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Are some areas more equal than others? Socioeconomic inequality in potentially avoidable emergency hospital admissions within English local authority areas

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Abstract

Objectives: Reducing health inequalities is an explicit goal of England's health system. Our aim was to compare the performance of English local administrative areas in reducing socioeconomic inequality in emergency hospital admissions for ambulatory care sensitive chronic conditions.

Methods: We used local authority area as a stable proxy for health and long-term care administrative geography between 2004/5 and 2011/12. We linked inpatient hospital activity, deprivation, primary care, and population data to small area neighbourhoods (typical population 1500) within administrative areas (typical population 250,000). We measured absolute inequality gradients nationally and within each administrative area using neighbourhood-level linear models of the relationship between national deprivation and age–sex-adjusted emergency admission rates. We assessed local equity performance by comparing local inequality against national inequality to identify areas significantly more or less equal than expected; evaluated stability over time; and identified where equity performance was steadily improving or worsening. We then examined associations between change in socioeconomic inequalities and change in within-area deprivation (gentrification). Finally, we used administrative area-level random and fixed effects models to examine the contribution of primary care to inequalities in admissions.

Results: Data on 316 administrative areas were included in the analysis. Local inequalities were fairly stable between consecutive years, but 32 areas (10%) showed steadily improving or worsening equity. In the 21 improving areas, the gap between most and least deprived fell by 3.9 admissions per 1000 (six times the fall nationally) between 2004/5 and 2011/12, while in the 11 areas worsening, the gap widened by 2.4. There was no indication that measured improvements in local equity were an artefact of gentrification or that changes in primary care supply or quality contributed to changes in inequality.

Conclusions: Local equity performance in reducing inequality in emergency admissions varies both geographically and over time. Identifying this variation could provide insights into which local delivery strategies are most effective in reducing such inequalities.

Keywords

emergency admissions, health care, inequalities, quality indicators, socioeconomic factors

Introduction

Emergency hospital admissions are undesirable for patients and costly for health care systems.[1] Several countries have sought to reduce admissions that may be avoidable.[2] Unplanned admissions for 'ambulatory care sensitive conditions' (ACS) is an indicator of admissions that could be avoided by care outside hospital emergency departments.[3,4] In England, the National Health Service (NHS) uses unplanned admissions for

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ACS chronic conditions (referred to as 'emergency admissions') as an indicator of how well such patients are being managed outside hospital.[5]

The NHS routinely monitors emergency admission rates in local administrative areas. Until recently this focused on mean rates, but in 2016, the NHS also started monitoring social inequalities in emergency admissions within local administrative areas.[6] This is in line with the statutory duty of local NHS planners to consider reducing health inequalities.[7] In addition, there are substantial geographic variations in emergency admissions,[1] which are higher in socioeconomically deprived areas.

A recent national analysis of 2004/05 to 2011/12 suggests that reducing inequalities in emergency admissions is challenging. Undertaken in a period of substantial government investment in reducing health inequalities, that analysis indicated that while inequalities in primary care quality and supply were virtually eliminated, there were only modest reductions in inequalities in emergency admissions.[8]

Performance on inequalities at national level may mask variations in local performance. Moreover, identifying local area performance could provide insights into which strategies are most effective in reducing inequalities. New methods of local health equity performance monitoring have been developed.[9] In this paper, we apply these methods to compare the performance of local administrative areas between 2004/5 and 2011/12 in reducing inequality in emergency admissions for ACS chronic conditions.

Our objectives were to:

- identify areas where performance was significantly better or worse than the national average in inequality in emergency admissions by year;
- assess the stability of this measure year-to-year, and over longer periods;
- identify areas with steadily improving or deteriorating performance;
- examine local associations between inequality in emergency admissions and primary care supply and quality.

Methods

Data

We used local authority district areas as a stable proxy for English health service administrative geography, i.e. to approximate the local unit responsible for planning and providing health care, public health, long-term care, and other services that may influence health outcomes. Local authorities typically cover populations of about 250,000 but vary from about 30,000 to one million. Each authority is divided into lower level super output areas (LSOA). LSOAs – referred to as ''neighbourhoods'' – are more uniform in size, typically covering 1500 residents and have stable boundaries which enable examination of within-local authority inequalities in health service performance over time.

Deprivation was measured using the Index of Multiple Deprivation 2010 (IMD2010) and neighbourhoods were grouped into quintiles of deprivation.[10] We excluded areas where deprivation spanned less than 60% of the IMD2010 scale (i.e. where comparisons would be across two quintiles only) so that inequality measures represented a wide and comparable deprivation range.

The indicators, defined briefly below, are described in more detail in online Appendix 1 and elsewhere.[8,9] Emergency admissions were defined as the number of people of all ages with one or more emergency admissions for an ACS chronic condition per 1000 of the resident population, indirectly standardized for age and sex.[5] Admissions data were obtained from Hospital Episode Statistics. The primary care supply indicator (full-time equivalent GPs/100,000 population adjusted for need) was derived using the annual NHS General and Personal Medical Services workforce census. A composite indicator capturing measurable aspects of primary care quality (public health impact score) was derived using data from the national primary care pay-for-performance programme, the Quality and Outcomes Framework.[11]

Mid-year population estimates for 2004–2011 were obtained from the Office for National Statistics. We constructed inequality indices by linking neighbourhood-level emergency admissions, primary care supply, and quality with population and deprivation data.

Analysis

Measuring inequality at a local level: Cross-sectional comparisons with the national average. Our methods for computing local inequality gradients are summarized below. More detail of their development and validation is in a technical report.[9] We measured absolute inequality gradients nationally and within each local authority using linear models of the neighbourhood-level relationship between national deprivation and rates of emergency admissions in each year of the study. We computed slope indices of inequality (SIIs) representing the modelled gap between the most and least deprived neighbourhoods in England.[12]

Local equity performance was assessed by categorizing each area's SII for emergency admissions (as better, worse or the same), depending on whether local inequality was significantly different ($p < 0.05$) than national average inequality in any given year. If this

measure is a meaningful indicator of inequalities, we would expect changes between consecutive years to be smaller than changes over longer periods when sustained changes in local delivery may occur. We used Cohen's Kappa statistic to compare stability between consecutive years and longer time periods.[13] This was weighted for the degree of agreement (1 for full agreement; 0.5 for a change from improved to same or same to worse; 0 for a change from improved to worse).

Trends in inequalities. To identify cumulative area-level inequality trends, we categorized administrative areas by:

- Change in local SII relative to a national benchmark: we initially categorized areas as improving if inequalities had fallen more than the national average reduction over the entire study period, or worsening otherwise (including reductions less than the national average).
- Cumulative change rather than short-term fluctuation: we re-categorized areas as no change where changes between consecutive years were greater than over the entire period or where changes were not in a consistent direction in at least five out of seven intervals.

Areas were also grouped by their performance compared with the national average in 2004/5.

We then explored whether cumulative change in inequalities could be an artefact of within-area deprivation change not reflected by our time-fixed deprivation indicator (IMD2010) which is based on data from 2007. If areas are substantially gentrifying, resulting in apparently deprived neighbourhoods actually being affluent, this could generate a reduction in inequalities in emergency admissions that is more apparent than real.

We compared deprivation in IMD2007 (based mainly on 2005 data) and IMD2015 (based on data from 2012–2013)[10] to reflect area deprivation at the study's start and end. We used the extent of deprivation, a weighted indicator of the proportion of an area's population living in the most deprived parts of England.[10] Areas were ranked on their extent of deprivation, where 1 represents the highest proportion living in deprived areas. We constructed a dichotomous variable for gentrification if an area's extent improved by at least five places in IMD2015 compared with IMD2007.

Contribution of primary care to inequalities in emergency admissions. We examined associations between emergency admissions, primary care supply, and quality using area-level panel data linear models with fixed and random effects between 2004/5 and 2011/2. We also included the rank of IMD2010 local authority score to control for area-level deprivation at the midpoint of the time period.

We used two models with different outcomes. Model 1 examined inequalities in emergency admissions using the SII index, controlling for overall emergency admissions, and the SIIs and means of primary care supply, quality, and deprivation. Sensitivity analyses were also conducted using the relative index of inequality (RII), which divides the SII by the national mean.[12] Model 2 examined overall mean emergency admissions, controlling for the means and SIIs of primary care supply, quality, and deprivation.

Results

Results are presented on 316 out of 326 areas after excluding local authorities with a narrow deprivation range.

Cross-sectional comparisons with the national average over time

Table 1 provides the national mean and absolute inequality (SII) of emergency admissions 2004/5–2011/12 with the minimum and maximum values across all areas for both measures to give an indication of the full range of performance by year.

In each year, there were 30–40% of areas with SIIs statistically significantly better or worse than national rates. Agreement between consecutive years (Kappa ranged from 0.47 [0.38; 0.55] to 0.56 [0.48; 0.65]) was greater than agreement over the entire time period (Kappa = 0.34 [0.26;0.41]), which supports the short-term stability of this measure.

Trends in inequalities

In areas classed as improving, the gap in emergency admissions between most and least deprived neighbourhoods fell by 3.9 admissions per 1000 from 2004/5 to 2011/12 (i.e. six times the size of the fall in overall emergency admission SIIs nationally), while in those worsening the gap widened by 2.4 (Figure 1). Expressed in terms of a typical local authority population of 250,000 people, over the study period, an improvement in SII of 3.9 represents a reduction of 488 admissions in the gap between the most and least deprived areas.

Between 2004/5 and 2011/12, emergency admissions inequalities in 21 (7%) areas reduced consistently and in 11 (3%) it increased. Only one area identified as improving over time started with better equity (i.e. lower inequalities) than the national average in 2004/5 and no areas that worsened over time started worse in 2004/5 (Table 2).

Fewer areas with worsening or improving equity in emergency admissions were gentrified than areas with no

Table 1. Cross-sectional comparisons of inequalities in emergency admission rates – National data and SIIs for local areas.

	Year							
	2004/5	2005/6	2006/7	2007/8	2008/9	2009/10	2010/11	2011/12
Emergency admissions (national rates/1000 population)								
Overall mean	6.21	6.06	5.98	5.72	5.85	5.68	5.71	5.55
Range (min–max)	(2.87–12.66)	(2–12.15)	(0.22–12.33)	(1.76–11.89)	(1.46–12.08)	(1.6–11.21)	(1.93–10.78)	(1.8–10.12)
Absolute inequalities (SII)[a]	6.63	6.51	6.42	6.24	6.36	6.07	6.33	5.98
Range (min–max)	(0.79–14.88)	(−0.55–16.29)	(0.08–14.64)	(−0.05–15.97)	(−3.01–14.99)	(−0.26–15.76)	(−1.11–17.55)	(−0.3–14.91)
LA performance on absolute inequalities (SII) in admissions								
Better than national average[a]	20%	19%	20%	24%	24%	24%	26%	13%
Not significantly different	69%	69%	68%	64%	66%	63%	60%	69%
Worse than national average[b]	11%	12%	12%	11%	10%	13%	14%	17%
Stability (Kappa coefficient)								
Consecutive years	n/a	0.52 [0.44;0.60]	0.55 [0.47;0.63]	0.52 [0.44;0.60]	0.47 [0.38;0.55]	0.56 [0.48;0.65]	0.54 [0.47;0.62]	0.54 [0.47;0.62]
vs. 2004/5	n/a	0.52 [0.44;0.60]	0.47 [0.39;0.55]	0.38 [0.3;0.46]	0.36 [0.27;0.44]	0.38 [0.3;0.46]	0.31 [0.23;0.39]	0.34 [0.26;0.41]

[a]An SII of 6.63 means there were 6.63 more admissions per 100 sex and age-adjusted population per year in the most deprived 20% of neighbourhoods compared with admissions in the 20% least deprived neighbourhoods.
[b]Significantly different at $p=0.05$.

change in admissions (9% and 10% vs. 17%) (Table 3), so there is no indication that improving socioeconomic circumstances was responsible for changing inequalities in emergency admissions.

Contribution of primary care to inequalities in emergency admissions

Using Model 1, absolute inequality gradients in emergency admissions were similar within deprived and affluent areas, once controlled for mean admissions, primary care supply, and quality (Table 4). Furthermore, the association between absolute inequality gradients and mean admissions became much smaller and non-significant when the relative index was used. This is as expected: absolute inequality measures are sensitive to changes in the mean, whereas relative measures are not.[12]

Inequalities in emergency admissions were not influenced by primary care supply or quality. While the association between inequalities in emergency admissions and mean primary care supply was statistically significant in the random effects model, it was weak and non-significant in models using fixed effects and relative indices of inequality.

Using Model 2, mean emergency admissions were higher in areas with higher deprivation (Table 5). They were also higher in areas with greater primary care supply and better quality. However, associations with primary care were small in magnitude. For example, when the coefficient of -0.02 for mean primary care supply in the random effects model is expressed in terms of a typical practice population ($\sim$6000 patients), an increase of 0.5 GPs per practice would be required to achieve one fewer admission.

Discussion

Main findings

Many areas (35–40%) performed significantly better or worse than the national average in any given year in reducing inequality in emergency admission rates for ACS chronic conditions. Furthermore, a few had cumulatively improving (7%) or worsening (3%) equity compared with a national benchmark.

Area-level improvements in primary care supply and quality were associated with minor reductions in average emergency admissions but not with reducing inequality gradients.

Strengths and limitations

This is the first study to compare health care equity in local administrative areas against a national

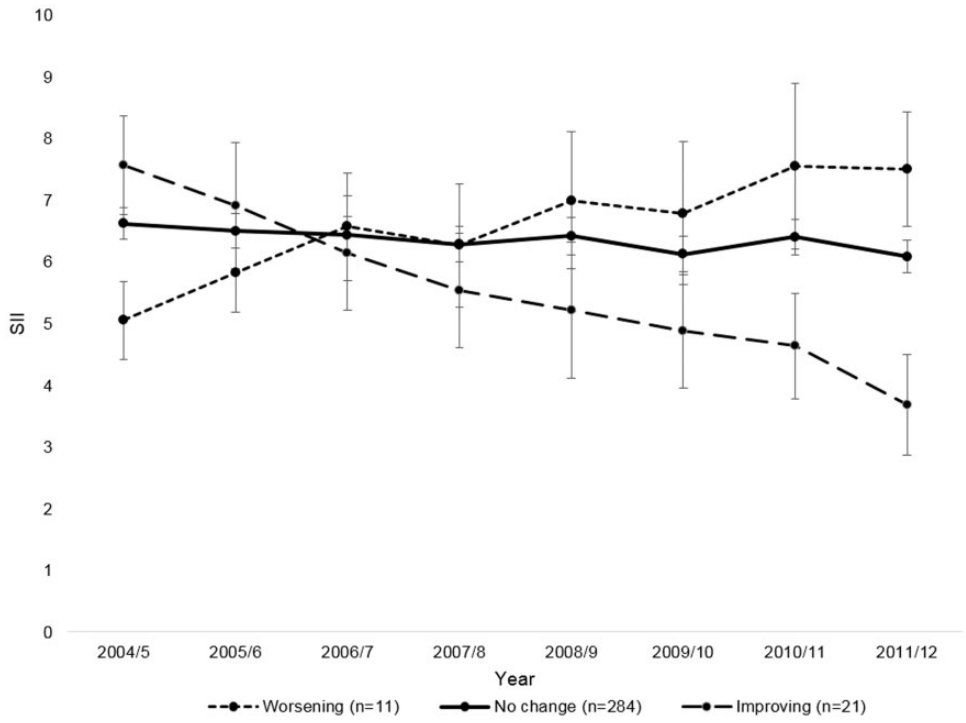

Figure 1. Cumulative changes in absolute inequalities.

Table 2. Areas 'worsening', with 'no change' or 'improving' by initial performance on inequalities.

		SII change (2004/5-2011/2012)			
		'Worsening' n (%)	'No change' n (%)	'Improving' n (%)	Total n (%)
SII in 2004/5 (compared with national average)	Worse	0 (0)	30 (9)	4 (1)	34 (11)
	Same	5 (2)	192 (61)	16 (5)	213 (67)
	Better	6 (2)	62 (20)	1 (0)	69 (22)
	Total	11 (3)	284 (90)	21 (7)	316 (100)

Note: Percentages in each cell of the table are calculated with reference to the entire sample.

benchmark. Its strengths include the use of administrative data for the whole population covering emergency admissions in England, the ability to compare neighbourhood inequality within local areas against a national benchmark, the use of longitudinal data to evaluate change in local equity over time, and examination of the area-level contribution of primary care to changes in local inequality gradients.

One limitation is the use of local authority districts as a proxy for health service geography, rather than NHS administrative areas. The rationale was that during the period studied health care underwent two reorganisations changing the boundaries of local geographical areas responsible for health services. In contrast, local authorities stayed fairly consistent. In addition, local authority areas are often co-terminous or nearly co-terminous with health service geography; are responsible for long-term care and other public services that influence health; and are supposed to work closely with local NHS managers on planning health services.

A second limitation is that we have used relatively simple statistical methods and inequality measures, in order to facilitate communication of our findings to decision makers. Our previous methods development work involved extensive sensitivity analyses using more sophisticated methods, (non-linear models and empirical Bayes estimation), which indicated this makes little difference to basic inequality patterns and local performance.[9]

Table 3. Changes in emergency admissions SII vs. 'gentrification' over time.

		'Gentrification' occurred?		
		No	Yes	n
SII change (2004/5–2011/2012)	'Worsening'	10 (91)	1 (9)	11
	'No change'	236 (83)	48 (17)	284
	'Improving'	19 (90)	2 (10)	21
	Total	265	51	316

Note: Gentrification = LA's rank extent of deprivation (% proportion living in the most deprived LSOAs in England) had improved relative to other LAs by at least five places.

Thirdly, there are limitations in the indicator for emergency admissions. It is an aggregate of emergency admissions for many chronic conditions so it may mask differences between conditions. Without disaggregated analysis, we cannot tell whether changes reflect a system-wide impact across all conditions, or whether changes in specific conditions are the predominant driver of overall equity change. Also, due to lack of detailed individual level data, we could only adjust for age and sex and not morbidity. Instead, we allow for the social gradient in morbidity by comparing local gradients against the national gradient as a benchmark for the expected local gradient due to the social gradient in morbidity.

Table 4. Regression models for inequalities in emergency admission rates controlled for primary care supply and quality 2004/2005–2011/2012 (n = 316 areas).

	Outcome: Absolute inequalities in emergency admissions (SII)		Outcome: Relative inequalities in emergency admissions (RII)	
	Random effects	Fixed effects	Random effects	Fixed effects
Deprivation (average score 2010)	0.01 (0.011)	n/a	0 (0.003)	n/a
Emergency admission rate (mean)	1.16 (0.045)**	1.17 (0.036)**	0.01 (0.015)	0.01 (0.007)
GPs per 100,000 patients (mean)	0.02 (0.007)*	0.01 (0.006)	0 (0.001)	0 (0.001)
GPs per 100,000 patients (inequality)[a]	0 (0.006)	−0.00 (0.005)	−0.02 (0.066)	−0.05 (0.054)
Primary care quality (mean)	0 (0.014)	0.01 (0.013)	0 (0.003)	0 (0.003)
Primary care quality (inequality)[a]	−0.03 (0.021)	−0.03 (0.02)	−0.38 (0.296)	−0.35 (0.271)
_cons	−1.78	−1.86 (1.10)	0.74	0.76
R squared	0.58	0.33	0.01	0

[a]Slope index where outcome is absolute inequalities, relative index where outcome is relative inequalities.
*$p < 0.05$; **$p < 0.01$.

Table 5. Regression models for mean emergency admissions, controlled for inequalities in emergency admissions, primary care supply and quality 2004/2005–2011/12 (n = 316 areas).

	Random effects (Standard error)	Fixed effects (Standard error)
Deprivation (average score 2010)	0.1 (0.008)**	n/a
Emergency admission rate (inequality)[a]	0.28 (0.026)**	0.277 (0.009)**
GPs per 100,000 patients (mean)	−0.02 (0.004)**	−0.016 (0.003)**
GPs per 100,000 patients (inequality)[a]	0.01 (0.002)**	0.01 (0.002)**
Primary care quality (mean)	−0.01 (0.007)	−0.019 (0.006)**
Primary care quality (inequality)[a]	0.03 (0.013)*	0.037 (0.009)**
_cons	4.33 (0.737)**	6.374 (0.518)**
R squared	0.73	0.58

Note: Deprivation captures the range of average LA score, ranging from 1 to 316, where 1 is the most deprived and 316 the most deprived.
[a]Slope index of inequality.
*$p < 0.05$; **$p < 0.01$.

Comparisons with other literature

Our finding that increasing primary care supply and improving quality (based on QOF) had only a slight impact on overall emergency admissions is consistent with previous studies.[14–16] It is possible that admissions are influenced by aspects of primary care quality and supply not captured by the indicators we used. Despite this, the finding is important for policy, given the continued focus on the contribution of primary care to reducing emergency admissions overall.[17] It underlines the importance of investigating other strategies to reduce inequalities and admissions overall. This may include a wider contribution of health services, such as better coordination across the health system, or more primary and secondary prevention. As Barr et al.[18] suggest, extra resources to the health system in deprived areas may improve outcomes in those areas but it is not known whether the effect extends to reducing inequalities within areas, something that may require services outside health care such as social care. Also, as Löfqvist et al.[19] illustrate, this question can be best answered where the data exist to examine the relative contribution of population composition and contextual factors, such as health care provision.

Implications for research and practice

It is well established that people in poor areas are more likely to experience an emergency hospital admission for potentially preventable conditions than people in more affluent areas. This study demonstrates that, over time, this social divide in emergency admissions has reduced in some areas much more than others. It highlights the importance of monitoring inequalities in emergency admissions over time. This will help to meet the aspiration in England that 'success is measured not only by the average level of improvement but also by progress in reducing health inequalities and unjustified variation'.[6] In-depth investigation into local areas performing particularly well or poorly on reducing inequalities in emergency admissions may provide insights into cost-effective strategies for local managers to improve population health and curb growing pressures on hospitals.

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References

1. Busby J, Purdy S and Hollingworth W. A systematic review of the magnitude and cause of geographic variation in unplanned hospital admission rates and length of stay for ambulatory care sensitive conditions. *BMC Health Serv Res* 2015; 15: 324.
2. Organisation for Economic Co-operation and Development (OECD). *Avoidable admissions: Respiratory diseases*: OECD Publishing.
3. Purdy S, Griffin T, Salisbury C, et al. Ambulatory care sensitive conditions: terminology and disease coding need to be more specific to aid policy makers and clinicians. *Public Health* 2009; 123: 169–173.
4. Torio C and Andrew SR. *Geographic variation in potentially preventable hospitalizations for acute and chronic conditions, 2005–2011. HCUP Statistical Brief #178*. Rockville, MD: Agency for Healthcare Research and Quality, 2014, Available at: http://www.hcup-us.ahrq.gov/reports/statbriefs/sb178-Preventable-Hospitalizations-by-Region.pdf.
5. NHS Group. *NHS outcomes framework 2015/16*. London: Department of Health, 2014.
6. NHS England. Challenging health inequalities, www.england.nhs.uk/about/gov/equality-hub/challenge-health-inequalities/ (accessed 9 September 2016).
7. Health and Social Care Act 2012, www.legislation.gov.uk/ukpga/2012/7/contents/enacted (accessed 19 May 2016).
8. Asaria M, Ali S, Doran T, et al. How a universal health system reduces inequalities: lessons from England. *J Epidemiol Community Health* 2016; 70: 990–996.

9. Cookson R, Asaria M, Ali S, et al. Health equity indicators for the English NHS: longitudinal whole-population study at small area level. First look summary of revised final report to NIHR health services and delivery research programme project number 11/2004/39 2016.
10. Department for Communities and Local Government. English indices of deprivation, 2010, www.gov.uk/government/statistics/english-indices-of-deprivation-2010 (accessed 19 May 2016).
11. Ashworth M, Schofield P, Doran T, et al. The Public Health Impact score: a new measure of public health effectiveness for general practices in England. *Br J Gen Pract* 2013; 63: e291–e299.
12. Regidor E. Measures of health inequalities: part 2. *J Epidemiol Community Health* 2004; 58: 900–903.
13. Karon SL, Sainfort F and Zimmerman DR. Stability of nursing home quality indicators over time. *Med Care* 1999; 37: 570–579.
14. Harrison MJ, Dusheiko M, Sutton M, et al. Effect of a national primary care pay for performance scheme on emergency hospital admissions for ambulatory care sensitive conditions: controlled longitudinal study. *BMJ* 2014; 349: g6423.
15. Purdy S, Griffin T, Salisbury C, et al. Emergency respiratory admissions: influence of practice, population and hospital factors. *J Health Serv Res Policy* 2011; 16: 133–140.
16. Soljak M, Calderon-Larranaga A, Sharma P, et al. Does higher quality primary health care reduce stroke admissions? A national cross-sectional study. *Br J Gen Pract* 2011; 61: e801–807.
17. NHS England. What actions could be taken to reduce emergency admissions? Secondary What actions could be taken to reduce emergency admissions? www.england.nhs.uk/wp-content/uploads/2014/03/red-acsc-em-admissions.pdf (accessed 19 May 2016).
18. Barr B, Bambra C and Whitehead M. The impact of NHS resource allocation on health inequalities in England 2001-2011: longitudinal ecological study. *BMJ* 2014; 348: g3231.
19. Löfqvist T, Burström B, Walander A, et al. Inequalities in avoidable hospitalisation by area income and the role of individual characteristics: a population-based register study in Stockholm County, Sweden. *BMJ Qual Saf* 2013; 23: 206–214.