Monitor
Making the health sector work for patients

A&E delays: Why did patients wait longer last winter?

Conclusions from the 10 hypotheses tested

Table 1 gives an overview of the evidence either supporting or refuting the 10 hypotheses for the cause of the decline in A&E performance against the four-hour waiting times target in Q3 2014/15. It draws on univariate, bivariate and multivariate econometric analysis of data reported by trusts nationally, the response to the A&E information request sent out by Monitor to trusts with type 1 A&E departments and our interview programme (see Section 2 of the main report for further details).[1]

The findings of our analysis for each of the 10 hypotheses is set out in the following format:

- **Conclusion:** Whether the hypothesis was found to be true or not true, given the available evidence.
- **Theoretical link to A&E performance against the four-hour target:** A brief explanation of why we tested the hypothesis, ie its potential impact on A&E waiting times performance.
- **Was there a change between Q3 2013/14 and Q3 2014/15?** A comparison of the trend observed in Q3 2014/15 compared with that over the same period in the previous year.
- **Does this explain part of the decline in the four-hour target?** Conclusions about whether the trends observed provide evidence to support or reject the hypothesis in question.
- **How reliable are the findings?** Discussion of how far we can rely on the conclusions, given the quality of available evidence.
- **Why did we observe these changes in 2014/15?** If the hypothesis is true, discussion of why the changes may have occurred over the period of analysis.

[1] A full description of our econometric model is given in a separate document.

Table A1: Key conclusions from our analysis

Hypothesis	Do the findings suggest this is true?	How reliable are the findings?	What drove the changes that caused the decline?
H1 **Nationally there was a higher number of A&E attendances and this had a negative impact on A&E performance against the four-hour target**	**NO** There was a 5.7 percentage point increase in A&E attendances in Q3 2014/15 compared to the same period the previous year. However, the correlation between attendances and A&E waiting times performance was only weak (–0.1), suggesting there is little relationship between them. This is supported by anecdotal and econometric evidence	 As the data used to determine trust performance against the A&E target (Sitreps) are converging with the other key data source over time (Hospital Episode Statistics (HES)), we believe they are of acceptable quality. The data have been adjusted to control for changes in the provider landscape over the period	• Increased 111 referrals to A&E do not appear to be a factor • Analysis by the North West Commissioning Support Unit (CSU) suggests the increase in attendances is largely within the normal range of variation
H2 **Nationally there was a higher proportion of sicker people attending A&E and this had a negative impact on A&E performance against the four-hour target**	**NO** Proxies for the sickness of attenders (conversion rate, ambulance attenders, triage category) suggest the proportion has remained stable or increased only very slightly. It is, therefore, highly unlikely that this is a driver of the decline in A&E performance	 As there are no direct measures of the level of sickness of attenders and it is challenging to measure, we cannot fully rely on these findings. However, all the proxies studied concur with the conclusion	• This does not appear to be driven by an unexpected disease outbreak such as for an infectious disease
H3 **Nationally there was a higher proportion of people attending A&E via ambulance and this had a negative impact on A&E performance against the four-hour target**	**YES** There was a 7.1 percentage point increase in emergency journeys to A&E in Q3 2014/15 compared to Q3 2013/14, and the percentage of attendances converting to admissions remained flat between these two periods. This suggests the absolute number of attendances via	 These data are used to measure ambulance trusts' performance against key targets and so we believe they are of acceptable quality	• There is no further evidence on this

Hypothesis	Do the findings suggest this is true?	How reliable are the findings?	What drove the changes that caused the decline?
	ambulance increased, but not the proportion. However, the proportion of emergency calls increased by 11.6% in Q3 2014/15, suggesting that ambulance crews were managing demand for A&E through better use of alternative services. Attendances referred by emergency services (which is a proxy for ambulance conveyances) were significantly related to A&E waiting times performance in the econometric model		
H4 **Nationally the variability of attendance patterns (in terms of the time and day of arrival) changed and this had a negative impact on A&E performance against the four-hour target**	**NO** The pattern of attendances did not change between Q3 2013/14 and Q3 2014/15, whether measured by day of the week or hour of the day. Neither has the variability of attendances changed by day or hour. In fact, variability may have decreased	This analysis was based on a 5% sample of HES A&E data and, therefore, may not have considered the full range of variation within the data. While anecdotal evidence further supports the conclusion, we have minor reservations about the reliability of these findings	• There is no further evidence on this
H5 **Nationally there was a higher number of people admitted via A&E and this had a negative impact on A&E performance against the four-hour target**	**YES** There was a 5.9 percentage point increase in type 1 admissions in Q3 2014/15 compared to the same period the previous year, but no change in conversion rate over the same period. The number of admissions and A&E waiting times performance were negatively	See H1	• There was a slightly higher proportion of junior to senior doctors in April to October 2014/15, but this was only very weakly related to the number of admissions (0.06) • We did not find that A&E staff were more likely to admit patients

Hypothesis	Do the findings suggest this is true?	How reliable are the findings?	What drove the changes that caused the decline?
	correlated (–0.2). This is supported by econometric evidence		in Q3 2014/15 compared to Q3 2013/14 • Not driven by an increase in ambulance dispatches resulting from 111 calls. However, 111 ambulance dispatches and admissions were positively correlated (0.42)
H6 **Nationally there was a higher proportion of sicker people admitted via A&E and this had a negative impact on A&E performance against the four-hour target**	**NO** Proxies used for the level of sickness of patients admitted through A&E (Charlson index and those used for H2) suggested this either remained stable or increased only very slightly. This is, therefore, highly unlikely to be a driver of the decline in A&E waiting times performance	🔴 The Charlson index is based on a 5% sample of HES data and so may not consider the full range of variation within the data	• This does not appear to be driven by an unexpected disease outbreak such as for an infectious disease
H7 **Nationally A&E departments had more problems with their staff-related resources and this had a negative impact on A&E performance against the four-hour target**	**NO** Staffing levels increased between April to October 2013 and April to October 2014 (+7.4%). The number of staff and A&E waiting times performance were not strongly related (–0.01). Neither the locum ratio nor the skill-mix ratio was related to A&E performance waiting times performance	🟡 Staffing data are not particularly robust. Responses to our information request suggest vacancy rates did not change considerably. While use of locums increased slightly, the potential negative impact of this may have been mitigated through the greater use of regular locums	• Mainly driven by increases in medical locums (+14.7%), particularly senior medical locums (+15.0%), and increases in senior medical staff (+7.4%)

Hypothesis	Do the findings suggest this is true?	How reliable are the findings?	What drove the changes that caused the decline?
H8 **Nationally A&E departments had more problems with their non-staff related resources (eg IT, diagnostics) and this had a negative impact on A&E performance against the four-hour target**	**NO** There did not appear to have been widespread changes in the non-staff resources of A&E departments during winter 2014. Around a third of trusts stated they had less access to short stay wards and 11% stated they had to close capacity within their A&E department. Only a third of trusts stated they had experienced greater problems with IT	 These findings are based on analysis of responses to the A&E information request. As we have no reason to question the responses to this and there is no further evidence available to compare these findings with, we believe they are reasonably reliable	• There is no further evidence on this
H9 **Nationally other hospital departments had more problems working effectively with the A&E department and this had a negative impact on A&E performance against the four-hour target**	**NO** There was a slight deterioration in A&E departments' access to specialist input from other departments and diagnostic facilities. However, trusts believed these changes had little impact on their performance against the A&E waiting times target, suggesting these problems were not key drivers of the deterioration in performance during winter 2014	 See H8	• There is no further evidence on this
H10 **Nationally other hospital departments had higher rates of bed occupancy and this had a negative impact on A&E performance against the four-hour target**	**YES** Bed occupancy rates increased from 87.8% to 89.7% between Q3 2013/14 and Q3 2014/15. Although this looks like a marginal increase, when hospitals are working at such high rates of bed occupancy, marginal increases in demand can	 Occupancy data have been collected since the 1980s and are widely used	• The number of available beds has remained stable since 2011 • Occupancy rate does not appear to be driven by delayed transfers of care (DTOC). There was a 27% increase in DTOC between Q3 2013/14 and Q3 2014/15, but

Hypothesis	Do the findings suggest this is true?	How reliable are the findings?	What drove the changes that caused the decline?
	have magnified effects on the flow of admissions from A&E departments. Bed occupancy rates and the four-hour target were negatively correlated (–0.22). Bed occupancy rates were also significantly correlated with A&E performance in our econometric model		no correlation between bed occupancy and DTOC. However, the data are not of sufficient quality to allow these findings to be relied upon • This does not appear to be driven by considerable reductions in social care spending • We could not quantify the effect of community care on bed occupancy rates

Testing the hypotheses

We developed a multi-faceted approach to test our hypotheses, which drew on three methods of analysis:

- **Examination of the trends and patterns observed in the data for each variable** to understand whether a change had occurred during Q3 2014/15, and the relationship (or correlation) of those variables to A&E waiting times performance.
- **An econometric model of A&E performance**, which identified statistically significant factors that were driving performance against the four-hour target when controlling for the effect of other factors,[2] and determined the impact of changes in these statistically significant factors on A&E performance in Q3 2014/15.
- **Analysis of the response to an information request** sent to both NHS trusts and foundation trusts with a type 1 A&E department. This asked about changes that had occurred during Q3 2014/15 (for which national data were not available) and their perceived impact on A&E performance. Responses provided new data on staff vacancy rates and the use of non-permanent staff. We received 123 responses, representing 89% of providers with type 1 A&E departments.

For each of the hypotheses, we combined the findings from each of these analytical approaches to determine whether the factor in the hypothesis was a driver of the decline in A&E performance. Where available, evidence from the econometric model was given most weight in reaching conclusions.

While we have sought to provide a definitive answer for each hypothesis, data quality concerns mean that for several of the hypotheses tested we cannot be confident in the reliability of the conclusions. We rated the strength of the evidence underpinning our conclusions for each hypothesis. We used a RAG rating to reflect the confidence in the available data. Green is used when the available data are strong, amber when data are available but not collected consistently and red when data are not available and we needed to use proxies.

[2] Statistical significance means the observed relationship between the factor and A&E performance would be very unlikely if it was determined by random chance alone.

Evidence supporting or refuting the hypotheses

This section provides an overview of the evidence supporting or refuting the hypotheses on what caused the sharp decline in A&E performance in Q3 2014/15 compared to Q3 2013/14.

H1: Nationally there was a higher number of A&E attendances and this had a negative impact on A&E performance against the four-hour target

Conclusion: The evidence indicates that this hypothesis is **not** true.

Theoretical link to A&E performance against the four-hour target

An increase in A&E attendances could lead to overcrowding of the A&E waiting room and longer processing times, which might reduce performance against the A&E waiting times target.

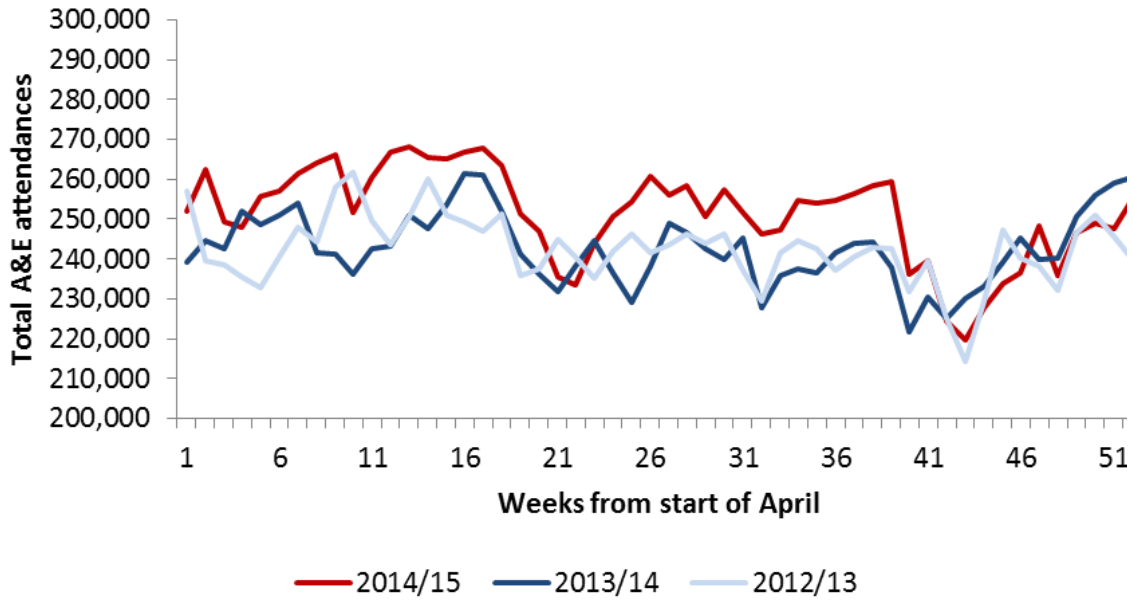
Was there a change between Q3 2013/14 and Q3 2014/15?

There was an increase in type 1 attendances to A&E departments during Q3 2014/15 compared to the same period the previous year. Trusts received an average 130 more type 1 attendances a month in Q3 2014/15, which equates to a 5.7 percentage point increase on the same period in the previous year. Over the whole of 2014/15, type 1 attendances were 3.4 percentage points higher than in the whole of the previous year. Between 2011/12 and 2014/15, type 1 attendances increased at a compound annual growth rate (CAGR) of 1.7% a year (Figure 1). Further, the pattern of increase was very similar for foundation trusts and non-foundation trusts (Figure 2) up until the beginning of 2015, when attendances at non-foundation trusts began to fall substantially.[3]

Analysis by the North West CSU suggests the increase in attendances observed during Q3 2014/15 was mostly within the range of normal variation.

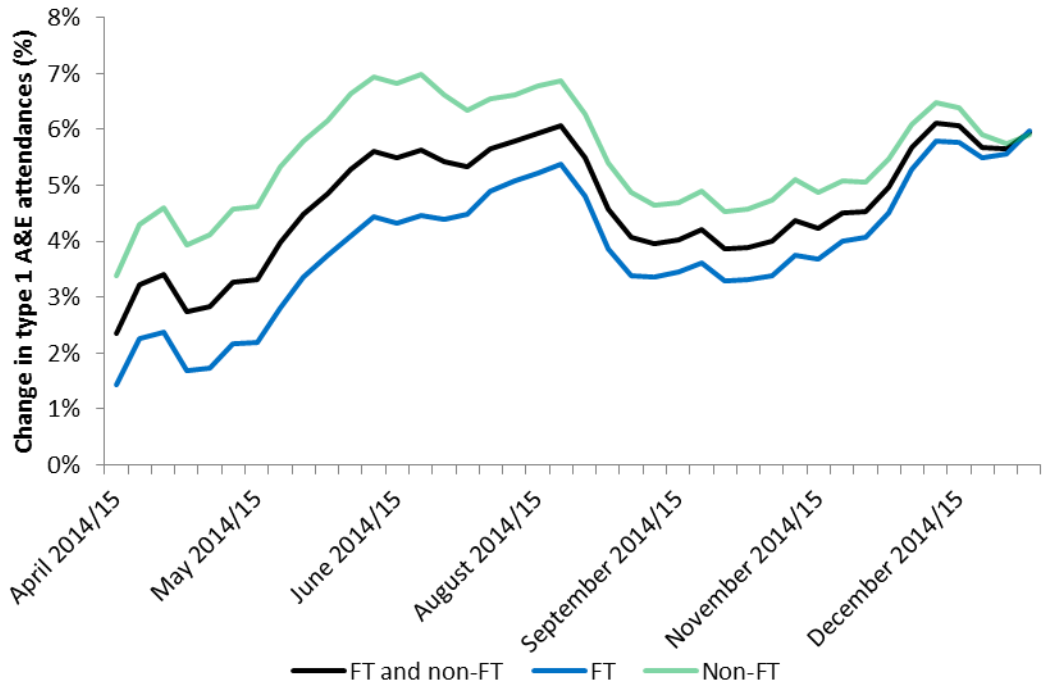
[3] This divergence between foundation trusts and non-foundation trusts is not explained by changes in type 2 or 3 A&E attendances (which exhibit a similar pattern). However, as it occurred outside our period of analysis, this divergence does not affect the overall sector trends in A&E attendances observed between 2011/12 and 2014/15 or our conclusions on the drivers of the decline in A&E performance.

Figure 1: Number of type 1 A&E attendances, weekly, 2012/13 to 2014/15



Source: Unify2 A&E Sitreps data, DDH.

Figure 2: Percentage change in type 1 A&E attendances from the previous year (13-week rolling average), April to December 2014, by provider type



Source: Unify2 A&E Sitreps data, DH.

Does this explain part of the decline in the four-hour target?

The available evidence indicates the increase in A&E attendances did not negatively impact on A&E performance in Q3 2014/15. The data show a 5.7 percentage point increase in type 1 A&E attendances during Q3 2014/15 compared to Q3 2013/14. However, the correlation between type 1 A&E attendances and A&E performance against the four-hour target is very weak (–0.1). This suggests that the increase in A&E attendances during Q3 2014/15 is unlikely to have been a driver of the contemporaneous decline in A&E waiting times performance.

These results also align with our econometric analysis, which showed that A&E attendances are not negatively related to A&E performance against the waiting time target when we control for admissions.

Finally, this conclusion concurs with anecdotal evidence from frontline A&E staff and sector experts, who suggest that an increase in A&E non-admitted attendances would not have had a considerable negative impact on A&E performance. This is because the types of patients who attend A&E and are treated and discharged (as opposed to those who are admitted to hospital) are relatively quick and easy to manage, and therefore lower the average waiting time.

How reliable are the findings?

On balance, we feel that these findings are based on data of sufficiently good quality to be reliable.

The data underlying these findings are used to determine trusts' performance against the A&E four-hour target. They have been collected since November 2010 and have been used by other national organisations in analyses of A&E attendances. There are other sources of data on A&E attendances (eg HES) but these were unavailable at the time of our analysis. While there has been some conflict between the data from these various sources in the past, they have been converging over time.

Responses to our A&E information request suggest that 26.1% of trusts changed the way they reported types 1, 2, 3 and 'other' A&E attendances during 2014/15. This may provide an explanation for some of the divergence between foundation trusts and non-foundation trusts we observed at the beginning of 2015. That said, the increases in both types 2 and 3 A&E attendances exhibited the same foundation trust/non-foundation trust variations, suggesting this particular pattern cannot be explained by recategorising A&E attendances.

H2: Nationally there was a higher proportion of sicker people attending A&E and this had a negative impact on A&E performance against the four-hour target

Conclusion: The evidence indicates that this hypothesis is **not** true.

Theoretical link to A&E performance against the four-hour target

Sicker people are likely to require more time and resources to assess, treat and discharge or admit, and will probably need input from specialists or diagnostic services in other parts of the hospital. Therefore, an increase in the level of sickness among A&E attenders would lead to longer waiting times and a decline in performance against the waiting times target.

Was there a change between Q3 2013/14 and Q3 2014/15?

There does not appear to have been a considerable change in the level of sickness of patients attending A&E during Q3 2014/15 compared to the same period the previous year. Sickness is conceptually challenging to measure,[4] but several proxies point towards stable or only slightly increasing levels of sickness.[5] In particular:

- The conversion rate was the same in Q3 2014/15 as it was in Q3 2013/14 (27.9%).[6] A constant conversion rate could indicate a stable level of sickness among attenders or greater risk aversion among staff if other proxies indicated falling levels of sickness.
- Public Health England data on the triage categories of attenders at a sample of A&E departments around the country show that the ratio of patients categorised as 'urgent' and 'very urgent' increased from 1 to as high as 1.2 in Q3 2013/14, and 1 to 1.3 in Q3 2014/15. This indicates a slight increase in the level of sickness among patients attending A&E.
- The number of ambulance journeys to type 1 and 2 A&E departments was 7% higher in Q3 2014/15 compared to the same period in 2013/2014, potentially indicating a slight increase in the level of sickness.
- The average age of A&E attenders rose from 39.3 to 39.8 years between Q3 2013/14 and Q3 2014/15. As sickness generally increases with age, this could indicate a rise in the level of sickness of A&E attenders.

We also looked at the possibility that providers faced an outbreak of a disease, such as an infectious disease, and therefore increased attendances during Q3 2014/15.

[4] DH is looking in more detail at level of sickness (acuity) as it relates to emergency attendances.
[5] We also looked at the possibility that the NHS faced one of the hypothesis tested.
[6] The conversion rate (%) is the number of admissions via A&E as a proportion of total A&E attendances.

This would have had a negative impact on A&E waiting times performance as hospitals cannot plan for such unexpected increases in attendances. We did not find enough evidence to confirm such a national outbreak had occurred. In particular:

- Public Health England data showed the peak in the percentage of attendances recorded as 'respiratory' (15%) occurred after A&E performance against the waiting times target had begun to decline. The proportion of attendances recorded as respiratory only surpassed the 2013 figures around the end of November 2014, by which time A&E performance against the waiting target had already substantially declined.[7]

- Evidence collected by North West CSU and shared with us also refuted the hypothesis that a disease outbreak contributed to the decline in A&E performance.

Taking these indicators together, we reject the hypothesis that there has been a considerable increase in the level of sickness among patients attending A&E. Rather, sickness has remained stable or has increased only slightly. Coupled with the fact that there was no change in conversion rates, this evidence allows us to conclude that there was no increased risk aversion in A&E departments.

Does this explain part of the decline in the four-hour target?

These findings show that sickness levels of A&E attenders during Q3 2014/15 cannot explain the deterioration in A&E waiting times performance during that period.

How reliable are the findings?

While all the proxies we have used to measure sickness point to the level of sickness among A&E attenders either remaining stable or only increasing very slightly in winter 2014, we still have reservations about the reliability of these findings.

As mentioned above, 'sickness' is conceptually challenging to measure. Using the available proxy measures, we have not detected any evidence of major changes in levels of sickness among attenders, but these proxies are unlikely to be as accurate or reliable as a direct measure of sickness.

The Public Health England sickness level data are drawn from a self-selecting sample of anonymous trusts and so may be biased. This anonymity also prevents us from investigating the relationship to waiting times performance. Further, we have

[7] Public Health England Emergency Department Syndromic Surveillance System (EDSSS) data are based on a non-representative voluntary sample of trusts. Only 28% of trusts with type 1 A&E departments submitted information on A&E attenders with respiratory conditions. We therefore caution against over-interpreting this as conclusive evidence of no spike in the incidence of a disease.

assumed that patients conveyed to A&E via ambulance are relatively sicker than those who walk in, which may not be accurate.

In addition, anecdotal evidence from trusts suggests they have not experienced a considerable increase in the incidence of severe sickness among patients attending A&E, particularly through an increased incidence of acute respiratory conditions. However, we do not have data supporting this perception.

H3: Nationally there was a higher proportion of people attending A&E via ambulance and this had a negative impact on A&E performance against the four-hour target

Conclusion: The evidence indicates that this hypothesis is **true**.

Theoretical link to A&E performance against the four-hour target

Anecdotal evidence indicates that patients arriving at A&E by ambulance disrupt processes and require considerably more resources. Staff are immediately redirected to ambulance arrivals regardless of what they are doing at the time and patients arriving via ambulance tend to present higher levels of sickness. Therefore, an increase in patients arriving by ambulance would likely disrupt patient flow through an A&E department and increase waiting times.

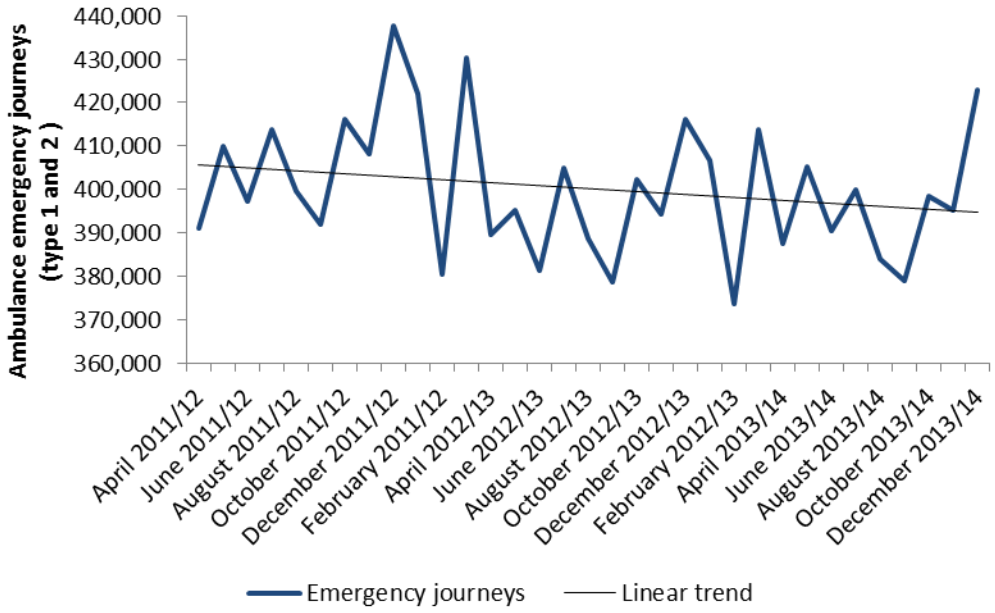
Was there a change between Q3 2013/14 and Q3 2014/15?

There was a 7.1 percentage point increase in the number of emergency journeys to type 1 and 2 A&E departments during 2014/15 compared to the same period for 2013/14. This contrasts to the slight downward trend in these journeys to type 1 and 2 A&E departments since 2012 (Figure 3) and the average 0.3% increase in emergency journeys for April to December 2014 compared to the same period for the previous year.

Anecdotal evidence from providers suggests it is the ratio of ambulance conveyances to walk-in attendances that is an important determinant of A&E waiting times performance, as opposed to the absolute numbers of both. The ratio of attendances by ambulance to type 1 and 2 A&E walk-in attendances[8] appears to have remained relatively flat since April 2012/13, after accounting for in-year seasonal fluctuations. The average ratio across April to December in 2014/15 was 0.45, compared to 0.47 across the same period in 2013/14. For Q3 2014/15, the ratio of ambulance to walk-in attendances was lower than for the same period in the previous year (0.47 in Q3 2014/15 compared to 0.51 in Q3 2013/14).

[8] Type 1 and 2 A&E walk-in attendances here are defined as the total number of type 1 and 2 A&E attendances minus the number of ambulance conveyances to a type 1 or 2 A&E department.

Figure 3: Number of emergency journeys to type 1 and 2 A&E departments, monthly, April 2012 to December 2014



Source: DH Unify2 – AmbSYS data.

There was an 11.6 percentage point increase in emergency calls to the switchboard during Q3 2014/15 compared to Q3 2013/14. The fact that the number of patient journeys to a destination other than a type 1 or 2 A&E department increased by only 7.1 percentage points over the same period suggests that ambulance crews made better use of alternative emergency care services.

Does this explain part of the decline in the four-hour target?

The number of attendances by ambulance to type 1 and 2 A&E departments was weakly negatively correlated with A&E performance (–0.172). However, in our econometric model, attendances via emergency services as reported in HES data were significantly negatively correlated to A&E performance, with a 10 percentage point increase related to a 0.24 decline in A&E waiting times performance.

This suggests that an increase in attendances via ambulance can explain part of the decline in A&E performance during Q3 2014/15.

How reliable are the findings?

While both the attendances by ambulance data and the HES emergency services referral data imply an increase in ambulance conveyances, we have some reservations about the accuracy of our findings given the large discrepancy between the two sets of data.

The data on attendances by ambulance that we analysed are used to measure ambulance trusts' performance against key targets and so we believe they are of acceptable quality. These data have been collected through the Unify2 data return since April 2011.

Our econometric model is unable to include ambulance conveyances directly and so we used emergency service referral source over the ambulance conveyance as a proxy for this.[9] This metric exhibited a 0.4 percentage point increase during Q3 2014/15 compared Q3 2013/14 and was identified in the econometric model as having a significant impact on A&E waiting times performance. Given this, the observed 7.1% increase in emergency journeys would also be likely to have had a significant impact on A&E waiting times performance.

Why did we observe these changes in 2014/15?

We could not further analyse the available data to answer this question.

H4: Nationally the variability of attendance patterns (in terms of the time and day of arrival) changed and this had a negative impact on A&E performance against the four-hour target

Conclusion: The evidence indicates that this hypothesis is **not** true.

Theoretical link to A&E performance against the four-hour target

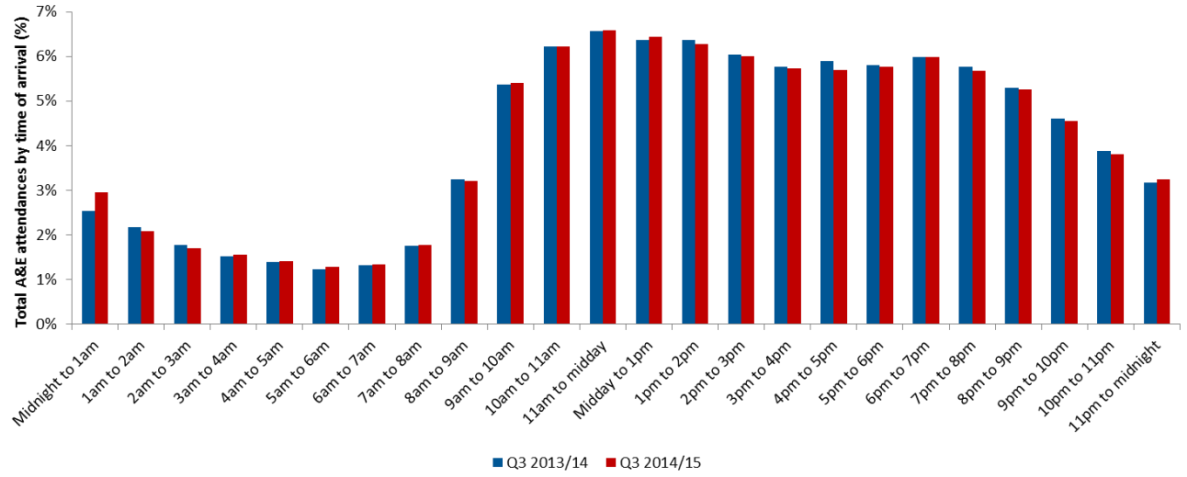
A change in the pattern or variability of A&E attendances would reduce the efficiency of A&E departments as their resources and processes cannot be easily adjusted to match unexpected fluctuations in demand. A&E departments are likely to become overstretched during busy periods as they do not have the staff or resources to cope with the increased demand, resulting in poorer performance against the waiting times target. By change in 'pattern' we mean a change in the times when more patients come to A&E, for instance a shift from many attendances on a Monday to many attendances on a Sunday. By 'variability' we mean the predictability and consistency of the pattern, for instance two neighbouring trusts could both have high attendances on Mondays, but for one attendances could vary very little around the mean and for the other the variation could be considerable.

Was there a change between Q3 2013/14 and Q3 2014/15?

Very little difference was seen for the pattern of attendances in Q3 2014/15 compared to Q3 2013/14, whether measured across days of the week or hours of the day (Figure 4).

[9] A complete explanation is given in a separate document.

Figure 4: Type 1 A&E attendances by hour of the day, Q3 2013/14 to Q3 2014/15

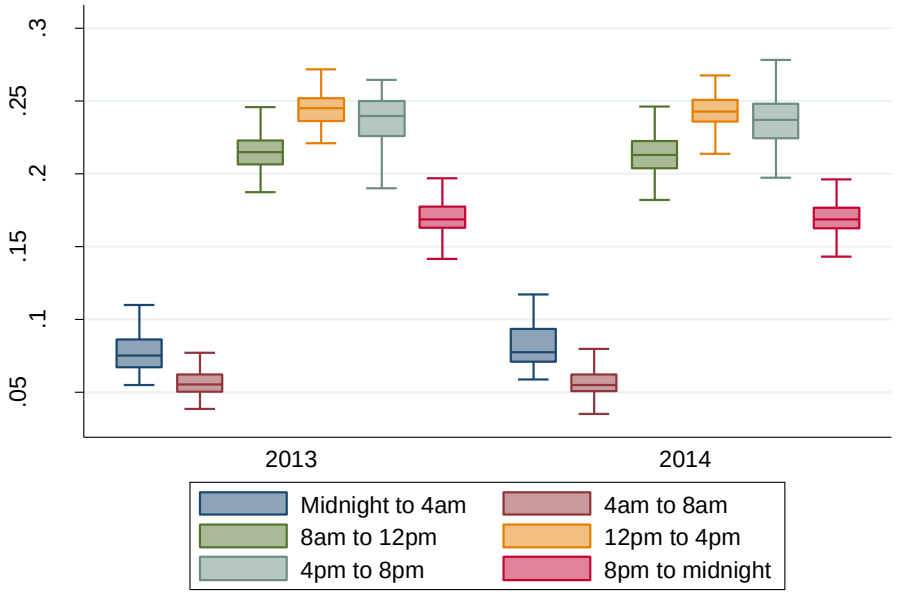


Source: HES A&E dataset, Health and Social Care Information Centre (HSCIC).

The variability of attendances, either by day of the week or hour of the day and as measured by the interquartile range, may have actually decreased in winter 2014 compared to winter 2013 (Figure 5). Less variation would suggest that it is becoming easier for trusts to plan for attendances, not harder.

The findings for the patterns and variability of emergency admissions are similar.

Figure 5: Variability of type 1 A&E attendances according to hour of the day (excluding outliers), 2013 compared to 2014



Source: HES A&E dataset, HSCIC.

Does this explain part of the decline in the four-hour target?

Given that neither the pattern nor variability of A&E attendances was different in winter 2014 compared to winter 2013, this variable cannot explain the decline in A&E performance against the target.

How reliable are the findings?

We believe these results are reasonably reliable but have some minor reservations. The analysis is based on a 5% sample of HES A&E data and therefore omits any variation in the data excluded from the sample. However, anecdotal evidence also suggests that the pattern and variability of A&E attendances have been relatively stable recently, providing further support for our findings.

H5: Nationally there was a higher number of people admitted via A&E and this had a negative impact on A&E performance against the four-hour target

Conclusion: The evidence indicates that this hypothesis is **true**.

Theoretical link to A&E waiting times performance against the four-hour target

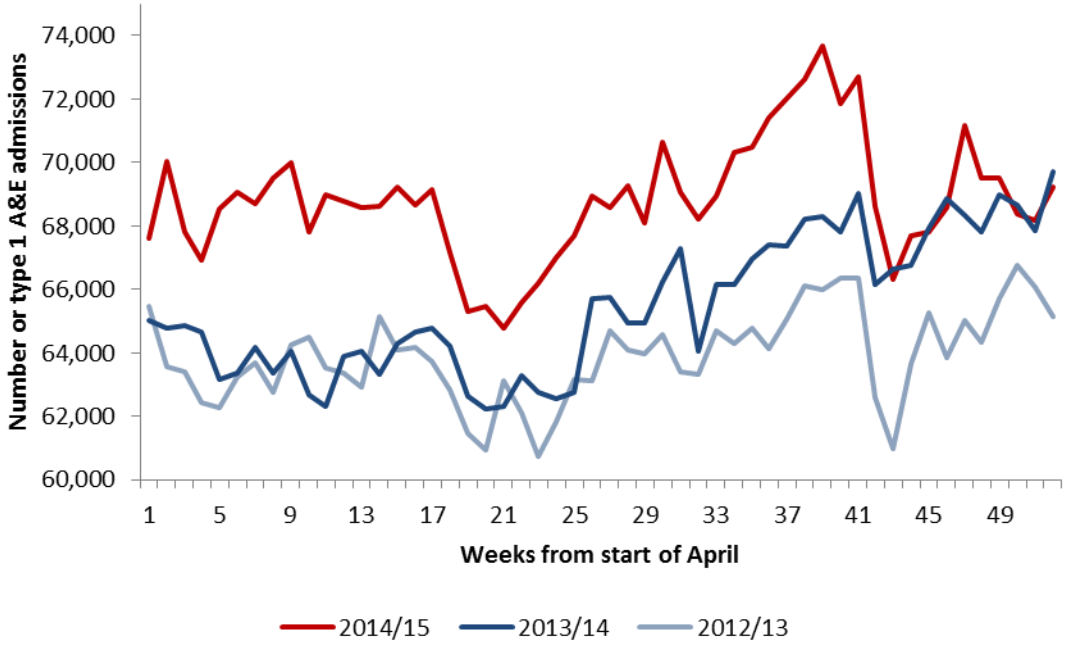
Patients who are admitted to hospital via A&E likely require more time, resources and diagnostic tests than those who are discharged from the A&E department. Further, patients being admitted must wait for a bed to become available before they can leave the A&E department and 'stop the clock' on their waiting time. Until a bed is available, these patients have to stay in the A&E department and use up resources needed by patients yet to be seen. Therefore, an increase in A&E attenders who need to be admitted to hospital would likely increase the waiting times in the A&E department, particularly if beds for them are in short supply.

Was there a change between Q3 2013/14 and Q3 2014/15?

During Q3 2014/15, admissions via A&E were on average 5.9 percentage points higher than in Q3 2013/14 (Figure 6). This is higher than the 3.8% CAGR between 2011/12 and 2014/15 and the 5.1 percentage point increase in admissions via A&E over the whole of 2014/15.

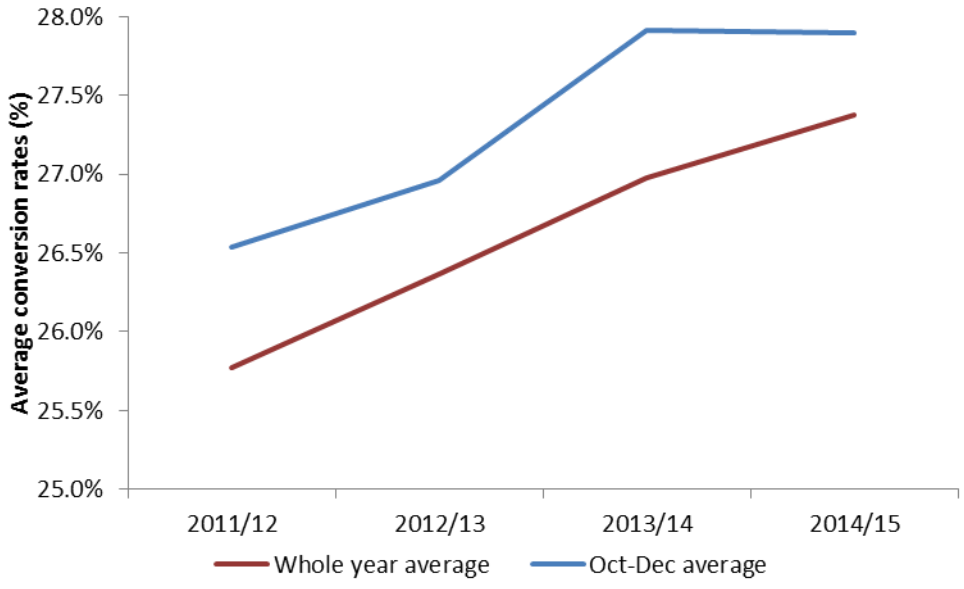
However, the conversion rate (ie admissions via A&E as a proportion of total A&E attendances) was the same during Q3 2014/15 as during Q3 2013/14 (27.8% and 27.9% respectively) (Figure 7). The conversion rate for the whole of 2014/15 was 27.3%.

Figure 6: Number of type 1 A&E admissions, weekly, 2012/13 to 2014/15



Source: Unify2 A&E Sitreps data, DH.

Figure 7: Average conversion rate for type 1 attendances, whole year and Q3, 2011/12 to 2014/15



Source: Unify2 A&E Sitreps data, DH.

In short, while the relative proportion of admissions via A&E to attendances did not change considerably during winter 2014, the absolute numbers of admissions increased. Foundation trusts in particular have experienced consistently higher rates

of increase in admissions via A&E than other providers since May 2014, peaking in July and February at 9 and 10 percentage points higher respectively than for the same period the previous year. Conversely, non-foundation trusts have experienced declining rates of increase since January 2015 and falling numbers of admissions via A&E in aggregate since February 2015. Our analysis has not provided further insight into this variation between foundation trusts and non-foundation trusts.

Does this explain part of the decline in the four-hour target?

The available evidence indicates that an increase in admissions via A&E did contribute to the decline in A&E waiting times performance during winter 2014.

To explore the impact of this on A&E waiting times performance, we tested the effects of an increasing conversion rate on A&E waiting times performance in our econometric model. We found that a 10 percentage point increase in the conversion rate related to a 0.29 percentage point reduction in performance against the A&E target. Further, we found a weak negative correlation between the number of admissions via A&E and A&E waiting times performance (–0.2).

These findings align with anecdotal evidence from trust visits and interviews, which suggests that an increase in attenders who are not admitted would not negatively impact on A&E performance, as these are easier and quicker to process. In contrast, increases in admissions via A&E are much more likely to cause problems with A&E performance, as these admitted patients require a greater level of input and resource; which is demonstrated by the negative correlation found above. In addition, whether they can be admitted to a bed within the four-hour target depends on other processes and capacity within the hospital, in particular bed capacity in inpatient wards, which evidence showed was more constrained than during the same period the previous year.

How reliable are the findings?

On balance, we are confident that these data and analysis are of sufficiently good quality for this conclusion to be relied upon.

The data underlying this analysis are used to determine trusts' performance against the A&E four-hour target. They have been collected since November 2010 and used by other national organisations in their analysis of A&E admissions. There are other sources of data on admissions via A&E (eg HES), but these data were unavailable at the time of our analysis. While there have historically been some discrepancies between the data from these various sources, they have been shown to be converging over time.

While divergence in trend between foundation trusts and non-foundation trusts, not just in magnitude of changes but also in direction, was seen between 2011/12 and

2014/15, this should not have affected the overall sector trends in A&E attendances over this time. Greater divergence has been observed in the data since January 2015; this is not fully understood and requires further analysis.

Further, responses to our information request indicated that 26.1% of trusts made changes to the way they reported type 1, 2, 3 and 'other' A&E attendances and admissions during 2014/15. This may provide an explanation for some of the observed divergence after January 2015. That said, the increase in both type 2 and 3 A&E attendances exhibited the same foundation trust/non-foundation trust variations, suggesting that the divergence is not explained by the recategorisation of A&E attendances.

Why did we observe these changes in 2014/15?

There are a number of reasons for the higher number of admissions via A&E in 2014/15:

- The positive correlation between the number of 111 calls resulting in an ambulance dispatch and the number of admissions via A&E (0.42) suggest that admissions increase as 111 ambulance dispatches increase
- The number of admissions via A&E has increased across all age groups but admissions per 1,000 population have not increased to the same extent, suggesting much of the increase in admissions is due to population growth. The oldest age groups are an exception as admissions per 1,000 population have been increasing for them, driven by an increase in the number of attendances rather than a change in the conversion rate.

Other possible reasons for the increase in admissions have been shown not to be significant, including:

- patients with ambulatory care sensitive conditions (ACSC) as there was no increase in these patients during Q3 2014/15
- level of risk aversion of staff as the conversion rate has remained stable and the level of sickness of admitted patients has either remained stable or only slightly increased
- widespread reconfigurations in local health economies (not supported by responses to our information request).

H6: Nationally there was a higher proportion of sicker people admitted via A&E and this had a negative impact on A&E performance against the four-hour target

Conclusion: The evidence indicates that this hypothesis is **not** true.

Theoretical link to A&E performance against the four-hour target

Sicker people are likely to take more time and resources to assess, treat and discharge or admit, and will probably need input from specialists or diagnostic services in other parts of the hospital. Therefore, an increase in the level of sickness among A&E patients who subsequently require admission to hospital would lead to longer waiting times.

Was there a change between Q3 2013/14 and Q3 2014/15?

There appears to have been no considerable change in the level of sickness among patients admitted to hospital through A&E during winter 2014 compared to winter 2013.

The Charlson index is a points-based score of the severity of patients' co-morbidities based on inpatient codes. This was 0.5 in Q3 of both 2013 and 2014, indicating no change in the severity of conditions of patients admitted through A&E from year to year. Combined with the findings of our analysis of the level of sickness among A&E attenders (see H2 above), this suggests that the level of sickness of patients admitted through A&E has either remained stable or only slightly increased.

Does this explain part of the decline in the four-hour target?

This finding does not explain the decline in A&E waiting times performance.

How reliable are the findings?

Sickness is conceptually challenging to measure. Using the available proxy measures, we did not identify any evidence that patients admitted through A&E were sicker during winter 2014. However, these proxies will not be as accurate or reliable as a direct measure of sickness.

In addition, the Charlson index is based on only a 5% sample of inpatient HES data, which may not be fully representative of the sickness levels of all patients. However, since all the proxies we used to measure sickness point to the level of sickness among patients admitted through A&E either remaining stable or increasing only very slightly, our findings appear relatively reliable.

H7: Nationally A&E departments had more problems with their staff-related resources and this had a negative impact on A&E performance against the four-hour target

Conclusion: The evidence indicates that this hypothesis is **not** true.

Theoretical link to A&E performance against the four-hour target

A lack of appropriately skilled staff familiar with the layout and processes of the A&E department would prevent patients from being managed in A&E as quickly and efficiently as possible. It would also mean that A&E departments are less able to catch up after busy periods and A&E waiting times performance would be likely to deteriorate.

Was there a change between Q3 2013/14 compared to Q3 2014/15?

We observed an increase in staffing levels (medical and nursing) between April to October 2013 and April to October 2014 of 7.5%. This was mainly driven by an increase in medical locums (+14.7%) – particularly senior medical locums (+15.0%) – and in senior medical staff (+7.4%).

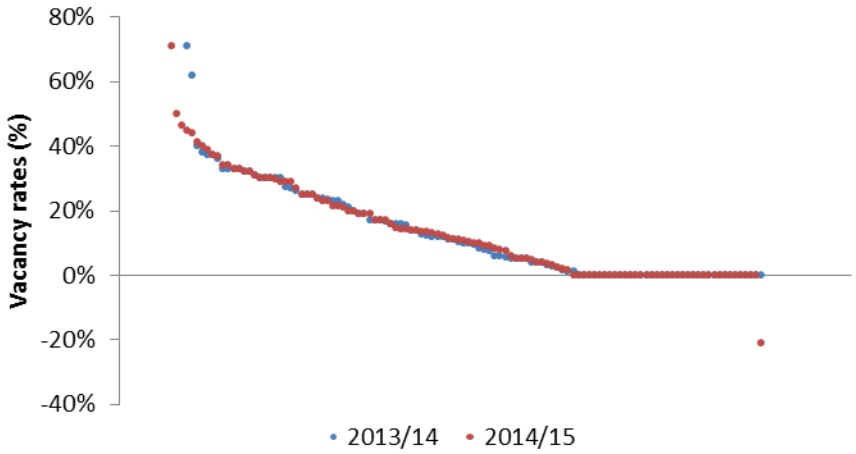
The ratio of junior to senior staff slightly decreased between April to October 2013 and April to October 2014 (from 31% to 30%), which suggests that trusts had relatively more senior staff during the decline in A&E waiting times performance.

Further, we found there were proportionately more staff available to deal with the higher activity levels: the number of staff per 1,000 attendances increased by 4% between April to October 2013 and April to October 2014.

Regarding vacancy rates, responses to the A&E information request indicated there was almost no change in their distribution for medical staff between September to December 2013 and the same period for 2014 (Figure 8). This was also true for specialty doctors and specially registrars.

The number of trusts filling over a quarter of consultant vacancies with non-permanent staff was 52% higher for September to December 2014 compared to the same period for 2013 (from 25 trusts to 38 trusts). However, there was a 36.4% increase in the number of trusts that ‘always’ use regular locums to fill consultant vacancies (from 22 trusts in 2013/14 to 30 in 2014/15). This may have helped to counteract some of the impact on efficiency of using more non-permanent staff. The use of non-permanent staff and the proportion of temporary staff who were regular were relatively stable for the other medical grades between 2013 and 2014.

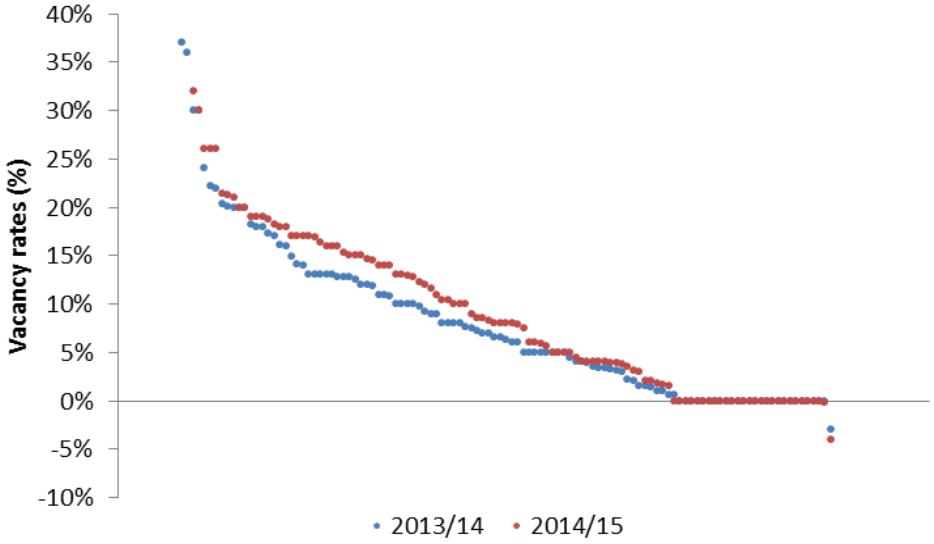
Figure 8: Distribution of trust consultant vacancy rates in A&E (from highest to lowest), 2013/14 and 2014/15



Source: Monitor information request.

For nursing staff overall, the vacancy rates appeared generally stable when comparing September to December 2013 with the same time period for 2014. However, for the staff nurse grade, there was a 90 percentage point increase in the number of trusts with vacancy rates of 15% to 20%; and a 25 percentage point increase in vacancy rates of greater than 25% (Figure 9). This suggests a slight reduction in nursing labour supply at the operational level, which could have had a detrimental impact on the efficiency of A&E departments.

Figure 9: Distribution of trust nurse vacancy rates in A&E (from highest to lowest), 2013/14 and 2014/15



Source: Monitor information request.

Does this explain part of the decline in the four-hour target?

Given the trends observed, staffing resources do not appear to have been a driving factor in the decline in A&E waiting times performance. While there was an increase in the use of non-permanent staff, there was only a very weak association between the proportion of locums in A&E departments and performance against the four-hour target (0.0036). This is consistent with the results from our econometric model, which found that the proportion of locum staff was not a significant variable in explaining the deterioration in A&E waiting times performance.

How reliable are the findings?

A&E staffing data are not systematically recorded by trusts and so Electronic Staff Record (ESR) data may not fully reflect actual staffing. Therefore, the findings from these data cannot be fully relied on. To mitigate this, we used the response to the A&E information request to verify the results of the quantitative analysis.

H8: Nationally A&E departments had more problems with their non-staff related resources (eg IT, diagnostics) and this had a negative impact on A&E performance against the four-hour target

Conclusion: The evidence indicates that this hypothesis is **not** true.

Theoretical link to A&E performance against the four-hour target

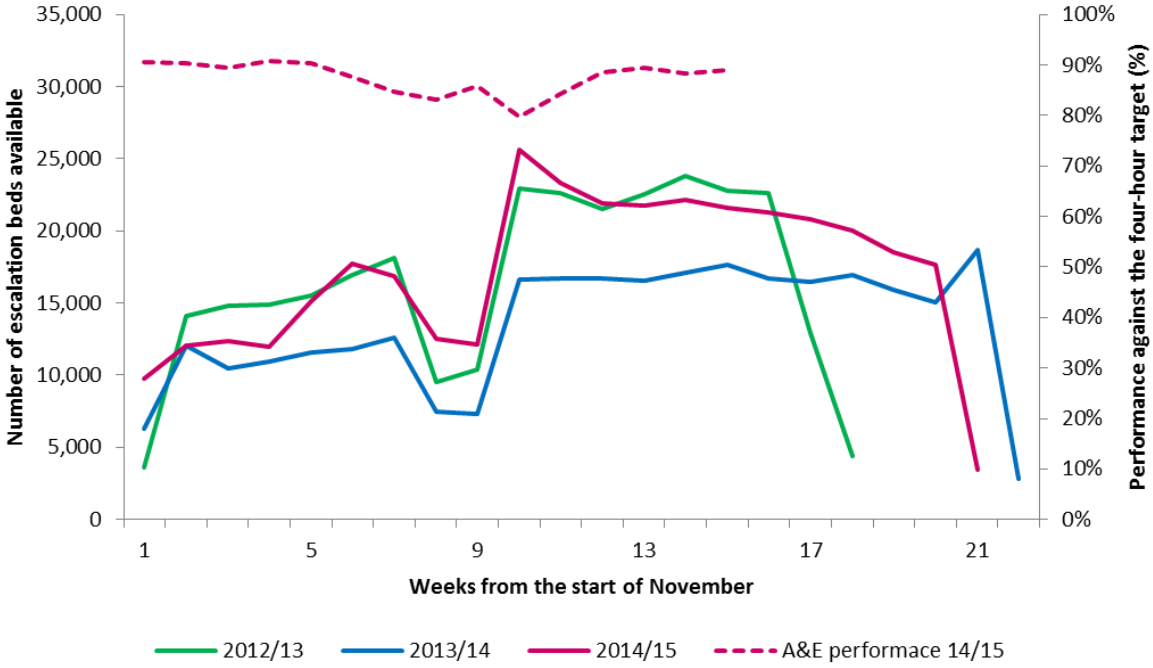
A reduction in non-staff resources in the A&E department would reduce the speed and efficiency with which patients could be assessed and treated. This would lead to longer waiting times.

Was there a change between Q3 2013/14 and Q3 2014/15?

Changes in A&E non-staff resources do not seem to have been widespread. Only 31% of trusts reported they had less access to short stay wards of up to 72 hours (escalation beds) in September to December 2014 compared to the previous year (Figure 10), and only a very small proportion of trusts reported they had to close bays/cubicles in their A&E department (11%) or had less flexibility to open their existing stock of bays/cubicles (14%).

More problems with IT also appear not to have been very widespread across trusts. Just under a third of trusts reported they experienced more problems with their IT systems in A&E departments (32%). Further, for those trusts that did experience more IT problems, the impact on A&E waiting times performance did not appear to have been material. Only 12% of trusts cited IT problems as one of the top five factors contributing negatively to their A&E waiting times performance in 2014/15.

Figure 10: Number of escalation beds available for A&E use during the winter months, weekly, 2012/13 to 2014/15



Source: Unify2 Daily Winter Sitreps.

Does this explain part of the decline in A&E waiting times performance?

Given that the evidence available suggests there have been no considerable changes in the non-staff resources within A&E departments, it is highly unlikely that this was a driver of the decline in A&E waiting times performance during winter 2014.

How reliable are the findings?

These findings are based on analysis of responses to the A&E information request, which collected information from acute providers with a type 1 A&E department. As we have no reason to question the responses to this and there is no further evidence available to compare these findings with, we believe these findings are reasonably reliable.

H9: Nationally other hospital departments had more problems working effectively with the A&E department and this had a negative impact on A&E performance against the four-hour target

Conclusion: The evidence indicates that this hypothesis is **not** true.

Theoretical link to A&E performance against the four-hour target

Ineffective working with other departments would prevent the smooth flow of patients from A&E through the hospital and increase the time required to make diagnoses and decisions about a patient's care. Further, lack of information about the number

and location of free beds would prevent the A&E department from placing a patient in the most appropriate inpatient ward in a timely way.

Was there a change between Q3 2013/14 and Q3 2014/15?

The available evidence indicates that there was a slight deterioration during Q3 2014/15 in how A&E departments worked with other hospital departments.

Responses to our A&E information request indicate that 45% of trusts experienced longer waits to access specialist input from other parts of the hospital during Q3 2014/15 than for the same period in the previous year. Furthermore, 33% experienced longer waits to access (and/or receive the results from) diagnostic facilities that carry out magnetic resonance imaging (MRI)/computed tomography (CT) scans (33%).

In contrast, only 27% of trusts reported they experienced longer waits to access diagnostic facilities that carry out X-rays. This may be because A&E departments are more likely to have their own X-ray machines than more specialised and costly diagnostic facilities such as CT/MRI scanners.

An even lower proportion of trusts experienced longer waits to access results from pathology (24%).

Does this explain part of the decline in A&E performance?

While there does appear to have been a slight change in how A&E departments worked with other departments and hospital diagnostic services, this does not seem to have had a considerable impact on A&E performance against the four-hour target.

Of the A&E departments that experienced longer waits for specialist input, only 35% stated this had an impact on waiting times performance and within this group, only 24% that it had a large or very large negative impact on performance.

Further, 26% of the trusts that experienced longer waits for MRI/CT scans reported this had no impact on waiting times performance. Among those it did negatively impact, only 12% reported it had a large or very large negative impact on performance.

Around one-third of trusts that experienced reduced access to pathology services reported this had no impact on performance. For those trusts it did affect, fewer than 15% reported it had had a large or very large negative impact on performance.

In view of this, it seems that changes in how A&E departments work with other departments in the hospital are unlikely to have been a key driver of the deterioration in A&E waiting times performance during winter 2014.

How reliable are the findings?

These findings are based on analysis of responses to our A&E information request, which collected information from acute providers with a type 1 A&E department. As we have no reason to question the responses to this and there is no further evidence available to compare these findings with, we believe these findings are reasonably reliable.

H10: Nationally other hospital departments had higher rates of bed occupancy and this had a negative impact on A&E performance against the four-hour target

Conclusion: The evidence indicates that this hypothesis is **true**.

Theoretical link to A&E performance against the target

An increase in bed occupancy levels would reduce the hospital's ability to accommodate increases in admissions via A&E. Patients admitted from A&E who are waiting for beds in other departments will block capacity in A&E and take up resources that could otherwise be employed to assess and treat other patients. This will increase waiting times and cause performance against the four-hour target to deteriorate.

Was there a change between Q3 2013/14 and Q3 2014/15?

Average bed occupancy levels in Q3 2014/15 reached 89.7%. This represents a 1.9 percentage point increase from the same period for the previous year, when occupancy rates were 87.8%. We see an upward trend in occupancy rates from Q1 2011/12 to Q3 2014/15.

We found a clear difference between the bed occupancy levels for foundation trusts and for non-foundation trusts. As reflected in Figure 11, foundation trusts registered lower occupancy rates than non-foundation trusts across the whole period of analysis. However, the trends exhibited by both were similar.

Does this explain part of the decline in A&E waiting times performance?

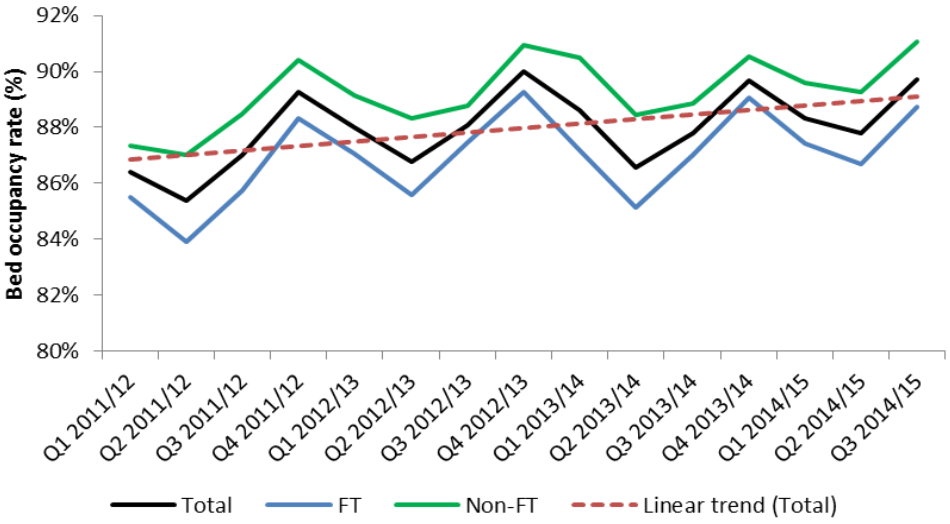
Bed occupancy rate was negatively related to A&E performance in the econometric model and explains 0.16 percentage points of the deterioration in performance during Q3 2014/15. Moving from less than 85% occupancy to above 95% reduces A&E waiting times performance by 0.4 to 1.6 percentage points.

While a 2 percentage point rise in bed occupancy rate may seem marginal, there is wide consensus that a small increase in demand can have magnified effects in a system that is working so close to full capacity. Evidence from DH and NHS England suggests that services need to be utilised at less than 85% of their maximum

capacity if they are to be able to respond to an increase in demand,[10] which further supports our econometric findings.

The facts that bed occupancy rates have gone up and that these are negatively related to A&E waiting times performance suggest that A&E departments encounter a bottleneck when trying to get patients admitted from A&E.

Figure 11: Average hospital bed occupancy rates (G&A) for hospitals with type 1 A&E departments, quarterly, Q1 2011/12 to Q3 2014/15



Source: Bed availability data, NHS England.

How reliable are the findings?

We have confidence in these findings as we believe the data are of relatively good quality. DH has been collecting bed availability and utilisation information since the 1980s, suggesting that hospitals are familiar with the definitions and type of information required. Furthermore, previous analysis also showed a strong relation between occupancy and A&E waiting times performance.[11]

[10] Note this 85% bed occupancy 'threshold' rate has been challenged as evidence indicates there is no unique optimal rate of hospital bed utilisation. Indeed, the ideal rate depends on (a) the size of the hospital, (b) the category of bed and (c) the out-of-hospital support in a particular health and social care system. See for example Jones R (2011) A paradigm shift for bed occupancy. *British Journal of Healthcare Management* 17 (8), 376-377.

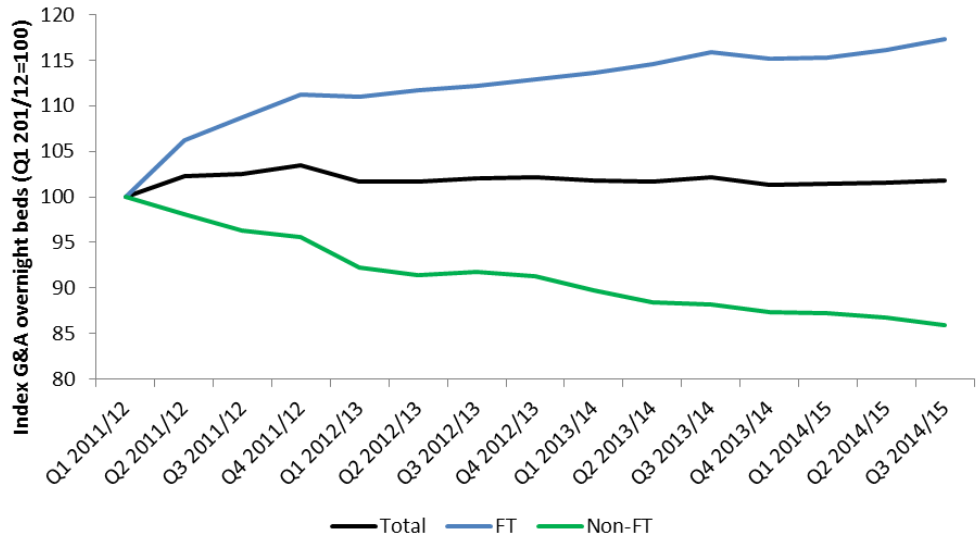
[11] A recent review of drivers of A&E waiting times performance found that high occupancy levels (defined as levels in excess of those expected at a given time of the week) are associated with longer than average waiting times in A&E departments and a greater likelihood of breaching the four-hour target. It found that for operating levels of between 90% and 190% of usual occupancy, performance falls by 0.3% for every 1% increase in occupancy (ie an 8% increase in occupancy would be expected to lead to a 2.4% decline in the achievement of the four-hour target). This suggests a relatively small impact on waiting time performance. *QualityWatch Focus on: A&E attendances* (2014) Nuffield Trust.

Why did we observe changes in 2014/15?

Bed occupancy rates could be driven by a large number of factors along the patient pathway, such as increasing difficulties in discharging patients or increases in the number of patients who are admitted to hospital (via both emergency and non-emergency care). Given the complexity of the system and the interaction between different stakeholders, identifying the specific drivers behind the high occupancy rates registered during Q3 2014/15 would require further analysis beyond the scope of our project. However, with the available evidence we explored several possibilities.

A **decrease in the number of available beds** could be a reason for occupancy rates going up. However, we did not observe any national decrease in number of available beds. Note that although Figure 12 shows a decrease in the number of overnight general and acute (G&A) beds in non-foundation trusts, this was compensated for by an increase in the number of beds available in foundation trusts.[12]

Figure 12: National number of overnight G&A beds available in hospitals with a type 1 A&E department (indexed to Q1 2011/12), quarterly, Q1 2011/12 to Q3 2014/15



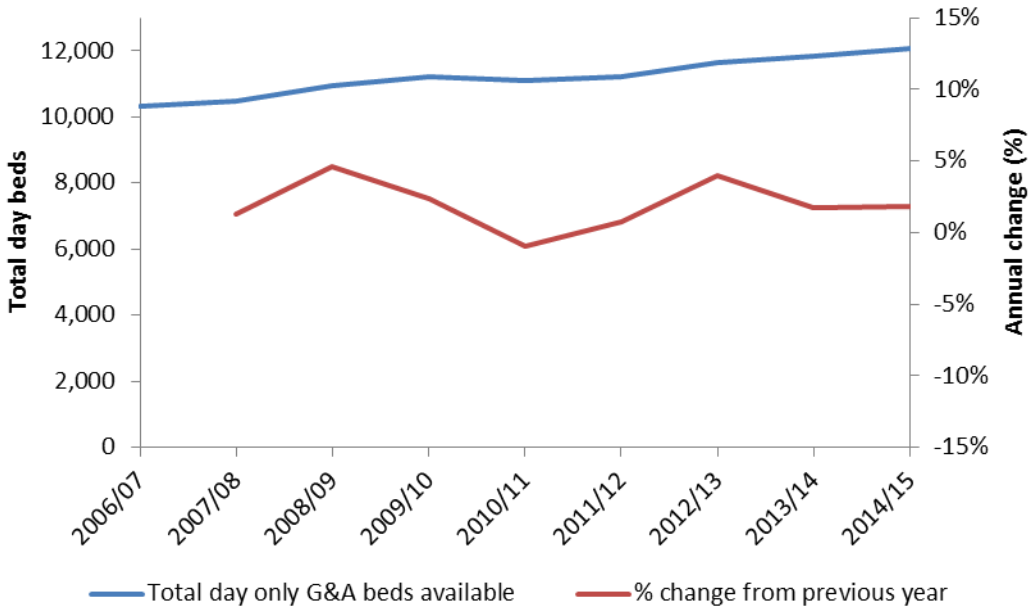
Source: DH form KH03.

We also explored the possibility that occupancy rates were higher because although total number of beds remained relatively constant, **overnight beds were being substituted with day beds** as trusts were being encouraged to do a greater proportion of activity through day cases. We did not find enough evidence to convince us that this was the case.

[12] We have accounted for changes in foundation trust status across time.

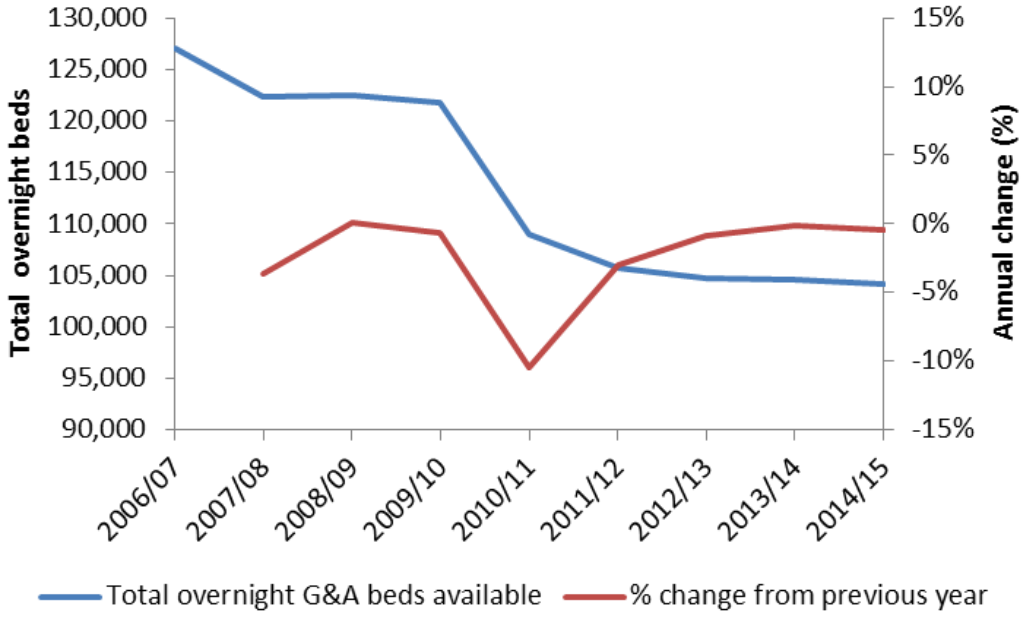
As shown in Figure 13, the number of day beds declined in 2010/11 (–0.9% compared to the previous year); however, this decline was much smaller than that observed in overnight beds over the same period (Figure 14). Before this dip (ie 2008/09) there was an increase in day beds, which may have enabled trusts to build up enough day case capacity to remove some overnight beds from the system. However, given the modest increase in day beds observed, it is unlikely that there has been a 1:1 substitution of day for overnight bed by providers.

Figure 13: National number of day only G&A beds available, 2006/07 to 2014/15



Source: DH form KH03.

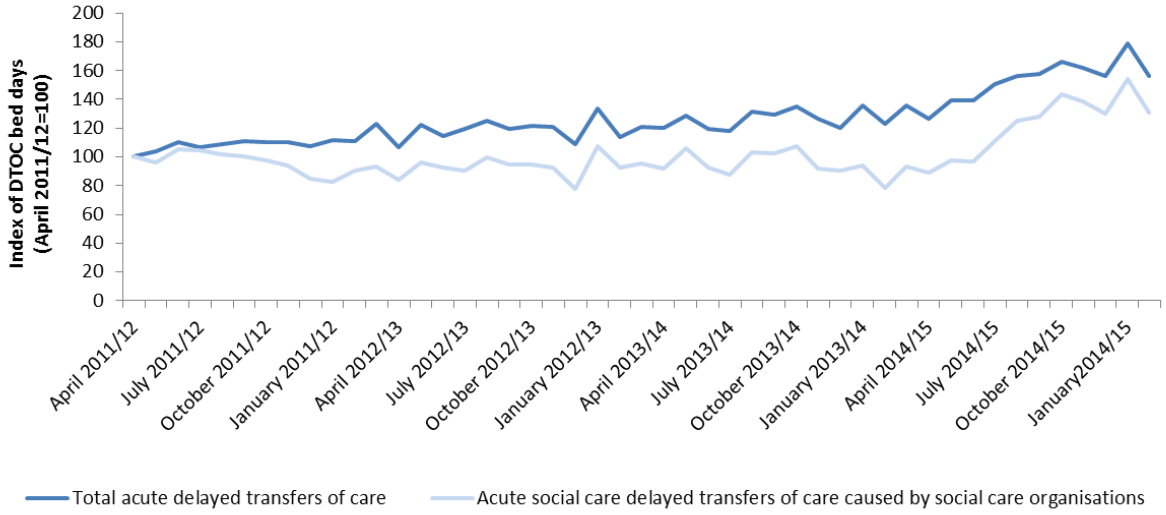
Figure 14: National number of overnight G&A beds available, 2006/07 to 2014/15



Source: DH form KH03.

Another potential driver of high bed occupancy rates could be an **increase in the number of DTOC out of hospital**, which would result in patients suitable for discharge or transfer to a non-acute setting 'blocking' hospital inpatient beds. Analysis of the data showed an upward trend in total acute DTOC since 2011/12 (Figure 15), with 27% more acute DTOC in Q3 2014/15 compared with the previous year. Numbers of acute social care DTOC have followed a similar pattern to total acute DTOC since 2011/12, but increased by 42.4% in Q3 2014/15 when compared to Q3 2013/14. This suggests that hospitals have found it increasingly challenging to discharge patients in a timely way, perhaps reflecting a lack of availability of out-of-hospital care to accommodate patients discharged from acute settings. In particular, the data suggest there were considerable challenges in 2014/15 in discharging patients who required social care services.

Figure 15: Acute DTOC (bed days), indexed to April 2011/12



Source: DTOC data, NHS England.

That said, we have a number of concerns about the quality of the DTOC data. Anecdotal evidence from stakeholders suggests that DTOC definitions are applied inconsistently across the country, meaning that reported DTOC numbers for different trusts (or even different sites within the same trust) may not be comparable. Further, while reported DTOC account for only 4% of total bed days,[13] research suggests there is considerable under-reporting of the number of patients who could be treated in an out-of-hospital setting. Given this, we cannot rely heavily on the findings from the DTOC analysis.

We have also explored the possibility that **reduction in local authority-funded social care and (NHS-funded) community care capacity** is partly responsible.[14] This seems to be a key driver of bed occupancy rates and A&E performance against the waiting times standard according to our information request. More than 50% of respondents reported they had experienced more DTOC as a result of reductions in social care and community care capacity[15] and fewer available rehabilitation beds. Reduction in social and/or community care capacity was a reported top five factor contributing to declining A&E waiting times performance in Q3 2014/15. Specifically, 60% of trusts that responded to our information request stated that DTOC had increased due to reductions in social care capacity; 45% to reductions in social care

[13] Calculated using the Winter Sitreps data.
[14] Reductions in social care capacity are most likely to be the result of reduction in publically-funded care (ie due to lower income thresholds for self-funding service users) as opposed to reduction in private provision.
[15] Anecdotally, there have been reports of families of self-funders taking a long time to find places in care settings for elderly relatives, with those people staying in hospital while places are found.

funding packages; 55% to reduction in domiciliary care provided by community providers (55%); and 46% to reductions in step-down/rehabilitation capacity in the community.

There were no social care data from 2014/15 that would have allowed us to quantify the effect of social care expenditure on the decline in A&E performance. The data available show a 2.1 percentage point reduction in social care spending per adult in 2014/15, but a 1.3 percentage point increase in weekly expenditure per older person on nursing/residential care. That said, our econometric analysis found that changes in social care expenditure did not affect A&E performance.[16]

Similarly, although trusts reported changes in community care expenditure to be a driver of the decline in A&E performance against the four-hour target, the limited available data indicate an increase in spending on community services in the last few years. Data on community care expenditure for 2014/15 per care commissioning group (CCG) are not yet available, but data on primary care trust (PCT) spending on community services show an increase between 2010/11 and 2012/13, from £8.4 billion to £9.7 billion. That said, it is not possible to calculate how much of the community care budget is spent on patients coming from an urgent care pathway or the impact community care has on both A&E attendances and admissions.

Therefore, it seems that DTOC are an increasing challenge for trusts, though we cannot quantify the size of the challenge they present or identify the actual sources of delays (or the relative contributions of social care and community care).

[16] Note that as we do not have data for 2014/15, we used lagged social care expenditure in our model.