccupancyRate_i \times Beds_i)}$$

A separate set of variables was established to describe the general nature of the patient population in each home, the distribution of which is indicated in Appendix D. This included the length of stay of the patients, and the proportion of self-funding patients at each home as opposed to state-funded care. Length of stay was included as a proxy to indicate the different types of care provided (temporary versus whole retirement, special care versus end-of-life). Half of the homes in the sample typically had permanent residents, but only a small number (13) had a short/medium-term patients. Self-funding was included as a proxy for the dependence of care homes on public funding, which might increase pressure on homes in times of austerity.

Previous work carried out using this tool has consistently identified a strong correlation between manager education and better management practices (Bloom & Van Reenen 2007; Bloom et al. 2012; Bloom et al. 2014; Bloom et al. 2015).We therefore included the education of the responding manager in some regression specifications. The distribution of this variable is also included in Appendix D.

Ownership

As stated above, since the deregulation of the care home sector there has been a marked shift in the type of organisations that run care homes. Laing and Buisson (2014) investigated elderly care and found that before 1975 private-sector provision of care was significantly outweighed by public provision, either through the National Health Service (NHS) or otherwise through homes owned and managed under the auspices of the local government. But since this time there has been a marked shift in the profile of providers of long-term care toward private-sector organisations, as also observed by (Barron & West 2017). Given that the ownership characteristics of care homes form one of the central tenets of NPM, we focus on three types of ownership: public sector, not-for-profit organisations such as charities, and for-profit private sector.

Table 4 Care Home Ownership

Ownership type	Frequency	%
Public	4	4.12
Not-for-profit	33	34.02
Private	60	61.86
Total	97	100%

As shown in Table 4, of the 97 homes in the working sample, more than half (60) are run by private companies, whereas 37 are not-for-profit organisations, only four of which are run by local government or NHS. The other not-for-profit homes are operated by a range of organisations including religions and charities.

Competition and the local market

One of the key issues considered by Bloom and Van Reenen (2007) was the impact of product market competition on both the performance and profitability of the firm, and also on the management practices employed. The inclusion of competition measures tests and controls for the broad hypothesis that a competitive environment is positively correlated with improvements in quality, thus driving improvements in both the adoption of progressive management practices, and also in the quality or efficiency with which the product is delivered. This theory also fits with the motives for the implementation of a NPM regime: competition should drive improvements in care home management and care quality.

Although Bloom and Van Reenen (2007) used import penetration and the Lerner Index as proxies for competition, there is limited comparability between care homes and the

manufacturing sector, in addition to limited information on price. Therefore, we have adopted an alternative range of measures for our investigation, as explained below.[5]

Table 5 Measures of care home competition. HHI = Herschman-Herfindahl index.

Variable	N	Mean	Std. Dev.	Min	Max
Number of competing orgs	95	80.32632	80.20657	6	320
HHI	95	368.6232	376.1347	42.22491	2081.734
Stated competition (min 1, max 10)	90	4.833333	2.619074	1	10

Spatial competition

We consider the raw number of alternative providers of residential social care within a radius of 20 km of the care home, calculated using simple postcode positional data. Spatial competition presumes that the more providers are present, the greater the competitive environment.

Market concentration

Table 5 uses Herschman-Herfindahl indices (HHI) to measure market concentration (in terms of the number of available beds within the same 20-km range) under the assumption that a higher degree of market concentration implies a less competitive market, as previously deployed by Forder and Allen (2014). This has an advantage over the basic measure of firm numbers in spatial competition, or over simple *n*-firm concentration ratios, because it expressly accounts for the size of firms (expressed as the number of beds) and thus shows whether the market is dominated by a small number of large providers or whether providers are relatively symmetrical in terms of capacity. Both HHI and spatial competition measures

[5] Note also that several care homes were lacking data for these measures of competition.

have their roots (and parallels) in the structure-conduct-performance (SCP) paradigm common in industrial economics.

Stated perception of competition

Finally, survey respondents were asked to state, on an increasing 10-point scale, their perception of the competitiveness of their local care home market. This has the distinction of not being subject to economic assumptions over the nature and observability of competition, but instead relies on factors that may be unobservable, or not captured, using conventional analysis. This may be prescient in the present case because different care homes may specialise in particular types of care, limiting the degree to which they can directly substitute for each other and thus leading to spurious conclusions when simple indicators such as the number of competitors (as above) are used as a proxy for competition.

Perceived competitiveness also captures the more holistic idea that competitive pressure is something that care home managers feel, and may be unrelated to competition as observable through simple metrics. This may reflect funding pressures, specific services offered by nearby care homes, or specific demographics (or other characteristics) of the local 'market'.

The next section verifies the positive association between management practices and care quality, before identifying the determinants of management practices in care homes.

Relationship between management and care quality

The adherence to NPM tenets in the oversight of UK care homes relies on the basic assumption that by adopting suitable management practices and internal incentive structures (akin to more conventional private-sector firms), coupled with a conducive external environment (market-style constraints and competition), organisations can boost their performance. In the case of care homes, such improvements would be evidenced by improved Care Quality Commission inspection scores.

As outlined earlier, there is solid evidence to support the presumption that management quality is positively correlated with outcomes such as productivity and quality in other sectors, but this relationship is not so clear in the case of care homes. Given the novel application of the management scoring interview approach to care homes, it is particularly important to validate the findings of the approach by confirming that management is indeed associated with improved outcomes.

Ordered probit econometric modelling of care quality outcomes

Consider a basic model of care home quality, where outcomes are some function (f) of the characteristics of a care home, its staff and their training, patients, and the market in which it operates:

$$Quality = f(Management, Ownership, Market, Manager, Patients, Physical, Staffing)$$

In keeping with previous studies of outcomes in care homes (Forder and Allen, 2014), the categorical nature of the dependent variable is accommodated by using an ordered probit approach to estimate a series of model specifications around the relevant factors discussed above. Such an approach allows the control of other factors that might affect quality outcomes, so it becomes possible to isolate the association of the sophistication of management practices with care quality outcomes.

The relationship between management practices and care home quality

The results of the initial ordered probit regressions to determine correlations between the strength of management practices and observed quality are shown in *Table* 6 and accompanied by descriptive statistics. These consist of the log-likelihood and the P-value associated with each regression, as well as goodness-of-fit statistics: pseudo-R^2 and Akaike's Information Criterion (AIC). In all cases except those defined as categorical in nature, the

regression limits scaling issues through the use of standardised z-scores for the included variables.

Table 6 Ordered probit quality regressions.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent variable	CQC Evaluation Overall Score (2,3,4)									
Overall management z-score	0.139	0.143	0.180	0.130	0.209	0.141	0.131	0.173	0.198	0.230*
	(0.121)	(0.134)	(0.128)	(0.124)	(0.132)	(0.124)	(0.126)	(0.126)	(0.171)	(0.134)
Public		0.271							0.0751	
		(0.691)							(0.957)	
Not-for-profit		0.0515							0.0781	
		(0.273)							(0.345)	
Private (base)		(omitted)							(omitted)	
Number competitors (z)			-0.134							
			(0.130)							
HHI (z)				-0.0414						
				(0.137)						
Stated level of competition (z)					-0.330**				-0.287*	-0.287**
					(0.136)				(0.159)	(0.139)
Manager Degree						-0.0213			-0.0289	
						(0.273)			(0.331)	
% Self paying (z)							0.0419		-0.0498	
							(0.125)		(0.144)	
Short-stay							0.142		0.0990	
							(1.219)		(1.343)	
Med-stay (base)							(omitted)		(omitted)	
Long-stay							0.114		0.361	
							(0.404)		(0.498)	
Permanent stay							0.340		0.556	

							(0.390)		(0.481)	
No. beds (z)								0.0160	0.0136	
								(0.125)	(0.144)	
Staff-per-patient (z)								0.244*	0.218	0.235*
								(0.128)	(0.153)	(0.134)
Constant cut 2/3	-0.816***	-0.791***	-0.816***	-0.808***	-0.866***	-0.831***	-0.579	-0.828***	-0.426	-0.873***
	(0.150)	(0.178)	(0.151)	(0.151)	(0.162)	(0.249)	(0.359)	(0.154)	(0.587)	(0.166)
Constant cut 3/4	0.884***	0.911***	0.880***	0.878***	1.014***	0.869***	1.156***	0.887***	1.475**	1.026***
	(0.153)	(0.182)	(0.154)	(0.154)	(0.169)	(0.250)	(0.368)	(0.156)	(0.595)	(0.174)
N	90	90	89	89	83	90	86	88	78	81
Pseudo R-squared	0.008	0.009	0.014	0.008	0.045	0.008	0.015	0.03	0.072	0.065
P>Chi2	0.250	0.681	0.306	0.496	0.034	0.515	0.792	0.171	0.401	0.021
Log-likelihood	-81.927	-79.846	-84.805	-72.797	-84.253	-83.77	-84.715	-84.808	-67.265	-70.364
AIC	175.616	179.431	175.54	176.506	153.594	177.61	173.692	173.854	160.522	150.728

Taking a hierarchical approach to model formation, specification 1 looks at the simple bilateral relationship between management and quality, whereas specifications 2–9 include (in turn) control variables associated with the themes of ownership, competition, managerial ability, patient characteristics, and home characteristics. Specification 9 features a fully-specified model with all of the control variables (with the exception of the competition, which uses only the stated approach), whereas specification 10 offers a parsimonious specification, which features only management, perceived competition, and staffing intensity as correlates of performance.[6] The various specifications are notable for a number of reasons:

[6] Specifications 9 and 10 were also estimated using the alternative measures of competition but, either independently or combined, they provide less explanatory power than stated competition alone.

First, the lack of statistical significance associated with many of the control variables is noteworthy and indicates a lack of systematic association between these factors and the quality of care provided. This result (or lack of) is persistent whether control variables are included individually or as part of a broader multivariate specification. It was possible to reject a null hypothesis of no association at any acceptable level of statistical significance for only two of the control variables: the level of competition (measured only via the manager's perception), and the staffing intensity (staff per patient) in the care home.

The second of these variables is intuitive because staffing levels in a care environment are naturally likely to affect the level of care provided to patients. On the other hand, the effect of competition presents an interesting result: Traditional measures of competition (the simple spatial measure, and market concentration measured by HHI) show no correlation with performance, but the interviewee's perception of competition proves to be statistically significant in any specification in which it is included, and negative. This result is striking, given that a central pillar of NPM is the association of competitive forces in driving positive outcomes. This result is discussed in more detail in the section Direct and Indirect Effects, below.

With regard to management, it is not possible to reject the null hypothesis of no association between management practices and competition, except in specification 10 where the null is rejected at a 10% level of significance. Specifications 1–9 suggest no association between management and quality, and their associated descriptive statistics indicate, variously, poor model fit, lack of explanatory power, and excessive noise in the models (as measured by AIC). Additionally, although we reject the null hypothesis for all covariates in specification 10, the low pseudo-R^2 statistic nevertheless suggests that there are likely to be other factors associated with quality outcomes which either cannot be measured, or otherwise are not present in our dataset.

In terms of the practical implication of this result, specification 10 suggests that, measured from the mean level, a positive change of one standard deviation in overall management practices (increasing overall management score from 3.22 to 3.67) is associated with a 6.05% higher probability of achieving the highest Care Quality Commission score, and 5.63% lower risk of being ranked in the second lowest category (no homes in the lowest Care Quality Commission category were included in the study).

Next we test the robustness of the relationship between management and care quality, through disaggregation of the management score and by investigating the possibility of reverse causality between care quality and management.

The relationship between care quality and selective management practices

The overall management score used in the regressions discussed above represented an unweighted mean of 21 individual responses to particular aspects of management, split over the five different themes. This approach, used in a number of papers including the original Bloom and Van Reenen (2007) study of manufacturing, raises a number of concerns.

The use of an unweighted mean implies the presumption that all management practices covered by the survey are equally important in the determination of care quality outcomes. This assumption should not be automatic, and the relaxation of belief in this assumption would lead the suggestion that homes may concentrate their efforts on those characteristics of management that are most effective in raising the observed quality.[7]

With specific reference to the present dataset, the limited correlation between each of the management practices (Appendix A) is likely to have a smoothing effect on the average

[7] Wilson et al. (2006) provide evidence indicating that UK secondary schools respond selectively to performance measures to maximise the efficiency of their investments.

score, limiting variation, and thus limiting the extent to which to which such a variable is informative. This section examines the association between management practices and care quality in more detail, using the management scores for each of the 21 practices and, subsequently, by applying factor analysis to identify themes therein.

Individual management practices and themes

Repeating specification 10 (*Table* 6) for each of the 21 individual management practices in the survey revealed only three aspects of management that are individually significant determinants of care quality: standardisation and alignment of case management processes; consequence management; and target balance (the presence of meaningful targets). All three are significant at a 95% level, but at such a granular level that it is impossible to rule out the risk of an omitted variable bias. These results are reported in Appendix E.

Repeating the above process for the five within-category average scores, statistical significance was found to be associated with only one category of management practices: performance management, i.e. those practices associated with monitoring and consequences of performance. It should be noted that if individual (disparate) management practices are associated with observed quality then the limited correlation between such practices combined with grouping by theme is likely to suffer from the same aggregation problems associated with the overall management score.

Factor analysis

The application of exploratory factor analysis relaxes the constraints associated with the use of individual management themes to group management practices and the implied smoothing of means that occurs with the aggregation of poorly-correlated variables. Principal component analysis of factor loadings using both orthogonal and oblique rotations yields two

highly correlated sets of five factors. Although the use of an orthogonal rotation ensures that multicollinearity is not present between the estimates of the different factors (permitting the inclusion of multiple factors as regressors in the same model), it requires that factors are perfectly uncorrelated. Alternatively, given that factor analysis permits the analysis of individually correlated sets of management practices, it is reasonable to suggest that at least some of these sets may be (at least partially) correlated, thus an oblique rotation is used to relax the restriction that identified factors should be perfectly uncorrelated.

Table 7 Factor associations for individual management practices (oblique rotation, correlation permitted).

Factor	Main variables	Relevant rotated factor loading
1	Q4: Standardisation and alignment of Case Management Processes	0.645
	Q6: Performance tracking	0.7804
	Q7: Performance review	0.5285
	*Q8: Performance dialogue	0.3853
	Q19: Managing talent	0.6536
	Q21: Attracting talent	0.5057
2	Q2: Effective Care Management Processes and personalisation	0.7142
	Q3: Rationale for introducing operational improvements	0.6957
	*Q8: Performance dialogue	0.3853
	Q10: Target balance	0.6738

	Q14: Clearly defined accountability of leadership for care home managers	0.4856
3	Q9: Consequence management	0.62
	Q11: Target inter-connection	0.6891
	Q12: Time horizon of targets	0.7049
	Q13: Target stretch	0.5552
	Q18: Promoting high performers	0.5035
4	Q1: Transformational Leadership, Vision and Strategy	0.7966
	Q5: Continuous improvement	0.5169
	Q17: Removing poor performers	0.5429
5	Q15: Clarity and comparability of targets	0.707
	Q16: Rewarding high performers	0.814
	Q20: Retaining talent	0.4646

* Note that Q8: Performance dialogue was equally associated with both factors 1 and 2

As stated above shown above in Table 7, the relaxation of the restriction that factors are uncorrelated is well justified in accounting for the likelihood that underlying factors influencing variation in management are unlikely to be perfectly independent. The correlation of these factors with overall management is between 0.78 for factor 1, and 0.47 for factor 5, and they exhibit an average inter-factor correlation of 0.27. Each individual management practice was most strongly associated with a single factor, except that pertaining to question 8

(performance dialogue), which was equally strongly associated with factors 1 and 2. Interpreting the association between the individual management practices and the identified factors, factor 1 could be interpreted as primarily relating to performance and the recognition of strongly performing staff members, whereas factor 3 appears to be primarily related to an appropriate target setting. The other factors are less well clearly defined. Factor 2 seems to relate most strongly to overall ideas of 'lean management', factor 4 is dominated by leadership and vision, and factor 5 relates to the comparability of targets and rewarding of high achievers. Given the rotated factor loadings and generating standardised z-scores for each of the factors, it is possible to observe how each of them is associated with care quality using the same parsimonious model as specification 10 (*Table* 6).

Table 8 Ordered probit factor-quality regression

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	CQC overall evaluation score (2,3,4)					
Overall management z-score	0.230*					
	(0.134)					
Factor 1 (Z)		0.235*				
		(0.137)				
Factor 2 (Z)			0.152			
			(0.132)			
Factor 3 (Z)				0.275*		
				(0.142)		
Factor 4 (Z)					0.101	
					(0.141)	
Factor 5 (Z)						-0.0757
						(0.133)
	-0.287**	-0.235*	-0.231*	-0.318**	-0.237*	-0.198

Stated level of competition z-score	(0.139)	(0.132)	(0.132)	(0.144)	(0.135)	(0.135)
Staff per patient z-score	0.232*	0.253*	0.210	0.225*	0.232*	0.225*
	(0.132)	(0.135)	(0.131)	(0.132)	(0.135)	(0.134)
Constant cut 2/3	-0.873***	-0.870***	-0.855***	-0.879***	-0.849***	-0.843***
	(0.166)	(0.165)	(0.164)	(0.167)	(0.163)	(0.162)
Constant cut 3/4	1.025***	1.029***	1.017***	1.032***	1.011***	1.015***
	(0.174)	(0.175)	(0.173)	(0.174)	(0.172)	(0.173)
N	81	81	81	81	81	81
Pseudo R-squared	0.0648	0.0649	0.0537	0.0706	0.0482	0.0470
P>Chi2	0.0208	0.0206	0.0443	0.0139	0.0643	0.0698
Log-likelihood	-70.364	-70.352	-71.195	-69.923	-71.612	-71.705

Table 8 restates the result of specification 10 in *Table* 6, rejecting the zero-effect null of management score at a 10% level. *Table* 8 also shows that the coefficients associated with factors 1 and 3 are positively associated with care quality at the same level of significance.[8] This suggests the selective result that effective performance review and talent management, and the setting of appropriate targets with promotion for high achievers, are most positively associated with quality, whereas other management themes are not.

Orthogonal rotation of the factors, given the imposed lack of correlation, resulted in a single dominant factor comparable to factor 3 in the analysis above.[9] This result is robust to its

[8] Inclusion of factors 1 and 3 in the same regression indicates the problem of multicollinearity between these factors. They are jointly significant (by way of a likelihood ratio test) but individually not significant at 90% or greater.

[9] This was identified as the second factor under orthogonal rotation.

individual inclusion in the above regression, or its inclusion with other factors. Although orthogonal rotation permits the inclusion of multiple factors as regressors in a single regression, the AIC result for such specifications suggested that the nested specification including only the main factor should be preferred to any model including multiple factors (on the basis that the inclusion of the additional factors does not sufficiently improve the fit of the model to justify their inclusion). These results are provided in Appendix F.

Reverse causality

Thus far, our results have focussed on and emphasised the notion of correlation over causality. One of the questions addressed by Bloom and Van-Reenen (2007) among others is the possibility that there exists an issue of endogeneity in the link between performance and managerial practices. Such reverse causality would mean that the productivity of firms might breed good or bad managerial practices, in addition to managerial practices creating successful firms. This would lead to overestimates and underestimates, respectively, of the impact of managerial practices on manufacturing productivity.

The concern in the care home sector is less-clearly justified from this perspective. The use of quality measures as an indicator of performance does not carry the same intuition over free cash flow elicited through productivity measures. However, there may yet be an issue because the logic with care homes is that poorer quality scores (which are publicly available) would motivate the adoption of strong managerial practices, whereas high scores might elicit an "if it ain't broke, don't fix it" approach that may suppress the adoption of managerial practices and thus lead to reverse causality, underestimating the impact of managerial practices on performance. The opposite would occur if buyers are sensitive to strong performance scores, thus enabling better-performing homes (as measured by the Care Quality Commission) to invest more heavily in potentially costly best-practice management.

To check for endogeneity, we carried out a two-stage regression using the same identification strategy later used in the estimation of overall management quality as an instrument for standard of managerial practices in the ordered probit framework used thus far. Although we observed a slight increase in the statistical significance of the (now instrumented) regressor associated with management practice, evaluating this using a Wu-Hausman test provided no statistically significant evidence that the phenomenon was due to endogeneity.

What determines good management?

Figure 1 demonstrates the variation between management practices across the care homes included in the survey (and in this analysis), although the distribution is tighter than observed in UK manufacturing. Although earlier sections of our paper provided some evidence of a positive association between the strength of such management practices and the overall performance of care homes, we now seek to understand the determinants of such a distribution of management practices in care homes.

Of particular interest herein is the effect of ownership on management practices. Whereas the original research using this tool investigated family ownership (Bloom & Van Reenen 2007), here we focus on the relationship between private, public, other not-for-profit ownership models, and their association with management strength. Management in the public sector may suffer a self-selection bias, in which high-performing managers receive higher return to their skills in the private sector, resulting in a poorer quality pool of managers in the public sector (Delfgaauw & Dur 2010; Jones 2015).

Methodology

Using the same set of regressors described in the Section “The relationship between management practices and care home quality”, this tests the hypothesis that the quality of management in a particular care home is some function of its ownership, the market in which

it operates, the skill of the manager, the type of patients it treats, and the characteristics of the care home in terms of size and staffing intensity:

$$Management = f(Ownership, Market, Manager, Patients, Physical\ and\ Staffing)$$

All relevant continuous variables are included as standardised z-scores (again limiting both scaling and censoring effects). In addition, a set of eight interviewer control variables were included in some specifications to control for the possibility of systematic differences in the scoring of management practices between the different interviewers employed in the project.

Because the dependent variable (standardised z-score of overall management) is continuous, it is not necessary to make special accommodations as per the ordered probit used above. Thus, a standard ordinary least squares approach is applied, first looking at bivariate relationships between each of the proposed regressors and management, and then testing a full multivariate model. The results are shown in Table 9 as both R^2 and adjusted-R^2 measures of fit.

Table 9 Ordinary least squares regressions of determinants of management.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent variable	Overall management z-score									
Public	-0.995**	-0.785							-0.968*	-1.124**
	(0.473)	(0.497)							(0.531)	(0.517)
Not-for-profit	0.726***	0.235							0.180	0.924***
	(0.198)	(0.368)							(0.419)	(0.211)
Private (base)	(omitted)	(omitted)							(omitted)	(omitted)

Number competitors (z)			0.189**							
			(0.0941)							
HHI (z)				-0.154						
				(0.0958)						
Stated level of competition (z)					0.274***				0.262***	0.250**
					(0.103)				(0.0979)	(0.102)
Manager Degree						0.768***			0.793***	0.618***
						(0.197)			(0.205)	(0.217)
% Self paying (z)							-0.0512		0.0692	0.0420
							(0.100)		(0.0943)	(0.100)
Short-stay							(no observations)		(no observations)	2.602***
										(0.900)
Med-stay (base)							(omitted)		(omitted)	(omitted)
Long-stay							0.218		0.676**	0.829**
							(0.347)		(0.326)	(0.334)
Permanent stay							0.135		0.827**	0.863***
							(0.343)		(0.323)	(0.316)
No. beds (z)								0.288***	0.161*	0.0646
								(0.0902)	(0.0919)	(0.0983)
Staff-per-patient								0.280*	0.489***	0.127
								(0.158)	(0.169)	(0.1000)
Constant	-0.206*	0.565	0.698**	0.737***	0.921***	0.382	0.620	1.031***	-0.0108	-1.536***
	(0.118)	(0.456)	(0.267)	(0.268)	(0.282)	(0.272)	(0.412)	(0.264)	(0.564)	(0.360)
Interviewer controls	N	Y	Y	Y	Y	Y	Y	Y	Y	N

N	97	95	93	93	88	95	90	92	81	83
R-squared	0.180	0.285	0.287	0.275	0.323	0.370	0.269	0.361	0.580	0.435
Adj. R-squared	0.162	0.21	0.22	0.206	0.255	0.312	0.176	0.291	0.476	0.356

Specifications 1–8 in Table 9 show the bivariate relationship between each of the regressor themes and the quality of management (with the exception of competition, where the measures are included separately). The distinction between specifications 1 and 2 demonstrates the importance of the inclusion of interviewer control variables. Specification 1 (without controls) shows a particularly strong relationship between ownership and management, but this is weakened when we include controls. This suggests a systematic bias associated with some interviewers.

Typical measures of competition have proven to be highly significant determinants of the strength of management practices in the study of more conventional industries, thus specifications 3, 4 and 5 investigate the three different measures of competition used in this study. Specification 4 indicates no significant relationship between HHI and management, whereas specifications 3 and 5 indicate it is possible to reject a null of no effect for both the raw number of competitors and managers' perceptions of competition at a 95% level.

Patient characteristics are not significant when viewed as the only regressors, but the education of the manager, staff-per-patient, and the size of the home all suggest some positive association with management quality (at respectively 95%, 95%, and 90% levels of significance).

Finally, the inclusion of all variables[10] in specifications 9 and 10 yields a model that accounts well for management quality, as measured by R^2. Coefficients for almost all included regressors demonstrate some degree of significance. As a test of robustness, specification 10 drops the interviewer control variables, resulting in a poorer fit compared to specification 9 (reiterating support for their inclusion).

Ownership and management

Focussing on specification 9, almost all estimated coefficients are positive and statistically significant (at either 90% or 95%). The exception is public ownership of care homes, which is associated with a lower average score for management practices.

Causality or correlation?

There persists the possibility of reverse causality in the above regressions that cannot be eliminated. It is entirely possible that care homes with better management practices are more likely to employ managers who hold a degree, meaning that this variable is not truly exogenous (this would overstate the significance of degree-educated managers in establishing better management practices). To a lesser extent, it is also possible to consider that *de facto* exogenous variables, such as the type of ownership, may hold some endogeneity if the private sector were permitted to purchase better-managed care homes from local authorities. The lack of available instruments to check for this means that such potential endogeneity should be borne in mind when interpreting these results.

Individual management practices

[10] Excluding HHI and number of competitors, both of which are statistically insignificant when included with other regressors.

Although specification 9 in Table 9 demonstrates a strongly fitting model, the issue of aggregation of relatively uncorrelated management practices remains a concern. Specifically, are all management practices equally associated with the included covariates, or is strong correlation between disparate individual practices affecting the aggregated results discussed above? To this effect Appendix G features specification 9 in Table 9 applied to all 21 individual management practices included as dependent variables.

As hypothesised above, the model varies across the 21 practices in terms of its ability to account for variation in the dependent variable, proving relatively effective at explaining variation (as measured by the adjusted R^2) in responses to questions 2, 4, 7, 9, 11, 12, and 20, but providing a relatively poor fit for practices associated with questions 6, 16, and 19. Logically, of the dependent variables associated with a well-fitting model, all (except question 20) demonstrate a relatively high degree of correlation, as featured in Appendix A. Responses to those questions which are poorly explained by the model show little correlation.

The results demonstrate the heterogeneity of associations between individual covariates in the model and individual management practices. The examination of management at such a granular level reveals that public ownership is significantly and negatively associated with three management practices: q3 – rationale for the introduction of operational improvements, q19 – managing talent, and q20 – retaining talent. Whereas questions 3 and 19 were poorly explained by the model, question 20 (retaining talent) was one of the management practices best explained by the model and is negatively correlated with public sector ownership at 99% level of significance. Other analysis (not reported) demonstrated that all five factors identified from the responses to the survey were relatively well explained by the model with factor 3 (identified as a significant determinant of quality) providing the strongest fit.

Concluding discussion

The results discussed above focussed on two areas of interest, with some notable results, despite the small sample size:

i. Quality of care shows some degree of positive association with the sophistication and quality of management practices, as measured during the 2010 survey. Quality is also positively associated with staffing intensity, but exhibits a negative association with the manager's perception of the competitiveness of the market.

ii. The quality of management is positively associated with a number of variables including the skill of the manager, staffing intensity, and perceived competition. It is negatively (weakly) associated with public ownership, relative to private-sector and other not-for-profit ownership models.

The following section develops some of the key findings in more detail, and offers some related policy implications.

Direct and Indirect Effects

The research discussed in this paper has straddled two main themes: what might influence care quality outcomes in care homes, and what might influence the standard of management? As stated above, there was some evidence to suggest a positive association between management practices and care quality, but also that the quality of care provided by care homes was negatively associated with the managers 'perception of competition'. However, this same perception of competition was positively associated with the quality of management provided at care homes, in addition to a range of other variables.

These results indicate there are direct and indirect associations with care outcomes, i.e. some variables that directly affect the quality of care and others that have an indirect effect by influencing management practices (*Figure 2*).

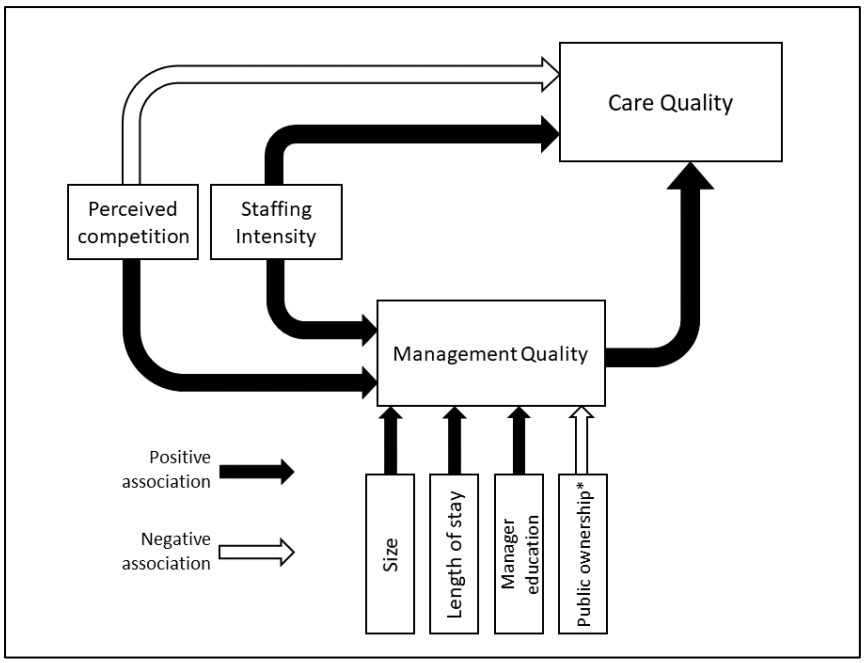

Figure 2 Direct and indirect effects on the quality of care

Although we observed a limited direct association between many variables and care outcomes through the analysis in the section "The relationship between management practices and care home quality, Figure 2, and the results presented in Section "What determines good management?", suggest that many of these factors indirectly influence care quality via their effect on management.

Of particular interest is the impact of our perception of competition, which as highlighted earlier, has opposite associations with care quality and management quality. It has a direct negative effect on care quality, but it is indirectly positively associated with care outcomes through improved management. The findings regarding competition are statistically significant, robust to alternative specifications, and present an intriguing area for investigation, not least because of the centrality of competition to the tenets of NPM.

Because the estimated coefficients of competition are similar in magnitude (though of opposite polarity) the direct association will outweigh the indirect because the estimated

coefficient relating to management's effect on quality is less than 1. Evaluating the results at the mean (or base) values of all regressors[11] indicates that a single standard deviation increase in perceived competition increases the probability of achieving the lowest Care Quality Commission score of 2 from 19.2% to 26%, and reduces the probability of a top score of 4 from 15.2% to 10.5%. In the absence of an indirect positive effect of competition on quality, these results would be a 28% probability of scoring in the lowest quality group, and only 9.4% of gaining the top score. The indirect effect is associated with a 2% lower difference in the probability of achieving a quality score of 2, and a 1.1% increase in the probability of gaining the highest score of 4.

Interpreting this quality result means we cannot rule out established results concerning quality in the presence of price competition (Maniadakis et al. 1999; Propper et al. 2004; Propper et al. 2008; Forder & Allan 2014), nor can we dismiss the notion (inherent in NPM) that exposure to competitive elements and private sector-style incentives raises performance (Andersson & Jordahl 2011; Dan & Pollitt 2015). In the absence of a counterfactual, it is unclear whether policy incentives such as fixed tariffs in the provision of social care would ameliorate the negative effect of price pressures, while maintaining incentives to improve management.

One other apparent finding of note concerned a negative association between public ownership and management, and indirectly between public ownership and care quality. Owing to the small number of public care homes in the sample, we would caution any reader against drawing firm conclusions from this result.

[11] Management was actually evaluated slightly below zero owing to all other variables at their means resulting in a management score 0.0108 standard deviations below its mean. This is maintained in the hypothetical scenario that there is no indirect effect.

Understanding the effect of competition

The negative correlation between competitive pressure and quality outcomes is, at first glance, a curious result given that one of the key tenets of NPM is that exposure to competition should drive improvements in otherwise inefficient sectors. Given the characteristics of the care home market, however, this negative result is not without precedent.

The negative link between quality and price competition has previously been observed in both healthcare (Mandiadakis et al., 1999; Propper at al., 2004, 2008), and in UK care homes (Forder and Allen, 2014). In the present case, given budgetary pressure after 2010, and changing societal demographics [12], there is a high probability that local authorities (the largest single buyer of social care in any region) will be very sensitive to price. This was also confirmed by Forder and Allen (2014), who found that competition negatively affected performance in those homes at the bottom end of the price spectrum, which relied most heavily on publicly-funded patients (though the variable reflecting this reliance was not found to be significant in the present dataset). Revisiting the original interviews, numerous respondents also claimed that the environment under which care homes operate is becoming more difficult, many highlighting budgetary pressures and the commissioning of care by local authorities.[13]

[12] The Institute for Fiscal Studies estimates that UK local authority spending on social care declined by 1% in real terms between 2009/10 and 2015/16, despite the over-65 population growing by 15.6% (Luchinskaya et al. 2017).

[13] Respondents were asked "Do you feel the market for nursing home services is improving or getting more difficult?" and then "What do you think is causing this change?" (both open-form questions).

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