Technical Annex 1

POTENTIALLY AVOIDABLE ADMISSIONS AMONG OLDER PEOPLE

Key findings

• Growth in the numbers of admissions for our defined set of avoidable conditions over the last six years has outstripped both demographic growth in the number of older people and growth in total emergency admissions among older people – i.e. admissions for this group of conditions constitutes a larger proportion of hospital workload than they did six years ago, despite efforts by successive governments to move more care into the community.

• The largest growth in these admissions per 1,000 people occurred in the 90 and over age group. Given that older age groups experience a higher frequency of these types of admission, it can be anticipated that demographic growth will continue to increase these demands on secondary health care unless more effective methods for managing care in the community can be incorporated across the country.

• Proportions of these avoidable admissions out of all emergency admissions for this age group and changes over time in these proportions have varied at the regional level. Overall the South West had the lowest proportion of avoidable admissions while the North East had the highest.

• Quarterly changes in the proportion of these avoidable admissions showed the same seasonal pattern as changes in the proportion of people waiting over four hours in A&E departments with both also showing a sharp upturn during the second half of 2012/13. While differences in regional patterns indicated that correlations between these variables are not clear cut, these admissions clearly represent an additional, and potentially avoidable, demand on urgent care services.

• The difference between the 10% of areas with the lowest and 10% with the highest proportion of these avoidable admissions has seen an overall increase over the last five years, with some areas going against the national trend and showing a steady or slightly decreasing admission rate over the last five years. Overall this indicates variable success in managing to avoid these admissions and keep people in community settings. Further exploration of what methods have been successful at a local level, and which could be replicated elsewhere, is needed to ensure all areas learn from best practice.
• Areas where the over 65 population report better health status tend to have lower rates of avoidable admissions. Good health status is likely to be a long-standing outcome of various factors, although a greater focus on improving public health, for example with enhanced primary healthcare, might reduce the burden on secondary care services and ensure people are cared for in the most appropriate environment. Overall this result reinforces the importance of preventative public health measures in reducing demands on secondary care.

• Areas with a higher proportion of over 65s in the population tend to have lower rates of avoidable admissions – this may be due to a greater awareness of the needs of older people in these areas and a greater success in developing systems and initiatives to reduce admissions to hospital.

Background

Research has shown that a number of patients, with a variety of diagnoses, are admitted to hospital when it is not essential and can remain in hospital unnecessarily.¹ It has also been a longstanding aim of the NHS to ‘manage’ demand and reduce the numbers of hospital admissions, although this is yet to be realised.² Inappropriate or unnecessary admissions to hospital are not only an inefficient use of resources but can be disruptive for people’s lives and have a negative impact on their wellbeing. These impacts can be particularly deleterious for more dependent members of the community, such as the elderly, undermining self-confidence, disrupting diet, and increasing dependency and the likelihood of infection. Research by the Nuffield Trust³ and Kings Fund has also shown that proportion of admissions for ambulatory care sensitive conditions (ACSCs⁴) is larger in child and older adult age groups.

This briefing note summarises the results of analysis looking at trends in emergency admissions using Hospital Episode Statistics (HES) data for a selected number of conditions chosen due to being potentially avoidable: either because they are generally preventable or treatable within community settings or are the kind of thing that can be caused by poor care or neglect.⁵ Admissions for these conditions can therefore indicate poor overall care even if the actual admission episode is well managed.

This list includes some commonly defined as ACSCs such as diabetes, chronic obstructive pulmonary disease (COPD), pneumonia, urinary tract infections etc. and also includes other presenting conditions such as fractures that while appropriately treated in an acute setting might have been preventable with better community care. The analysis also focuses only on admissions for older people (aged 65 and

---

¹ Christina L Hammond, Lorraine L Pinnington and Margaret F Phillips, A qualitative examination of inappropriate hospital admissions and lengths of stay, BMC Health Services Research 2009, 9:44
² The King’s Fund 2010, Avoiding Hospital Admissions
³ The Health Foundation and the Nuffield Trust - Focus on preventable admissions: Trends in emergency admissions for ambulatory care sensitive conditions, 2001 to 2013
⁴ ACSCs are defined as conditions for which hospital admissions could be avoided by interventions in preventive and primary care (Purdy et al 2010).
⁵ This is a selection of conditions chosen by CQC and are referred to as ‘avoidable’ conditions for the remainder of this briefing note.
over) due to the higher proportion of avoidable admissions seen for this age group, the greater effect unplanned admissions tend to have on older people’s lives and their greater dependency on services being integrated (e.g. are more likely to be using both health and adult social care services).

Whilst there are a number of factors that influence numbers of emergency hospital admissions for older people quality of care in the community and the interaction between primary healthcare, secondary healthcare and social care services are particularly pertinent. The avoidable admissions being looked at for this review may therefore have been caused by deficiencies in adult social care, primary healthcare or acute care; but it is likely that trends at area, regional or national will be the result of the interplay between several different factors and can provide a general insight into how well care providers are working together to ensure unplanned hospital admissions for the elderly are avoided.

The analysis for this review has been conducted in the following two broad sections:

- Part 1: Examination of trends in emergency admissions amongst older people for the selected conditions over the last six years (using Hospital Episode Statistics data); looking at how numbers of admissions have changed over time, changes in the proportion that these conditions account for out of all emergency admissions and how these trends compare to changes in A&E waiting times.

- Part 2: Regression analysis looking at total admissions for these conditions for 2012/13 to estimate how much variation across the country can be explained by factors such as the proportion of elderly people in the community, availability of care home beds, council spending and levels of deprivation.

**Selection of ‘avoidable’ conditions**

The starting basis of the list was commonly defined preventable or Ambulatory Care Sensitive Conditions (ACSCs) as identified from available literature (e.g. Billings, 1993, Purdy et al, 2010) with several of the list being chosen in this way. The full list of ACSCs was then refined removing those that had low numbers of admissions amongst the elderly over the last two years (and in particular those being admitted from care home postcodes) or aggregating some into a condition bundle with other relevant diagnostic codes. This was done to focus our analysis on the group of people we were most interested in (i.e. older people experiencing health and social care) and in part to aid statistical analysis at the individual condition or diagnostic group level for all chosen conditions rather than being limited by sample sizes at the local authority level to only looking at the conditions as a single bulk group.

To this rationalised list of preventable admissions we then added some conditions that were considered to indicate potential poor care within the community (e.g. fractures and pressure sores). While some of these additional conditions are not community treatable and may require a hospital admission, should they occur, higher rates do indicate a possible failure at some point along the pathway (e.g. lack of appropriate risk assessment and falls prevention in a care home leading to increased numbers of bone fractures).
Overall while admissions for these ‘avoidable conditions’ may not represent poor care for individual cases, changes at the national/regional level and statistically significant variations at a local level do indicate potential differences in the quality of care and integration of care services in regards to reducing hospital admissions for older people.

An admission was counted as ‘avoidable’ in this review where someone aged 65 or over was admitted as an emergency to an acute NHS hospital with a primary diagnosis that matched one of our chosen avoidable conditions. The full list of ICD-10 diagnostic codes and ten condition groups used was as follows:

- Acute lower respiratory tract infections – codes: J20-J22
- Chronic lower respiratory tract infections – codes: J40-J44
- Decubitus ulcers (pressure sores) – codes: L89
- Diabetes – codes: E10-E14
- Food and drink issues – codes: R63 (63.1, 63.2, 63.4, 63.6 and 63.8)
- Food and liquid pneumonitis – codes: J69
- Fractures and sprains – codes: S02, S03, S08, S12, S13, S18, S22, S23, S28, S32, S33, S38, S42, S43, S48, S52, S53, S58, S62, S63, S68, S72, S73, S78, S82, S83, S88, S92, S93, S98, T02, T03, T05, T08, T10 and T12)
- Intestinal infections – codes: A02-A09
- Pneumonia – codes: J12-J18
- Urinary tract infections (UTI): N39
Analysis summary

Part 1: Data Sources

For the analysis conducted in Part 1 of this review the following data sources were used:

- Admissions: Health and Social Care Information Centre - Hospital Episode Statistics, Provisional Data for 2012/13
- Demographic: Office of National Statistics, Census and Mid-year Population Estimates
- Accident & Emergency Waiting Times: NHS England - A&E Waiting Times and Activity Data

Growth in the numbers of admissions for these conditions over the last six years has outstripped both demographic growth in the number of elderly people and growth in total emergency admissions amongst elderly people – i.e. admissions for this group of conditions constitutes a larger proportion of hospital workload than they did six years ago despite efforts by successive governments to move more care into the community.

The avoidable admissions among people aged 65 and over included in this data set accounted for 10.5% of emergency admissions in 2012/13 and this has increased from 8.3% in 2007/08.

Figure 1: 65+ avoidable admissions as % of all emergency admissions

![Graph showing the percentage of 65+ avoidable admissions from 2007/08 to 2012/13]
The increase in avoidable admissions has outstripped the increase in the 65+ and 75+ population. Among those 65 and over the rate of avoidable admissions (per 1000 people 65+ in the population) increased from 48 (2007/08) to 62 (2012/13). The increase among those 75 and over is more steep, with the rate of avoidable admissions (per 1000 people 75+ in the population) increasing from 74 (2007/08) to 99 (2012/13).

Looking just at individuals who were admitted (i.e. removing repeat admissions) shows a very similar pattern (see figure 2b below) with over 9% of the 75 and over population experiencing at least one emergency hospital for one of these conditions during 2012/13.
Among those 75 and over the number of avoidable admissions has outstripped the increase in emergency admissions of those 75 and over accounting for almost a quarter of emergency admissions in 2012/13 for this age group. Avoidable admissions amongst those 75 and over as a proportion of emergency admissions for this age group has increased from 21.2% (2009/10) to 24.6% (2012/13).

Admission patterns for these conditions among those 65 and over has also varied by age group. The greatest admission growth occurred among those 90 and over, with this outstripping demographic growth of the 90+ population.

The older of the age groups here show the bigger increases in admissions over the period. In order to explore the effect of population changes, the graph below shows avoidable admissions as a rate of each 1,000 people in the population in that age group. When presented in this way it is clear that the increase in avoidable admissions is outstripping the population increase over time, especially in those aged 90 and over (see graph below).
The change in these admissions as a proportion of all admissions shows a similar trend over the last five years to changes in the proportion of people waiting over four hours in A&E departments.
Annually the proportion of people waiting over four hours in A&E increased from 1.9% in 2008/09 to 4.1% in 2012/13. Comparing figure 6 with figure 3 shows a similar pattern in the proportion of admissions amongst the 75+ population classed as avoidable and the proportion of people waiting over four hours in A&E with both showing similar quarterly/seasonal fluctuations (see also figure 7 below) and a sharp increase during the second half of 2012/13. As can also be seen from figure 1 there would appear to have been a general acceleration in the rates and numbers of these avoidable admissions from 2010/11 onwards which coincides with a general deterioration in performance against the A&E four hour standard.

Given the differences in patterns at the regional level between the rate of these admissions and performance against the four hour standard it is clear that the relationship between the two is not entirely clear cut. However, these admissions do represent an additional strain on emergency services and, given their nature, could potentially be prevented by better community care and integration of services.

The graph below compares the quarterly changes in avoidable admissions and A&E waits over four hours and there are similarities in the seasonal and overall patterns.

Figure 7: Percentage quarterly change in number of avoidable admissions and number of people waiting longer than four hours in A&E
Regional differences

Most regions show an increase year on year in the proportion of people waiting over four hours, particularly in the later years of the time period displayed. In 2012/13 more people waited over four hours in the West Midlands, South East and East Midlands, which differs from the regional pattern in relation to avoidable admissions.

Admission rates for these avoidable admissions have varied across the country.

Figure 9 shows the spread of avoidable admissions for older people by region in comparison to the spread of the older population while figure 10 shows the rate of avoidable admissions per head of population for each region.

Some regions (e.g. North East and London) account for a greater proportion of national avoidable admissions than their proportion of the national over 65 population, while some regions (e.g. South East and South West) account for a lower proportion of national avoidable admissions than their proportion of the national over 65 population. This suggests that the latter group of regions may have a healthier elderly population or may manage these conditions better in the community.
Figure 9: Regional comparison of proportion of national 65+ population (2012) and national 65+ avoidable admissions (2012-13)

Proportion of national 65+ population
Proportion of national 65+ avoidable admissions

Figure 10: Rate of 65+ avoidable admissions per person 65+ in the population, by region (2012-13)
The map below shows the distribution across England number of people 65 and over who experienced at least one avoidable emergency admission in 2012/13 per head of population. Results are displayed in quartiles for each of the 152 councils with adult social services responsibilities with darker shading representing higher rates of admissions.
The gap between average rate of admissions per 1,000 people 65+ in the 10% of areas with the highest rate and the 10% of areas with the lowest rate while generally increasing has shown an inconsistent pattern over the last 5 years.

As can be seen from figure 13 below the difference in average rate of admissions per 1,000 people 65+ in the 10% of areas with the highest admission rate and the 10% of areas with the lowest rate decreased between 2008/09 and 2009/10 (when there was a slight decrease nationally in the rate of admissions) and between 2010/11 and 2011/12 (due to improved performance amongst the highest rate areas). However, the difference increased for the other years and overall has risen over the last five years with admission rates amongst both the highest and lowest rate areas increasing during this time.

The growth in this disparity does suggest that while there has been a growth in these admissions per population 65+ across the country some areas have been better at managing this problem and avoiding these admissions than others. Although part of this may be due to changes in some of the explanatory variables examined in Part 2 of the analysis (see results below).

---

*Figure 11: Difference in average admissions per 1,000 population 65+ in the 10% of areas with the highest and lowest rates*

---

6 Local and unitary authorities
While there has been overall growth in these concerning admissions this has varied for individual conditions with one actually declining slightly as a proportion of total admissions over the last 6 years.

All conditions (with the exception of diabetes) have increased over the period (between 2007/08 and 2012/13) in terms of the proportion of all emergency admissions which they account for. Four conditions show particular increases including pneumonia (64% increase), food/liquid pneumonitis (52% increase) and urinary tract infection (45% increase). There was also a rise for intestinal infection (203% increase) due to a large change in 2012/13, although this may be a short-term increase rather than evidence of any longer term trend.
Part 2

Regression analysis was performed to model Hospital Episode Statistics (HES) emergency admission spells, for people aged 65 and over, with discharge dates from 1 April 2012 to 31 March 2013. Spells were for 150 local authorities\textsuperscript{7}, and comprised the 10 groups of avoidable conditions listed in the background section above.

Eight possible explanatory variables were used in models:

1. Care home bed numbers (Maximum Service Users registered, across all locations in CQC’s Customer Relations Management (CRM) system in May 2013, divided by the mid-2012 ONS estimate of population aged 65 and over)

2. Gross council weekly expenditure per person on care home and home care services

3. Proportion of people aged 65 and over (as a proportion of people all ages, in ONS mid-2012 population estimates)

4. Self-funded care (Proportion of people in care homes who are self-funders, from CQC’s webform survey. This survey did not receive data from all care homes, but the correlations described later give some confidence in the data.)

5. Good health (of Census 2011 respondents aged 65 and over, the proportion reporting their health as “Very good” or “Good”, rather than “Fair”, “Bad” or “Very Bad”)

6. No limiting conditions (of Census 2011 respondents aged 65 and over, the proportion reporting “No” when asked “Are your day-to-day activities limited because of a health problem or disability which has lasted, or is expected to last, at least 12 months?”)

7. Index of Multiple Deprivation (IMD) 2010 “extent” from county summaries (proportion of the population living in the most deprived Lower layer Super Output Areas)

8. National Statistics Socio-Economic Classification (NS-SEC) classes 1 and 2 (of employed Census 2011 respondents, the proportion with a managerial, administrative or professional occupation)

\textsuperscript{7} All Unitary Authorities, Metropolitan Districts, London boroughs, and non-metropolitan Counties, in England, with the exception of Isles of Scilly and City of London. These two authorities had no data for some sources; but only comprise 0.002% of care home capacity anyway, so their omission makes little difference.
Initial overview of variables

The left column (and the mirror image on the top row) of this scatterplot matrix shows the variation, against the eight possible explanatory variables, for the aggregated count of admission spells over all specified conditions. The other columns show the variations between all the possible combination pairs of explanatory variables.

All variables will be hugely influenced by the population of each local authority, so in these scatterplots, all count variables (including the count of HES admission spells) have been divided by the relevant population aged 65 and over.

The scatterplots in the left-hand column show that, unsurprisingly, the strongest correlations for ‘HES All conditions’ are on rows 6 and 7; increasing proportions of people in the 2011 census reporting good health (row 6, R²=0.65) and no limiting health conditions (row 7, R²=0.55) correlate with fewer hospital admission spells.
An increasing proportion of people living in the local authority who are aged 65 and over actually appears to be linked with fewer admissions (row 4), although the relationship is not strong (R2=0.36).

Increases in the proportion of self-funded care, a possible measure of wealth, are linked with decreasing admissions (row 5, R2=0.43). An alternative measure of wealth, in the form of decreasing deprivation, is also linked with a decrease in admissions (row 8, R2=0.49). There is a suggestion of decreasing admissions as NS-SEC management occupations increase (row 10) but the low R2 value of 0.12 suggests otherwise. There is no correlation (R2 less than 0.01) between admissions and the maximum number of service users registered by care homes (row 2), nor with council expenditure (row 3).

**Correlations between explanatory variables**

The right five columns of the bottom five rows of the scatterplot matrix show that unsurprisingly, there are correlations between five explanatory variables; (i) good health and (ii) limiting conditions as reported in the census, plus the three potential measures of wealth: (iii) self-funded care, (iv) deprivation and (v) NS-SEC. (R2 values for each combination of pairs are always more than 0.3, except for the self-funding / NS-SEC combination. The strongest correlation is between the two census variables on good health, row 6, and limiting conditions, row 7, R2=0.94). This means that these five variables are all, to some extent, measuring the same thing.

**Results of regression modelling**

1. Care home bed numbers and Gross council expenditure had practically no effect.

Neither of these variables were significant (p value less than 0.05) for most conditions. For the conditions where they were significant, R squared values were less than 0.05, meaning they explained very little of the variation in admissions.

2. The proportion of the population aged 65 and over has some influence.

For all conditions, when analysed in a model alone, this variable appeared significant. Perhaps surprisingly, there were more admissions for authorities that had smaller proportions of their population aged 65 and over.

When considered alongside all other explanatory variables, this variable was shown to be not significant for most conditions. For some conditions (diabetes, pneumonitis and UTI), it was still the most significant variable, with each p value less than 0.001, although it did not explain a great deal of variation in admissions, with R values ranging from 0.27 for pneumonitis to 0.47 for diabetes.

3. Measures of health and wealth make a large difference, but overlap.

We have two similar variables measuring good health and limiting conditions for those aged 65 and over from the 2011 census, plus three variables which could be considered as measures of wealth: the proportions of residents living in deprived
areas, the proportion of employees working in NS-SEC management positions, and the proportion of care users that are self-funded.

We have already seen how these five variables are all correlated with each other. Generally, one measure of health or wealth has a significant influence upon admissions, but once the influence of one such variable is taken into account, the others are not important.

**Example: the model on admissions for all conditions combined**

For all specified conditions combined, and with all eight explanatory variables, the most significant variable is the good health proportion, with a p value less than 0.001, and it explains a good deal of the variation, with an R squared value of 0.65. Once this variable is allowed for, the population proportion aged 65 and over is the second most significant (p value 0.002), but explains little of the variation in admissions, with a partial R squared value of 0.06. Once that is also allowed for, the third most significant is NS-SEC; but only just, with a p value of 0.045, and explaining very little of the variation, with partial R squared value less than 0.01. None of the other variables are significant.

Interestingly, if the good health proportion is excluded and the other seven variables used, then the most significant variable is not the proportion 65+, nor NS-SEC. Actually, it is the proportion of people without limiting conditions that is most significant with a p value less than 0.001, and an R squared of 0.55. The pattern then returns, with the population aged 65+ the second most significant variable, p value less than 0.001, and a partial R squared of 0.15. Third is NS-SEC, only just significant with a p value 0.042, and a partial R squared value less than 0.01. No other variables are significant.

**Models for each condition separately using all eight explanatory variables**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Most significant variable</th>
<th>p value</th>
<th>Partial R²</th>
<th>Second most significant</th>
<th>p value</th>
<th>Partial R²</th>
<th>Third most significant</th>
<th>p value</th>
<th>Partial R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>All conditions</td>
<td>Healthy</td>
<td>0.000</td>
<td>0.648</td>
<td>Pop 65+</td>
<td>0.002</td>
<td>0.064</td>
<td>NSSEC</td>
<td>0.045</td>
<td>0.008</td>
</tr>
<tr>
<td>Acute lower resp</td>
<td>NSSEC</td>
<td>0.001</td>
<td>0.032</td>
<td>Healthy</td>
<td>0.001</td>
<td>0.262</td>
<td>Limit’g</td>
<td>0.023</td>
<td>0.025</td>
</tr>
<tr>
<td>Chronic lower resp</td>
<td>Healthy</td>
<td>0.000</td>
<td>0.695</td>
<td>Expendit</td>
<td>0.026</td>
<td>0.010</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decubitus</td>
<td>Healthy</td>
<td>0.001</td>
<td>0.172</td>
<td>Limit’g</td>
<td>0.031</td>
<td>0.050</td>
<td>Bed nos.</td>
<td>0.042</td>
<td>0.022</td>
</tr>
<tr>
<td>Diabetes</td>
<td>Pop65+</td>
<td>0.000</td>
<td>0.471</td>
<td>Healthy</td>
<td>0.000</td>
<td>0.098</td>
<td>Limit’g</td>
<td>0.002</td>
<td>0.027</td>
</tr>
<tr>
<td>Pneumonitis</td>
<td>Pop65+</td>
<td>0.000</td>
<td>0.274</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food drink issues</td>
<td>Healthy</td>
<td>0.000</td>
<td>0.310</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fractures</td>
<td>Limit’g</td>
<td>0.000</td>
<td>0.078</td>
<td>NSSEC</td>
<td>0.000</td>
<td>0.070</td>
<td>Bed nos.</td>
<td>0.019</td>
<td>0.032</td>
</tr>
<tr>
<td>Intestinal infection</td>
<td>Healthy</td>
<td>0.000</td>
<td>0.527</td>
<td>NSSEC</td>
<td>0.011</td>
<td>0.021</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumonia</td>
<td>Healthy</td>
<td>0.000</td>
<td>0.493</td>
<td>NSSEC</td>
<td>0.001</td>
<td>0.107</td>
<td>Pop 65+</td>
<td>0.010</td>
<td>0.018</td>
</tr>
<tr>
<td>Urinary tract infection</td>
<td>Pop65+</td>
<td>0.000</td>
<td>0.362</td>
<td>Healthy</td>
<td>0.000</td>
<td>0.061</td>
<td>IMD2010</td>
<td>0.003</td>
<td>0.034</td>
</tr>
</tbody>
</table>
The model for fractures is the weakest, with a total R squared below 0.2 and all variables explaining little, each with partial R squared values of less than 0.1.

Six conditions have a similar model to the model for all conditions combined: chronic lower respiratory tract infections, food and drink issues, acute lower respiratory tract infections, pressure sores, intestinal infections and pneumonia. Each had Good Health as the main explanatory variable (with R squared values ranging from 0.17 for pressure sores to 0.70 for chronic lower respiratory tract infections). The latter four then have limiting conditions or NS-SEC as the second most significant variable, but they explained little of the variation in admissions (partial R squared values ranging from 0.03 to 0.11). For all six, any other significant variables have even less effect, with partial R squared values of 0.02 or less.

As reported in section 2 above, for pneumonitis, diabetes and UTIs, the proportion of population aged 65 and over is the most significant variable; and for pneumonitis, it is the only significant variable. For diabetes and UTIs, Good Health also explains a small amount of variation in admissions (0.10 in diabetes, 0.06 for UTIs).

**Conclusions for Part 2**

As with all regression analysis, when no significance correlation is found between variables, it does not mean there is no link. It could be that a link exists, but important variables are missing from the model, so it cannot be revealed. Re-analysing the data at smaller geographic levels may help. However, it is equally valid to conclude that there genuinely is no link.

Conversely, one weakness with significance tests is false positives. Testing for significance at the 95% level will always mean that, of the findings that appear significant, only 95% genuinely are.

Nevertheless we can be sure that the most important factor in admissions for these conditions is, unsurprisingly, levels of good health in the general population aged 65 and over. There is a long-standing, interesting and complicated debate to be had over what extent this is determined by levels of wealth (or even vice versa).

The more surprising finding is the increased numbers of admissions spells for local authorities with low proportions of their population in the 65 and over age group.

An explanation, although it is conjecture and not based upon regression results, might be that services in authorities with many people in this age group were more attentive of issues affecting the elderly, or that specific initiatives or action had been taken to reduce admissions. They may have a greater focus on developing systems/initiatives to reduce admissions to hospital.
Other factors

A number of other factors not directly accounted for in our analysis will have also affected the numbers and patterns of admissions amongst the elderly, some of these are:

1. **Primary healthcare and preventative interventions** – one of the biggest factors not accounted for is the quality and provision of primary healthcare services including GPs, out of hours services, community nurses, ambulance services, other therapeutic services etc. For example data would suggest that almost everyone will have a registered GP, however their quality and accessibility will vary (e.g. some GPs will make regular visits to patients in care homes while others will not) with this likely to affect the numbers of emergency hospital admissions. The prevalence and importance attached to preventative interventions (e.g. diabetes services) will also vary across the country.

2. **Disease prevalence** – For some of the conditions, such as diabetes or COPD, some areas will have a higher prevalence of people with the condition than others (and therefore a higher number of admissions for these conditions).

3. **Knowledge about services** – differences in information provision and knowledge about how to access alternative services or self-manage certain conditions will also affect numbers of emergency admissions.

4. **Proximity to secondary care services** – studies have shown that the closer people live to an A&E department the more likely they are to attend and hence to be admitted.

5. **Quality of social care services** – the nature of current CQC compliance data means that is cannot be used effectively as a proxy explanatory variable for the quality of social care provision for making statistical comparisons with hospital admissions.

6. **Consultant presence in A&E departments** – many of these admissions will have occurred via an A&E department and studies have shown that increased presence of senior doctors results in reductions in unnecessary admissions. (Comparisons at regional level did not indicate any clear cut relationship although standardisation for other factors was not performed.)

It is also possible that there are many other variables that affect the rates of avoidable admissions and have not been accounted for in this analysis.