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The impact of structural changes to community nursing services on the rate of emergency hospital use of older people: a longitudinal ecological study of based on 140 primary care trusts in England

Structural
change to
community
nursing service

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Abstract

Purpose – In 2011, community nursing services were reorganised in England in response to a national policy initiative, but little is known about the impact of these changes. A total of three dominant approaches emerged: (1) integration of community nursing services with an acute hospital provider, (2) integration with a mental health provider and (3) the establishment of a stand-alone organisation, i.e. without structural integration. The authors explored how these approaches influenced the trends in emergency hospital admissions and bed day use for older people.

Design/methodology/approach – The methodology was a longitudinal ecological study using panel data over a ten-year period from April 2006 to March 2016. This study's outcome measures were (1) emergency hospital admissions and (2) emergency hospital bed use, for people aged 65+ years in 140 primary care trusts (PCTs) in England.

Findings – The authors found no statistically significant difference in the post-intervention trend in emergency hospital admissions between those PCTs that integrated community nursing services with an acute care provider and those integrated with a mental health provider (IRR 0.999, 95% CI 0.986–1.013) or those that did not structurally integrate services (IRR 0.996, 95% CI 0.982–1.010). The authors similarly found no difference in the trends for emergency hospital bed use.

Research limitations/implications – PCTs were abolished in 2011 and replaced by clinical commissioning groups in 2013, but the functions remain.

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Practical implications – The authors found no evidence that any one structural approach to the integration of community nursing services was superior in terms of reducing emergency hospital use in older people.

Originality/value – As far as the authors are aware, previous studies have not examined the impact of alternative approaches to integrating community nursing services on healthcare use.

Keywords Older people, Health and social care, Integrated care, Community nursing, Emergency admission

Paper type Research paper

Introduction

The global trend towards ageing populations and increases in those experiencing long-term and multiple health conditions is resulting in a common aspiration to re-orientate health and care systems towards more preventative and person-centred models of care. There is international consensus that such transformation will be through a strengthening of primary care services, on the basis that this will improve greatest accessibility, effectiveness and resilience (WHO, 2016; EU, 2017; van der Heide *et al.*, 2017). The role of hospitals will be to focus on high-intensity care and the deployment of complex technologies (WHO, 2018). Most countries have therefore introduced programmes to divert those with less intense needs from hospital settings. Many of these are founded on the premise that better integrating care will facilitate the necessary changes in clinical practice, resource allocation and organisational behaviour (Minkman, 2012; Valentijn *et al.*, 2015). Integrated services, i.e. those that “are managed and delivered in a way that ensures people receive a continuum of . . . services, at the different levels and sites of care within the health system, and according to their needs throughout their life course” (WHO, 2016, p. 11) are now a common aspiration. There is, however, still considerable uncertainty about how best to achieve integration in practice, and divert patients from hospital (Van den Heede and Van de Voorde, 2016; Damery *et al.*, 2016; Baxter *et al.*, 2018). Fragmentation of care can occur when several organisations with different cultures, operating practices and financial imperatives are involved in delivering components of care to an individual (Cameron *et al.*, 2014; Miller *et al.*, 2016). One potential solution is to merge organisations, creating a single entity with authority to allocate resources, reconfigure services and incentivise staff members to deliver more coordinated and flexible care (Miller *et al.*, 2011; Shaw *et al.*, 2011).

The National Health Service (NHS) in England reflects such aspirations. Its current long-term plan contends that new organisational relationships based on partnership are required to orientate health services around the needs of patients and ensure that resources were reallocated from hospital to primary care services (National Health Service, 2019). The long-term plan is the latest of series of policy iterations to achieve such goals (Glasby *et al.*, 2011; Wistow, 2012). This includes the Transforming Community Services (TCS) policy announced in 2009 and implemented by April 2011 (Department of Health, 2009). This sought to bring about a complete separation of purchaser and provider functions in the NHS in England by requiring primary care trusts (PCTs) to divest themselves of provider services (Charles *et al.*, 2018).

Primary care trusts (PCTs) were part of the NHS in England from 2001 to 2013. PCTs were largely administrative bodies, responsible for commissioning primary, community and secondary health services from providers for populations of around 250,000 people. Collectively PCTs were responsible for spending around 80% of the total NHS budget (Smith and Mays, 2005). Until 31 May 2011, they also provided community health services directly. Such community health services accounted for around 12% of NHS England’s spending in 2014/1520 and cover a range of services including community matrons, community specialists nurses, district nursing and health visiting (Smith and Mays, 2005), but such services were often fragmented, poorly coordinated and not well integrated with other services in the community (Smith and Mays, 2005).

Box 1. Key functions and roles of community nursing services as described by Spilsbury and Pender (2015)

- (1) Delivering treatment in a community or home setting and where possible avoiding unnecessary admission to hospital
- (2) Supporting case management and disease management for those with complex long-term conditions and promoting independence
- (3) Supporting rehabilitation
- (4) Preventing disease and promoting health and healthy behaviours
- (5) Providing palliative care
- (6) Providing end-of-life care
- (7) Supporting the health and well-being of carers

The 2009 (TCS) policy document stated that one of the criteria to be met, when considering new models, was to demonstrate how the organisational form would “help to manage the demand for services more effectively (for example, reducing acute admissions and lengths of stay)” (Department of Health, 2009). This reflects a longstanding concern despite a range of initiatives (Purdy *et al.*, 2012; Bardsley *et al.*, 2013), over the rising tide of emergency admissions in the NHS. For example, during the year April 2009–March 2010, there were 5.2m emergency admissions to NHS hospitals in England, an increase of 17% over 5 years, which account for almost 70% of hospital bed days (Health and Social Care Info, 2014–15). Subsequent guidance emphasised “The NHS needs to achieve an unprecedented transfer of care and treatment from hospital to community settings and community services have a pivotal role to play in this” (Department of Health, 2010).

The TCS policy identified several possible models for divestment which included vertical integration with an NHS provider organisation such as an acute trust or mental health trust, horizontal integration between different providers or the establishment of various models of new organisations responsible for the provision of community services (non-merged) (Charles *et al.*, 2018). As noted by Spilsbury and Pender (2015), the TCS programme of restructuring had a significant impact on the landscape of community nursing service provision – which, in its broadest sense, refers to any nursing care delivered “outside” the hospital setting, such as patients’ homes, or residential care or health centres (see Box 1). Spilsbury and Pender (2015) undertook a subsequent systematic mapping exercise to scope and categorise community nursing service organisation provider models, but little is known about the impact of such community nursing models on emergency admissions (Smith and Mays, 2005). We sought to examine the extent to which different community nursing models, as described by Spilsbury and Pender (2015), impacted on emergency hospital admissions and emergency hospital bed days for older people using an ecological study design based on routinely collected data.

Methods

Study design, setting and population

The organisation model that PCTs adopted for community services in 2011/12 was taken from Spilsbury and Pender. A design variable was constructed with three categories: integration with an acute hospital provider, (the largest group which was used as the reference category), integration with a mental health provider and no structural integration (community trust, community interest company).

We conducted a longitudinal ecological study using a balanced dataset of 1,400 observations: 140 primary care trusts for ten annual time periods (2006/7 to 2015/16). The 140 primary care trusts were those that adopted one of the following three models for community services in 2010/11; integration with acute hospital provider, integration with a mental health

provider, the establishment of a stand-alone organisation (community trust, community interest company).

Variables and data sources

The outcome variables were the number of emergency hospital admissions and emergency hospital bed days. These variables were derived from an extract of the Hospital Episode Statistics for Admitted Patient Care dataset obtained from the NHS Health and Social Care Information Centre. Emergency admissions and bed days were identified using the admission method field. The number of bed days was identified using the spell duration field. Admission and bed days were assigned to a year based on the patient's discharge date and to PCT based on the patient's lower super output area (LSOA) of residence using the 2011 LSOA to PCT lookup file from the Office of National Statistics Geography Portal.

The explanatory (or risk-modifying) variables included the resident population aged 75 and over, the proportion of the population aged 85 or over (of those aged 75+), levels social deprivation, year and the organisational model adopted for community nursing services in 2011/12. In addition, variables were created to encode the number of years since the intervention, the adoption of a new service model for community nursing, (0 if before 2011/12, 1 if 2011/12, through to 5 if 2015/16).

The resident population aged 75 years and over and 85 and over was obtained from the Office of National Statistics mid-year population estimates for LSOAs. Social deprivation was defined using the 2010 English Indices of Deprivation for LSOAs. The deprivation level variable for a primary care trust was defined as the unweighted average deprivation score for lower super outputs areas within the primary care trust. Year was converted to an integer variable from 0 for 2006/7 through to 9 for 2015/16.

Statistical methods

We used negative binomial regression to estimate the impact of the organisational model for community nursing on the number of emergency hospital admissions and bed days having adjusted for the explanatory variables. Given that we were interested in estimating and comparing the average effect on a PCT of adopting each of the organisational models, we used generalised estimating equations to estimate the parameter values. Robust standard errors were used to generate 95% confidence intervals for each of the model parameters.

The models contained three time-varying main effects: the proportion of the population aged 75 and over who are aged 85 or over minus the 10-years PCT-specific mean for this proportion; year; and years since intervention; and three time-invariant main effects: 10-years mean proportion of population aged 85 and over; deprivation level; and organisational model.

The model also contained three interaction terms between organisational model and year, before/after intervention and years since intervention. These interaction terms were used to identify and adjust for differences between organisational models in emergency admissions and bed day trends before, at the point of and after the organisational models were adopted. These were our variables of interest.

Primary care trust was treated as a cluster variable. The population aged 75 and over was used as a time-varying offset variable.

Pairwise comparisons between the three organisational models were calculated for the variables of interest.

The quasi-likelihood under the independence model criterion (QIC) was used to guide decisions about the optimal correlation structure (Pan, 2001).

DF Beta values were calculated for all combinations of model coefficients and PCTs. Sensitivity analysis was conducted by assessing the stability of the model coefficients having removed those PCTs with the greatest leverage.

Data processing was conducted in Microsoft SQL Server 2012. Analysis was carried out in Stata IC version 15.1 statistical software package incorporating the QIC program developed by Cui (2007).

Results

Description of primary care trusts and integration choices

Integration with acute hospital provider was the most common organisational model selected by primary care trusts for their community nursing service in 2011/12 ($n = 58$), followed by integration with a mental health provider ($n = 38$), a community trust ($n = 30$) and a community interest company ($n = 14$). 11 primary care trusts were excluded from our later analysis: six that adopted a mix of organisational models, two that selected a supplier using an any willing provider (AWP) approach, two that postponed the transfer to community nursing and one whose organisational model was not known.

In this paper, we focus our attention on the 140 primary care trusts that transferred services to a community trust, a community interest company, (i.e. without structural integration), integrated services with an acute or integrated services with a mental health trust.

The average population size, aged 75+, was greater for those PCTs that established community trusts. Deprivation levels, emergency admissions and bed day rates were higher on average amongst those PCTs that chose to integrate their community nursing service with an acute hospital provider (see Table 1).

There was substantial variation in the approaches taken to community nursing service transfers between government office regions. All community nursing services in the North East of England were integrated with acute trusts. No such transfers took place in the East of England.

Trends in emergency admissions and bed days

The numbers of emergency admissions amongst those aged 75 and over grew at 3.4% per annum between 2006/7 and 2015/16 and a slightly faster rate in the first half of this period. Emergency bed days fell between 2006/7 and 2011/12 before returning to the starting level by 2015/16. The population aged 75 and over grew by 1.4% over the 10-year period (see Table 2).

Figure 1 shows the trends in crude rates of emergency admissions and bed days by PCT, segmented by the organisation model adopted for community nursing services in 2011/12.

		Organisational model adopted in 2011/12			
		Integration with an acute care provider	Integration with an mental health provider	No structural integration	Other
Primary care trusts	Number	58	38	44	11
	[%]	[38]	[25]	[29]	[7]
Population aged 75+ (‘000s)	2011 Mean	22.4	29.4	30.9	32.7
	[SD]	[14.7]	[20.8]	[22.0]	[26.6]
% Population aged 85+ *	2011 Mean	27.8	28.7	28.8	28.9
	[SD]	[1.9]	[1.8]	[2.1]	[3.4]
Deprivation Score	2010 Mean	25.7	22.4	22.8	20.6
	[SD]	[8.4]	[7.8]	[8.4]	[8.9]

Note(s): *of those aged 75+

Table 1.
Description of primary
care trusts by TCS
transfer ($n = 151$)

Year	Emergency admissions	Emergency bed days	Population
2006/7	1,220,322	15,351,182	3,890,227
2007/8	1,243,183	14,717,354	3,938,501
2008/9	1,343,438	15,184,556	3,976,133
2009/10	1,396,790	15,349,255	4,012,512
2010/11	1,442,222	15,136,651	4,073,151
2011/12	1,462,560	14,853,345	4,137,496
2012/13	1,516,397	15,020,643	4,212,018
2013/14	1,538,484	14,951,552	4,281,606
2014/15	1,630,782	15,261,955	4,374,835
2015/16	1,650,635	15,233,255	4,425,817
CAGR 2006/7 to 2010/11	4.3%	-0.4%	1.2%
CAGR 2011/12 to 2015/16	3.1%	0.6%	1.7%
CAGR 2006/7 to 2015/16	3.4%	-0.1%	1.4%

Table 2.

Trends in emergency admissions, bed days and population aged 75+

Model results and model fit

Estimated coefficients for the emergency admission and emergency bed-day models are provided in [Tables 3](#) and [4](#). We present the models with a full set of candidate covariates, although some very small improvements in model fit (measured by the QIC) could be achieved by eliminating some of variables.

Differences between organisation models in emergency admissions and bed days

Having adjusted for changes in population size, structure and deprivation levels, growth rates in emergency hospital admissions (aged 75+) prior to TCS were 3.0% per annum for PCTs that went onto integrate community nursing services with an acute care provider, 2.9% for those that integrated community nursing services with a mental health provider and 3.6% for those that did not structurally integrate community nursing. In the years that followed TCS, the rates of growth in emergency hospital admissions fell in all three groups to 0.7%, 0.6% and 0.9%. Whilst the change in growth rates seen in all three groups is statistically significant ($p < 0.05$), the difference between the groups both before and after TCS are not. [Note that this analysis is not designed to assess the impact of the TCS policy *per se* but rather the differential impact of TCS integration options. In particular, we cannot conclude from this analysis that the TCS policy caused the reduction in emergency admission rates. (see [Figure 2](#)).

For emergency bed day use (75+), growth rates were broadly similar ($c -2.0%$) before and after TCS in all three groups of PCTs. The changes before and after TCS and the differences between the three groups were not statistically significant ($p > 0.05$) (see [Figure 3](#)).

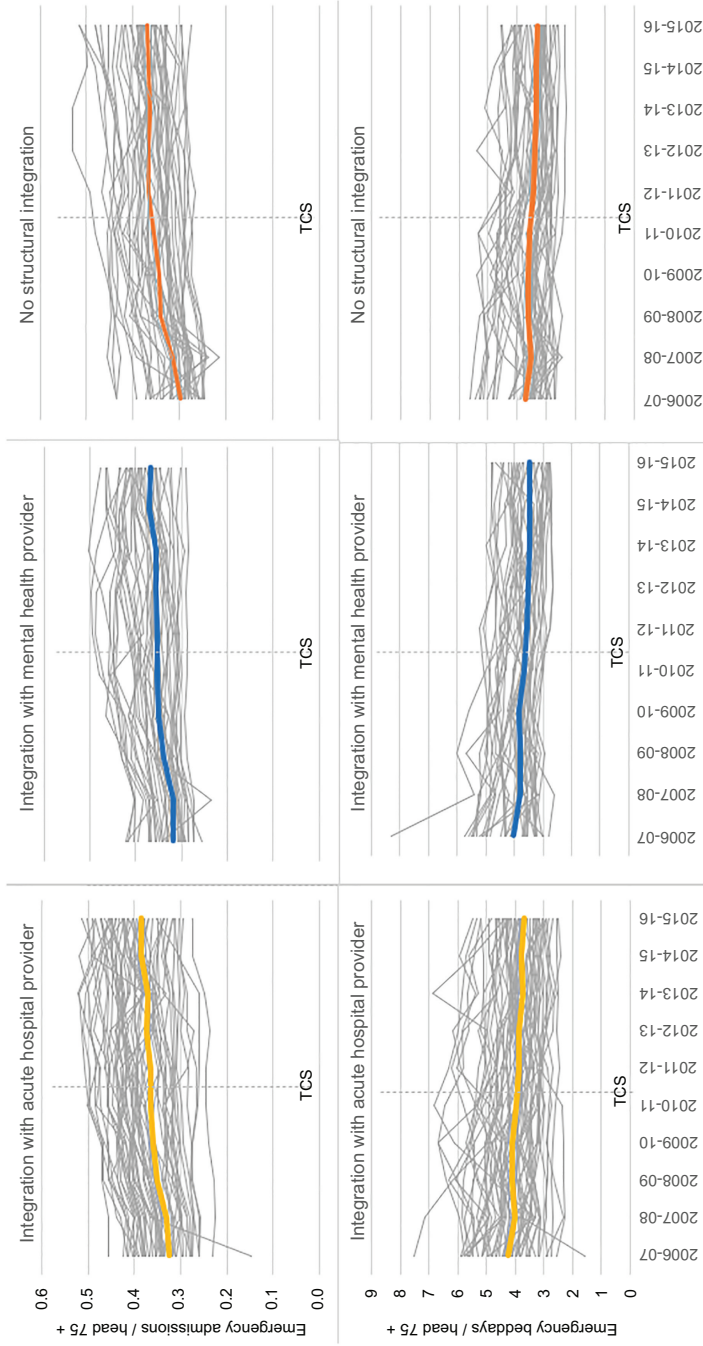
Sensitivity / outlier analysis

One PCT exhibited larger DFBeta values than the other PCTs for several of the model coefficients; however the headline model results were not altered when this PCT was removed from the analysis.

Discussion

Key findings

We set out to determine if, in response to the TCS policy directive ([Charles et al., 2018](#)), different models of community nursing services had a differential impact on emergency admissions. Three dominant approaches emerged: (1) integration of community nursing services with an acute hospital trust, (2) integration with a mental health trust and (3) the establishment of a stand-alone organisation (NHS Trust or Community Interest Company) without structural integration (and therefore greater autonomy to focus on the related



Note(s): Grey lines represent individual PC'Ts, coloured lines represent the aggregate rate across the PC'Ts in each group

Figure 1. Trends in emergency admissions and bed-days rate per head of population 75+

Covariate		IRR	<i>P</i> > <i>z</i>	[95% conf. Interval]	
Year		1.030	0.000	1.023	1.037
% Pop 85+	(10-yr PCT mean)	0.477	0.114	0.190	1.194
% Pop 85+	(PCT trend)	2.013	0.201	0.689	5.879
Deprivation		1.011	0.000	1.009	1.013
Years since intervention		0.978	0.000	0.969	0.986
Org. model	Integration with an acute care provider	1.000	–	–	–
	Integration with a mental health provider	1.011	0.646	0.965	1.059
	No Structural integration	0.944	0.018	0.899	0.990
Org. model * year	Integration with an acute care provider	1.000	–	–	–
	Integration with a mental health provider	0.999	0.859	0.990	1.008
	No structural integration	1.006	0.228	0.996	1.015
Org. model * intervention	Integration with an acute care provider	1.000	–	–	–
	Integration with a mental health provider	0.999	0.936	0.986	1.013
	No Structural integration	0.996	0.571	0.982	1.010
Intercept		0.309	0.000	0.236	0.405

Table 3.
Emergency admission
model, model
covariates and
coefficients

Covariate		IRR	<i>P</i> > <i>z</i>	[95% conf. Interval]	
Year		0.979	0.001	0.968	0.992
% Pop 85+	(10-yr PCT mean)	0.664	0.547	0.175	2.521
% Pop 85+	(PCT trend)	9.989	0.009	1.784	55.942
Deprivation		1.011	0.000	1.008	1.014
Years since intervention		1.003	0.661	0.989	1.017
Org. model	Integration with an acute care provider				
	Integration with a mental health provider	1.036	0.446	0.946	1.133
	No structural integration	0.898	0.006	0.832	0.970
Org. model * year	Integration with an acute care provider				
	Integration with a mental health provider	0.988	0.132	0.972	1.004
	No Structural integration	1.004	0.622	0.990	1.018
Org. model * intervention	Integration with an acute care provider				
	Integration with a mental health provider	1.010	0.300	0.991	1.030
	No structural integration	0.995	0.628	0.977	1.014
Intercept		3.818	0.000	2.538	5.744

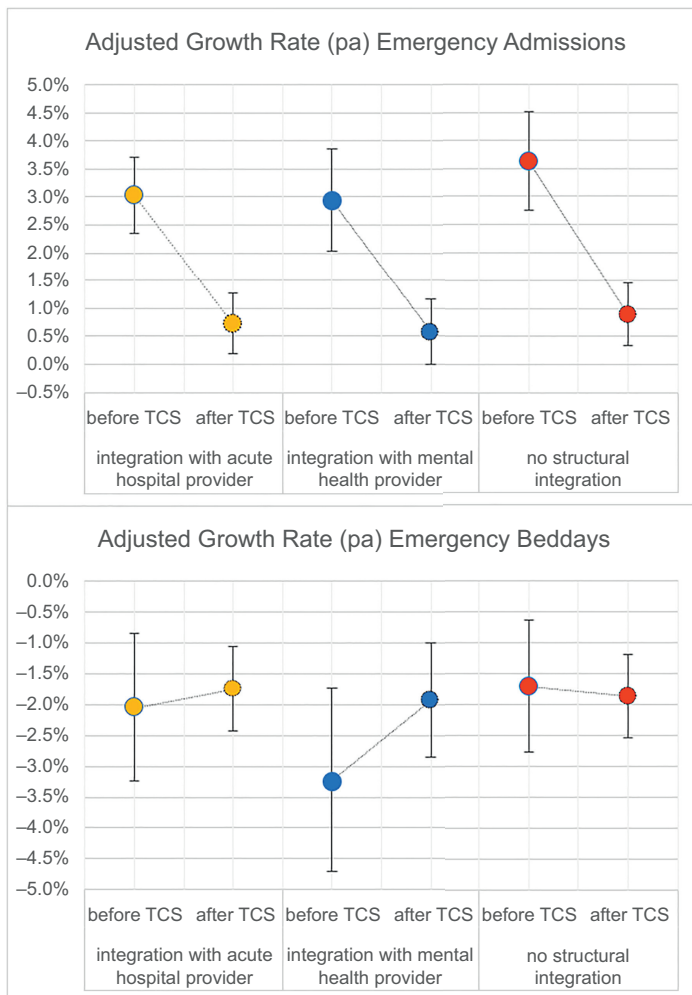
Table 4.
Emergency bed-day
model, model
covariates and
coefficients

services. Our analysis provides no evidence that any one approach to organising community nursing services was superior in terms of reducing emergency hospital use in older people. As far as we are aware, previous studies have not examined this question ([Smith and Mays, 2005](#); [Lafond *et al.*, 2016](#); [Pan, 2001](#)).

Limitations

There are several limitations to our work.

- (1) Our negative finding should not be used to over-interpret the success or otherwise of the TCS policy which was accompanied by 43 quality indicators to measure success ([Department of Health, 2011](#)).
- (2) PCTs themselves were abolished on 31 March 2013 as part of the Health and Social Care Act 2012 ([Health And Social Care Ac, 2012](#)), with their work taken over by clinical commissioning groups. Nevertheless, this does not mean our findings are



Note(s): Whiskers (error bars) denote 95% confidence intervals

Figure 2. Adjusted growth rates (per annum) in emergency hospital use (75+) before and after transforming community services

redundant because the general premise, of integrating services using different models, especially to reduce hospital activity, remains an ongoing concern in health and care systems.

- (3) The selection of integration approach did not occur randomly (Smith and Mays, 2005; Lafond *et al.*, 2016; Pan, 2001). Indeed, the selection of approach was the subject of considerable debate (Smith and Mays, 2005; Lafond *et al.*, 2016; Pan, 2001). It is likely that these choices were influenced by ideology of decision-makers, the reputation of potential host organisations and the quality of relationships between provider organisations. There was variation in the geographic distribution and in the age and deprivation profile of organisations selecting each of the three approaches. Although our study controlled for some of these differences, we cannot discount the possibility that our results have arisen due to a failure to control for some unobserved covariate.

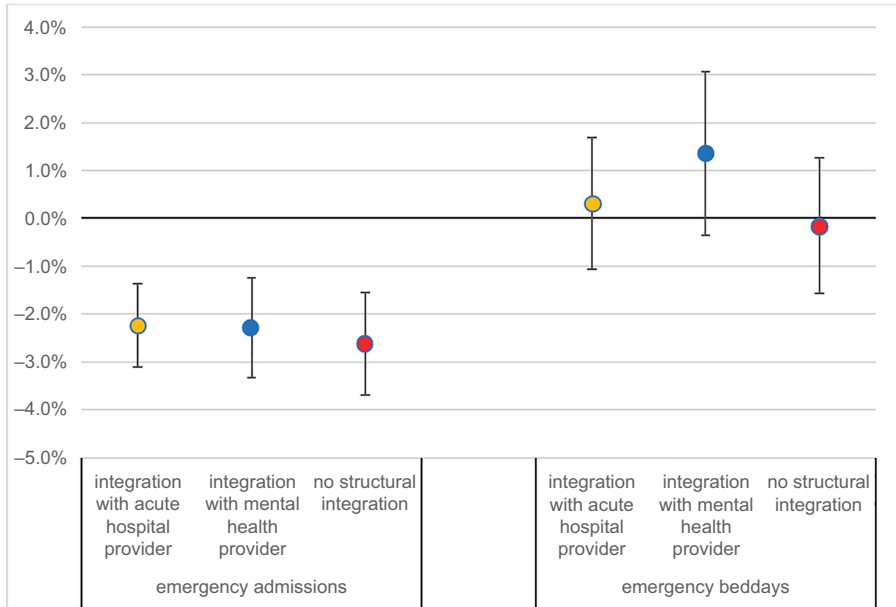


Figure 3.
Change in adjusted growth rate (per annum)

Note(s): Whiskers (error bars) denote 95% confidence intervals

- (4) Whilst our study compared PCTs in terms of the approach to integration of community nursing services that was selected in 2011, a small number of services may have subsequently reorganised during the study period.
- (5) Emergency hospital admissions and bed days are commonly used indicators of the quality and integration of care for older people. However, reducing the frequency of these events is not the only or even primary objective of community nursing services. Further research to explore the impact of structural integration on patient experience, outcomes and on costs is warranted.
- (6) Many other services and policy interventions have sought to influence the trends in emergency hospital use for older people during the study period. These may have obscured any relationship between community nursing integration approaches and emergency hospital use for older people.
- (7) Our study found no systematic difference between organisations adopting different structural models. Nonetheless variation in the growth of emergency hospital use amongst older people is clearly present. If these differences are not driven by organisational structures, then other factors must be at play and merit further study.

Conclusions and implications for policy and research

There is a clear rationale for more person-centred and coordinated care and to moving appropriate care from the hospitals to the community. The most efficient ways to achieve such goals in practice remain elusive. Our analysis suggests that decisions taken in 2010/11 to structurally integrate community nursing services and the form of this integration did not systematically and differentially influence the rate of emergency hospital use of older people. Whilst a positive finding in favour of one approach might have been more striking, our result is still highly informative. Undertaking mergers of health care organisations are often

challenging, time-consuming and costly in terms of missed opportunities with the danger of disrupting what has worked well previously (Fulop *et al.*, 2005; Weil, 2010). They require considerable planning and implementation over long time periods if the expected benefits are to be realised (Miller *et al.*, 2017). This research suggests that mergers and organisational changes should not be confidently promoted or pursued as a means of reducing hospital activity. If organisational change must take place, then healthcare systems should have other compelling reasons for doing so. Other factors appear to play a more significant role in determining levels of emergency hospital admissions, and more effort should therefore be applied to identifying those critical ingredients robustly. Finally, the lack of such analysis until now demonstrates again that opportunities are being lost to generate timely evidence to evaluate common policy assumptions.

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