Allan, S. & Vadean, F. (2019) **The association between staff retention and English care home quality**. *Journal of Aging and Social Policy*, accepted 12th August 2019.

The association between staff retention and English care home quality

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This paper examines the association between workforce retention and related staffing measures and the quality of English care homes using a national database of social care providers' staffing. The analysis finds significant correlations between quality and the levels of staffing vacancies and retention of both residential and nursing homes, but no association was found between quality and the use of temporary contract workers nor the resident to staff ratio. Only for staff vacancy rates was there a significant difference in the size of these relationships between types of home. The findings suggest that quality could change for the average care home with a relatively small alteration in staffing circumstance. Long-term care is a labour intensive industry and many countries face relatively high levels of staff turnover and job vacancy rates. These findings are therefore of interest for policy internationally and for England in particular, where the development of social care recruitment and retention strategies are ongoing.

Key words: Nursing homes, care, staff, quality, retention, job vacancies, turnover

INTRODUCTION

Long-term care in general, including care homes, is labour-intensive. A productive and trained long-term care (LTC) workforce is therefore a high priority internationally (Colombo & Muir, 2016). However, in many countries there are workforce shortages in LTC, with high levels of staff turnover (Castle & Engberg, 2005; Colombo, Llena-Nozal, Mercier, & Tjadens, 2011; ILO, 2015). Quality in care homes – that is both quality of care, the technical aspects of care, and quality of life – is dependent on the competency, quality, and composition of staff (Chou, Boldy, & Lee, 2003; Lucas et al., 2007; Malley & Fernandez, 2010). Workforce shortages and poor retention can therefore impact on the outcomes of care home residents (Antwi & Bowblis, 2018; Huang & Bowblis, 2018).

Like many other countries, the UK care home sector, which consists of residential homes (i.e. personal care only) and nursing homes (i.e. personal care plus nursing care through employment of registered nurses), has high levels of staff turnover and vacancy rates (Skills for Care, 2016). Lower fees and employee turnover are putting pressure on care homes such that only basic needs are met and homes have problems investing in staff training (National Audit Office, 2014). However, despite the importance of staff to LTC, and the staffing issues prevalent in LTC, there is little quantitative evidence for England to address their influence on quality.

This paper seeks to add to existing evidence by providing an empirical analysis of the association between firm-level workforce composition and the quality of English care homes, including the influence of gaps in the workforce, measured by staff vacancy rates. Care quality is measured using the quality ratings of the Care Quality Commission (CQC), the national health and social care regulator, and controls are included for both care home and local area characteristics. In particular, the analysis assessed whether there were differences in relationship between staffing and quality by type of home, residential or nursing.

Prior literature

The existing empirical evidence has generally found that poor workforce characteristics have a significant negative effect on quality indicators in nursing homes (Dellefield, Castle, McGilton, & Spilsbury, 2015; Spilsbury, Hewitt, Stirk, & Bowman, 2011). For example, a greater number of staff has been found to improve quality (Cawley, Grabowski, & Hirth, 2006; Zhang, Gammonley, Paek, & Frahm, 2008), but there are also studies that have found little or no link between certain staffing levels and quality (e.g. Rantz et al., 2004; Lin 2014). There is also evidence that a lack of registered nursing staff leads to increased hospitilisation rates (Kayser-Jones, Wiener, & Barbaccia, 1989; Carter & Porell, 2003). The employment of contract staff, for example agency staff, has a significant negative impact on quality, although the use of particular agency staff, such as nurses, may be quality improving (Castle & Engberg, 2008a, 2008b).

The evidence as to the impact of staffing on LTC quality in England is generally descriptive. There are persistent levels of employee turnover and vacancies which are much higher than national averages in other industries (Hussein, Ismail, & Manthorpe, 2016), and a survey of nurses working in care homes highlighted that (low) staffing levels and poor skill mix impacted on the level of quality (Royal College of Nursing, 2012).

Care homes market and regulation in England

There are more than 11,000 care homes (both residential and nursing) in England registered to provide care to those who live with dementia or the general population of older people. Much of the supply comprises of single home providers or small multi-home organisations, although there are some large chains, and 15% of the market is supplied by non-profit providers. Private payers make up around 40-45% of demand and, other than a small proportion of placements made by the National Health Service (NHS), the remaining placements are publicly funded through local public councils (local authorities). The private

pay market can be regarded mostly as a conventional market with providers directly competing for potential residents, whereas the publicly-supported market is a quasi-market in which private providers compete for placements from local authority purchasing commissioners (Bartlett, Propper, Wilson, & Le Grand, 1994). All homes, regardless of payer, are required to meet quality standards (see below).

In general, (potential) residents are concerned with the quality of the care home. Private payers have a greater choice of homes at their preferred price-quality point, although it is worth noting that most homes currently operate with a mix of private pay and local authority residents, but with an increasing minority now focussing on private payers only (Laing & Buisson, 2014). As is seen between public (i.e. Medicaid) and private payers in the US nursing home market (e.g. Grabowski 2004), local authorities appear to have some market power as suggested by the discounts they apparently secure (Competition & Markets Authority, 2017).

In England, staff in all care homes consist of care and senior care workers, supervisors, management and ancillary staff (e.g. cooks, maintenance staff). There may be other professionally qualified employees such as occupational therapists. The medical needs of those in residential homes will be met by local district nursing and doctors (Dudman, Meyer, Holman & Moyle, 2018). Nursing homes will employ registered nurses, and staffing in nursing homes is therefore generally comparable to that found in the USA. In contrast to residential homes in the UK, a large proportion of assisted living facilities in the USA employed registered nurses (Kisling-Rundgren, Paul III, & Coustasse, 2016).

Care homes are regulated as to their quality by the Care Quality Commission (CQC), the health and social care regulator for England, according to their compliance with both the Health and Social Care Act 2008 (Regulated Activities) Regulations 2014 (from herein the Regulations) and the Care Quality Commission (Registration) Regulations 2009 (CQC,

2015a). The fundamental standards in the Regulations include no specific requirements as to the number of staff or ratio of skill mix required in English care homes, only that a sufficient number of qualified staff are employed. The Regulations further detail that all staff employed by registered providers must receive training and support to carry out their duties, and be able to further their qualifications in the role they work.

The CQC monitors the performance of providers to assess if they comply with the fundamental standards included in the Regulations and their quality of care. Monitoring occurs through local feedback, information gathering, and the inspection and rating of services, the latter to make the public aware of how a home is performing. Inspections are based around five key questions that ask whether a care home is: well-led, responsive to people's needs, safe, effective and caring. Inspections focus on key lines of enquiry (KLOEs) that are used to consistently assess the five key questions. For each of the five key questions care homes are given a rating of outstanding, good, requires improvement, or inadequate. Inspectors rate homes based on their professional judgement, informed by framework characteristics for the key questions that describe the quality of care expected to be observed at each rating (CQC, 2015b). Care considered to be good or outstanding will be beyond the level of care as set out in the fundamental standards (CQC, 2015a). An overall rating for the home is determined from consistently aggregating the ratings for the five key questions using rating principles. For example, a home will usually be rated as outstanding when two or more of the five key questions are rated as outstanding and the other key questions are rated as good (CQC, 2015b).

Care homes can be inspected at any time, but re-inspections will usually take place within six, twelve, or twenty-four months for homes rated as inadequate, requires improvement or good/outstanding, respectively (CQC, 2016). The enforcement policy of the CQC is linked to inspections and ratings (CQC, 2015c) and a significant relationship between

CQC quality ratings and quality of life has been found for residential and nursing home residents (Towers, Palmer, Smith *et al.*, 2019).

THEORETICAL FRAMEWORK AND HYPOTHESES

For care homes there will be both a fixed and variable cost element to quality. Increased quality can be achieved at higher fixed costs (e.g. bigger rooms, better standard of décor). In England, care homes that have been purpose built (i.e. built from the foundations up as a care home) have higher quality (Forder & Allan, 2014). Total labour costs form the largest part of variable costs. A 'Fair price of care' model for a care home suggested that labour costs would account for 49% and 57% of a fair price for a place in a private, non-London, residential and nursing home, respectively (Laing & Buisson, 2014).

An adequate number of staff will be required to perform all necessary tasks within a care home. As described earlier, there is no mandated minimum staffing level and England has large differences in nursing levels and standards for care homes compared to other countries (Harrington *et al*., 2012). There have been calls for national guidance on staffing levels and ratios (Royal College of Nursing, 2012).

The *a priori* expectations on staffing levels will depend on the motives of care home owners. The motives of non-profit care homes is not clear (Schlesinger and Gray, 2006), whilst for-profit care homes would consider maximising profit, subject to an adequate level of quality to remain in business (Allan & Forder, 2015). However, many 'for-profit' providers, particularly single home or small multi-home organisations, can be regarded as not solely wanting to maximise profits (Knapp, Hardy, & Forder, 2001; see also McDonald, Wagner, & Castle, 2003). Nonetheless, subject to diminishing marginal returns, the greater the ratio of staff to the number of residents the higher will be the quality provided.

Relationships form a key part of care home life (Brown Wilson, Davies, & Nolan, 2009). Therefore it could be expected that retention and turnover of staff will have opposite

effects on care home quality. Retention of staff is important so as to maintain the carer-resident relationship, whereas a high turnover of staff will lead to a breakdown of this care continuity. High workload and turnover have negative effects on quality (Low *et al*., 2015).

Linked to turnover and retention are job vacancies and the use of temporary staff. Any shortage of skills identified by firms will inevitably mean that either there is a gap in the workforce, i.e. a vacancy, or a lower-skilled, and less productive, employee is fulfilling the role (Green, Machin, & Wilkinson, 1998). There is evidence of a significant negative impact of skills shortages on productivity (Haskell & Martin, 1993). Temporary staff, and particularly contract staff such as agency workers, may then be employed to fill any gap in the staffing of a care home. A greater number of staff should therefore improve quality, subject to diminishing marginal returns. However, the use of contract staff may also have negative connotations. Residents' experiences may be impacted upon if agency staff are behaving more pragmatically in their role, concentrating on the task at hand rather than focusing on the relationship (Brown Wilson & Davies, 2009). A care home may specifically decide against using contract staff for this reason, but this in turn may place greater pressure on existing staff (e.g. Royal College of Nursing, 2012).

Any difference between residential and nursing homes' staffing and their quality is not known, *a priori*. Nursing homes will face challenges in the distribution of tasks between nursing and care staff (Perry, Carpenter, Challis & Hope, 2003). Residential homes also have to deal with the relationship between care staff and medical staff (Davies *et al.*, 2011). Nursing and care staff alike face similar pressures in work, and this is across nursing and residential homes (Royal College of Nursing, 2012; Kadri *et al.*, 2018). Within nursing homes, both care and nursing staff were thought to influence resident quality of life, but it was registered nursing that was seen as being most important to this (Heath, 2010).

From the above discussion, the following hypotheses of the association between staffing and quality were developed: Increased staff vacancy rates will lower quality (H1); a high retention of staff and higher staff to resident ratio will improve quality, the latter subject to diminishing marginal returns (H2 and H3); a high level of staff turnover and contract staff the lower the quality (H4 and H5); and the higher the proportion of registered nurses in a care home the higher the quality (H6). The difference in the staffing to quality relationship between residential and nursing homes is unknown, *a priori*, but is to be assessed.

METHODS

Data

The National Minimum Dataset for Social Care (NMDS-SC) as of April 2016 was used for the analysis. The NMDS-SC is an online database of the adult social care workforce for England, managed by Skills for Care on behalf of the Department of Health and Social Care and, as the only nationwide source of social care staffing data, is used for workforce intelligence by the Government and local councils. Skills for Care offer free advice and support to providers, and the use of the NMDS-SC comes with a number of benefits including: personalised reports, planning and tracking staffing, and access to online training and funding for training. In addition, provider data held on the NMDS-SC can automatically be used to update a Provider Information Return (PIR), which is a legally required document as part of the inspection and monitoring process (CQC, 2015d). The main potential weakness to this data is that sign-up and data provision is voluntary. Nonetheless, the NMDS-SC has information on a large proportion of social care establishments (Skills for Care, 2016).

Skills for Care provided an anonymised provider database for April 2016 with CQC quality ratings matched to providers (where they had been rated). The database has 22,088 providers across all forms of social care. Of these, 5,083 were independent sector care homes where at least some of the residents were older people or older people living with dementia.

We restricted the analysis to those establishments that had entered data in the last calendar year, leaving 3,496 care homes (68.78%). This is 31.1% of the 11,257 older people care homes in England in April 2016.

Measures

The measures of staffing characteristics were as follows. Staff vacancy rate was the percentage of the number of vacancies reported to the total number of staff, which included all permanent and temporary staff employed. The turnover rate for staff was percentage of the number of staff who left the establishment in the previous year to the total number of staff one year previously, and the retention rate was the percentage of the number of staff retained in the last 12 months to total staff. The percentage rate of contract staff was calculated as the number of direct care staff that are either pool, agency, or on temporary contracts to the total number of direct care staff. The resident to staff ratio measured the number of residents in the care home to the number of direct care staff. Finally, the nursing ratio was measured as the percentage of registered nurses to the total direct care staff (for nursing homes only). As well as information on staffing levels, the dataset had information on the type of care home (nursing or residential), the sector (private or voluntary), the region where the care home is located in England, and number of beds.

Local area characteristics were matched to the dataset using geographical identifiers held in the database. Measures of need, demand and supply were matched to providers at local authority-level (n=152) and postcode district-level (n=2,302), which is the first half of a full UK postcode (e.g. SW1) and was the lowest level of geography available in the database. For need and demand the percentage of people who provided unpaid care, the percentage of people reporting their health as bad (both from 2011 census data), the percentage receiving pension credit (an income-based credit for those who qualify for state pension) and the percentage receiving Disability Living Allowance (a benefit for adults that need help with

mobility or care costs) were used, all at the postcode district-level. At supply level, the percentage of females receiving job seekers' allowance (unemployment benefit), the percentage of females with no qualifications, both at postcode district-level, and local authority-level average house price were used. In addition, a Herfindahl-Hirschman Index (HHI) measure of average competition at the postcode district-level was also included. A distance-weighted HHI with 10km radius was calculated for all care homes for the elderly/those living with dementia, and averaged at postcode district-level.

Analysis

Quality, staffing characteristics and control variables were descriptively analysed, including information on missing data. Further, t-tests were utilised to assess any differences in the complete cases sample means between residential and nursing home staffing and quality characteristics. For the multivariate analysis, the following model of quality was estimated:

$$Q_{ij} = \alpha_{ij} + \beta S_{ij} + \delta X_{ij} + \varepsilon_{ij}$$

The quality of care home i in postcode district j is dependent on a vector of staffing characteristics, S, a vector of care home- and local-level need, demand and supply measures, X, and a random error term, ε. Homes could be rated as either inadequate, requires improvement, good or outstanding. Nationally, a very small proportion of homes were rated as outstanding in April 2016 (2.3%), and homes cannot remain rated as inadequate indefinitely due to the inspection and monitoring processes outlined above. As such, a binary measure of overall care home quality was utilised, with homes rated good or outstanding taking a value of one, and homes rated as inadequate or requires improvement taking a value of zero. The model of care home quality was therefore estimated using probit regression for residential and nursing homes, respectively.

In addition, the rating system began in October 2014 and so a large number of homes had yet to be rated by the CQC. There were also high levels of missing data for certain

staffing characteristics, something that previous research on staffing in social care has had (e.g. Castle and Engberg, 2006). As such, it was assumed that the data were missing at random and multiple imputation was used to give predicted values for the homes with data missing. Given the level of missing data for certain variables, and given subsequent analysis of the random error generated from the imputation process, we used 50 imputations (see White et al., 2011). The imputations were generated using a chained imputation method with logit (quality) and predictive mean matching models (competition, staffing measures). The probit models of quality were estimated using both the full multiple imputation sample and the complete cases sample. Differences by type of home, residential or nursing, were assessed by testing the equality of marginal effects with chi-squared tests for the complete cases sample and F-tests for the full multiple imputation sample.

RESULTS

Descriptive statistics are provided in Table 1. Staff-wise, there was evidence that there are significant differences between an average residential home and an average nursing home in the sample of care homes, with the latter having significantly higher staff vacancy rates, staff turnover and contract staff, and a significantly lower staff retention rate (all $\rho < 0.01$). Nursing homes had marginally lower resident to staff ratios ($\rho < 0.1$), were significantly bigger and also had lower quality (both $\rho < 0.01$). Nursing homes had around 1 in every 7 non-management staff as registered nurses on average. Average quality in the overall sample was significantly higher than nationally in April 2016 for rated care homes ($\rho < 0.01$, not reported).

<Table 1 about here>

Tables 2 and 3 report the marginal effects found from estimating probit regressions of the likelihood of residential and nursing homes being rated as good or outstanding in their quality, respectively. In each table, models 1 and 2 present the results for the complete cases

sample for a basic (unadjusted, staffing variable only) and full (all control variables included) model, respectively, and models 3 and 4 present the same for the multiple imputation (full) sample. In all models the staffing variables were included separately because of collinearity. For example, staff retention rate and staff turnover rate have a significant pairwise correlation of -0.83.

For both residential (multiple imputation sample only) and nursing homes, the results suggest that staff vacancy rates and retention rates have a significant association with the likelihood of a care home being rated as good or outstanding, in the expected directions. From model 4, the marginal effect of a one percentage point increase in staff vacancies is -0.6% and -1.2% for the average residential and nursing home, respectively, and there is a marginal effect of 0.2% for both types of home for staff retention rate increasing by the same level.

<Tables 2 and 3 about here>

For residential homes, staff turnover has a significant negative relationship with the likelihood of good or outstanding quality ratings, but for nursing homes this is only weakly found in one model. For both types of home, the resident to staff ratio has no significant relationship with care home quality, and the same was found for contract staff, with the exception of a weak significant positive association with nursing home quality ratings in the basic complete cases model. The ratio of registered nurses had a positive but insignificant association with quality ratings for nursing homes. Compared to residential homes, nursing homes only had a significantly stronger correlation with quality ratings for staff vacancy rates (complete cases: $\chi^2 = 43.36$, $\rho<0.01$; multiple imputation: $F = 4.53$, $\rho<0.05$).

The marginal effects found are not large in an absolute sense. However, the quality rating of a care home could be affected by relatively modest changes to their staffing circumstances. For instance, the results suggest if the otherwise average residential home had

a staff retention rate at the 10th percentile (51.1%) and then improved it to the mean level, equivalent to 10 extra staff members being retained in a year (average staff size for residential homes is 36.63), their probability of being rated good or outstanding would increase by 5.4%.

DISCUSSION

This paper looked to assess the relationship between staffing characteristics and the quality of English care homes using quantitative analysis. The findings suggest that a successful staffing strategy does have a relationship with quality. There is a negative association found between staff vacancies and the probability of a care home being rated as good or outstanding, as compared to inadequate or requires improvement, from CQC inspections. The results also show a positive association between staff retention and the probability of a good or outstanding rating. Staff vacancies in a care home could increase working pressure for existing staff and lower the amount of time an individual staff member can give to any resident. A survey of registered nurses found that many felt they could not adequately deliver the quality they wanted to because of staff shortages (Royal College of Nursing, 2012). There was no significant relationship between quality and the prevalence of contract staff. This finding combined with that of staff vacancy rates suggests that having the correct level of staffing is very important for care homes. The latter finding could also suggest that care home providers are good at training short-term staff.

Higher retention rates could mean better quality is delivered, and has a stronger (absolute) effect on quality than turnover rates. This finding is suggestive that tenure at a care home is important, that there is job-specific training and knowledge which is pertinent to how successful care home staff are in delivering high quality outcomes for residents. Continuity of caregivers for residents is undoubtedly important, but perhaps less so in determining care home quality given that only a weak association was found for turnover rate.

Whilst there were differences in the relationship between staffing characteristics and quality for residential and nursing homes, only for staff vacancy rates was the size of the correlation with quality ratings significantly different between care home types. Generally, these findings could suggest that future policy focus on the care home sector as a whole. One exception may be in the recruitment and retention of registered nurses, where employment in the NHS is seen as higher status and is usually better remunerated (National Audit Office, 2018). However, no significant correlation between ratio of registered nurses and quality ratings was found in the analysis for nursing homes.

Policy relevance

This work adds to the existing evidence on the relationship between staffing and both residential and nursing home quality; indeed, this is the first quantitative evidence for England. Quality of LTC, how staff impact on the quality of LTC provision, and issues around staff recruitment and retention are critical policy themes in England and internationally (Harrington *et al.*, 2012; Skills for Care, 2014; Colombo & Muir, 2016).

The importance of the workforce to the quality of LTC is highlighted by the international evidence, and a number of alternative policy options exist that can be utilised to improve workforce conditions, for example increased: staff, training, and wages and benefits (Wiener 2003; Wiener, Freiman, & Brown, 2007). The current issues in the funding of LTC given increasing demand in England and internationally mean that it is difficult to finance any of these alternatives (Colombo *et al.*, 2011; Fernandez, Snell, & Wistow, 2013).

Increased staffing is also difficult when there are existing workforce shortages; a shortage of staff will occur if there are no incentives to enter the LTC workforce (and remain in it). Reduced income, combined with cost pressures (e.g. National Living Wage introduction in England), will not encourage care homes to maintain strong staffing levels.

For example, US evidence shows that cuts to reimbursement payments resulted in fewer staff (e.g. Konetzka, Yi, Norton, & Kilpatrick, 2004; Unruh, Zhang, & Wan, 2006).

A lack of funding will reduce opportunities for care homes to improve staff retention through offering increased wages or training. In England, there has been a consultation on a draft 10-year NHS and social care workforce strategy (NHS and Public Health England, 2017). This recognises that staff turnover and poor training in social care is linked to low pay. Low wages, and a stressful working environment with too few staff, will reduce the incentive for staff to remain with a provider, or even within the industry, when alternative low-wage, but lower pressure, jobs are usually available (e.g. retail industry). Promoting the value of social care work, and other policies to help encourage longevity in post, would aid in the promotion of a stronger, higher quality, workforce.

Limitations and future research

There are a number of caveats to the findings. First, the results are based on a cross-section and only confirm a correlation between quality and workforce characteristics. The results may also be biased due to care homes that submitted data to NMDS-SC having higher quality than those that did not. However, any bias is likely to mean the relationship between the staffing characteristics and quality ratings is underestimated, such that the true population relationship may be stronger than that reported.

A second limitation is that the results will depend on the quality of the modelling used. Specifically, multiple imputation (MI) was used because of missing data. MI was used since the complete cases analysis will only be unbiased from true population correlations if the data is missing completely at random (MCAR), i.e. the reason for missing data is completely unconnected to observed and unobserved factors (Carpenter and Kenward, 2013). A logistic regression of a binary variable indicating if a nursing or residential home had missing data using all the variables with complete data as independent variables confirmed

significant correlations between the likelihood of having missing data and a number of observed variables (e.g. sector and size), indicating that the data was not MCAR.

The use of MI assumes the data is missing at random (MAR), that is the missing data is independent of unobserved data given the data that is observed (Carpenter and Kenward, 2013). If this assumption is violated the data is missing not at random (MNAR) and the results of MI estimations will be biased, at least to some extent. As a sensitivity check of the MI analysis, the marginal effects found in both the basic and full models presented do not change markedly, with the exception of the staff/resident ratio for both types of home and contract staff ratio for nursing homes. Further, the use of MI naturally adds a random error component in to the analysis (called Monte Carlo error). We assessed the random error generated by the MI process for the results and found them to be acceptably small (White et al., 2011). It is unlikely that the significant associations found for the staffing variables on quality ratings would disappear if the imputation process was repeated.

A third limitation is that staffing characteristics and care home quality (ratings) are likely to be endogenous in their relationship. This could be an omitted variable bias or simultaneity between quality ratings and staffing measures. Homes may have high staff vacancy rates, staff turnover and/or low staff retention because of poor quality. For example, nursing homes where staff were consistently assigned to the same care recipient had lower levels of staff turnover and absenteeism (Castle, 2013).

The use of CQC quality ratings in this analysis may further compound the endogeneity problem as each of the five key questions that underpin the overall quality rating specifically include elements around staffing. As a robustness check we performed probit estimations on the binary measure of rating (inadequate/requires improvement vs good/outstanding) for each of the five key questions using the multiple imputation sample. These showed that staff vacancy and staff retention rates have different associations with the

five key questions for both nursing (e.g. staff vacancy rates only significant at 5% for Safe and Well-led questions) and residential homes (e.g. staff retention not significant at 5% level for Responsive question). These findings give a certain indication that endogeneity through the use of quality ratings based (at least partially) on staffing may not directly influence the findings from the main results. However, the overall endogeneity issue between quality and staffing addressed above remains.

In addition to improving on the limitations outlined above, where possible, future research could also look to improve certain measures of staffing. For example, more refined data on hours of work and contact time could be used for resident to staff ratio and contract staff ratio. Further investigation is also required to assess why the negative correlation between vacancy rates and quality is stronger for nursing homes than residential homes. For example, particular vacancies (e.g. registered nurses) may impact on the quality of nursing homes to a greater degree.

CONCLUSIONS

Staffing in social care plays at least some role in determining quality. The findings presented here provide evidence that staff vacancy rates and retention rates have a relationship to quality ratings for English residential and nursing homes, and support continued policy to improve retention and staffing in social care.

FUNDING

This research is funded by the National Institute for Health Research (NIHR) Policy Research Programme (reference 103/0001). The views expressed are those of the author(s) and not necessarily those of the NIHR or the Department of Health and Social Care.

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Table 1: Complete case sample descriptive statistics

Variable	n	Missing data (%)	mean	s.d.	min	max
Residential homes (n=2,283)						
Quality	1455	36.27	0.69	0.46	0	1
Vacancy rate	1137	50.20	2.28	4.98	0.00	34.55
Retention rate	1308	42.71	77.61	19.19	15.79	100.00
Turnover rate	1548	32.19	24.07	20.49	0.00	78.79
Contract staff %	2215	2.98	4.66	8.99	0.00	48.15
Resident/staff ratio	1739	24.83	1.31	0.46	0.5	2.35
Number of beds	2283	0.00	34.12	19.40	1	166
Voluntary sector	2283	0.00	0.157	0.364	0	1
Nursing homes (n=1,213)						
Quality	841	30.67	0.59***	0.49	0	1
Vacancy rate	541	55.40	3.13***	5.40	0	32.00
Retention rate	671	44.68	73.49***	20.24	13.51	100.00
Turnover rate	781	35.61	28.96***	21.21	0	78.79
Contract staff %	1171	3.46	6.32***	9.98	0	48.28
Resident/staff ratio	931	23.25	1.28*	0.46	0.5	2.35
Registered nurse staff % (NH only)	1080	10.96	14.34	6.03	1.02	34.48
Number of beds	1213	0.00	50.02***	26.17	1	236
Voluntary sector	1213	0.00	0.100***	0.300	0	1
Postcode level (all care homes)						
Competition (HHI)	3488	0.23	0.06	0.08	0.01	1
Female JSA %	3496	0.00	0.95	0.67	0.00	4.74
Female no quals %	3495	0.03	25.76	6.33	2.82	49.03
Pension Credit %	3496	0.00	17.80	8.41	0.64	67.88
DLA %	3496	0.00	4.66	1.88	0.17	12.92
Health bad %	3495	0.03	5.72	1.69	1.25	14.78
Activity limited a lot %	3495	0.03	8.29	2.27	2.56	21.15
Average house price (£)	3495	0.03	264232	198415	54997	4819745
Population 65+	3496	0.00	6023	2897	242	16847

Notes: HHI = Herfindahl-Hirschman Index; JSA = Job Seeker's Allowance; Quals = qualifications; DLA = Disability Living Allowance; Res. = Residential; NH = Nursing homes. Res. v NH column presents the t-statistic of a two sample t-test of the equality of means between residential and nursing homes. *, **, and *** indicate significant difference in means between residential and nursing homes at 10%, 5% and 1% levels, respectively.

Table 2: Association of staffing on quality of residential homes being rated good or outstanding

Staffing measure	Model 1: Complete case, basic	Model 2: Complete case, full	Model 3: MI, basic	Model 4: MI, full
Vacancy rate	-0.003	-0.0029	-0.0059**	-0.0059**
	(-0.0093, 0.0032)	(-0.0090, 0.0032)	(-0.011, -0.0004)	(-0.0116, -0.0002)
Retention rate	0.0030***	0.0031**	0.0020***	0.0020***
	(0.0013, 0.0047)	(0.0013, 0.0048)	(0.0006, 0.0033)	(0.0006, 0.0034)
Turnover rate	-0.0019***	-0.0017**	-0.0014**	-0.0013*
	(-0.0033, -0.0005)	(-0.0031, -0.0002)	(-0.0027, -0.0001)	(-0.0026, 0.00001)
Contract staff ratio	-0.0006	-0.0005	-0.0002	-0.0002
	(-0.0033, 0.0021)	(-0.0033, 0.0023)	(-0.0026, 0.0021)	(-0.0027, 0.0022)
Resident/staff ratio	-0.042	-0.026	-0.027	-0.0044
	(-0.103, 0.018)	(-0.093, 0.040)	(-0.083, 0.030)	(-0.068, 0.059)

Notes: Models estimated using Stata 15. MI = Multiple imputation; Table presents marginal effect of staffing measure on probability of quality rating being good/outstanding. 95% confidence intervals are in parentheses. Basic models include only the staffing measure, full models include the control variables presented in Table 1 and an indicator of region. Standard errors are clustered by postcode district (i.e. local area). For model 1, n = 716 (vacancy rate), 803 (retention rate), 955 (turnover rate), 1,411 (contract staff) and 1,110 (resident/staff ratio). For model 2, n = 714 (vacancy rate), 801 (retention rate), 953 (turnover rate), 1,409 (contract staff) and 1,108 (staff/resident ratio). For models 3 and 4, n = 2,283 in all cases. *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively. NS indicates not significant. Mean value of quality: 0.687 (complete case, n=1,455) and 0.686 (MI models).

Table 3: Association of staffing on quality of nursing homes being rated good or outstanding

Staffing measure	Model 1: Complete case, basic	Model 2: Complete case, full	Model 3: MI, basic	Model 4: MI, full
Vacancy rate	-0.021***	-0.0235***	-0.0119**	-0.0120***
	(-0.032, -0.0097)	(-0.0347, -0.0122)	(-0.019, -0.0045)	(-0.0197, -0.0043)
Retention rate	0.0026**	0.0024**	0.0021**	0.0020**
	(0.0004, 0.0048)	(0.0001, 0.0047)	(0.0003, 0.0039)	(0.0001, 0.0038)
Turnover rate	-0.0015	-0.0009	-0.0017*	-0.0015
	(-0.0035, 0.0005)	(-0.0030, 0.0011)	(-0.0034, 0.00002)	(-0.0033, 0.0003)
Contract staff ratio	0.0031*	0.0021	0.0023	0.0015
	(-0.0004, 0.0065)	(-0.0014, 0.0057)	(-0.0009, 0.0056)	(-0.0019, 0.0048)
Resident/staff ratio	0.007	0.0346	0.0036	0.025
	(-0.073, 0.087)	(-0.051, 0.121)	(-0.064, 0.072)	(-0.048, 0.099)
Registered nurse ratio	0.0044	0.0048	0.0052*	0.0053
	(-0.0015, 0.0102)	(-0.0018, 0.0114)	(-0.0006, 0.011)	(-0.0011, 0.012)

Notes: See notes for Table 2. For model 1, n = 365 (vacancy rate), 454 (retention rate), 533 (turnover rate), 812 (contract staff), 644 (resident/staff ratio) and 753 (registered nurse ratio). For model 2, n = 363 (vacancy rate), 454 (retention rate), 532 (turnover rate), 809 (contract staff), 642 (staff/resident ratio) and 752 (registered nurse ratio). For models 3 and 4, n = 1,213 in all cases. Mean value of quality: 0.586 (complete case, n=841) and 0.588 (MI models).