The Public Health System’s 2nd Report

External Factors (‘Drivers’) Affecting Long-Term Term Trends and Recent ‘Pressures’ on Unscheduled Care Use and Performance in Wales

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Purpose and Summary of Document:
This document is the second report of work-in-progress to identify the risk factors for unscheduled care in Wales.

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This paper is for Information
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This report is the product of on-going collaborative work by numerous colleagues in the Wales Public Health System.
Contents

Executive Summary ........................................................................................................ 4

Background and purpose ............................................................................................... 9

Methods ....................................................................................................................... 9

Long term trends in major A&E attendance and waiting time performance .................. 9

What external factors might be contributing to longer-term trends in major A&E attendance and waiting time performance? ......................... 13

  Changing age profile of the population? ................................................................. 13
  Chronic morbidity .................................................................................................. 15
  Socioeconomic factors and inequalities ............................................................... 21

Short-term variation in attendance and declining waiting time performance in major A&Es in 2012/13 ................................................................. 23

What factors may have contributed to recent short-term fluctuations in major A&E attendance? ................................................................. 27

  Meteorological factors .......................................................................................... 27
  Fuel poverty .......................................................................................................... 33
  Acute morbidity .................................................................................................... 33

Other parts of the system – trends in use and performance ........................................ 36

  NHS Direct Wales .................................................................................................. 36
  General practice .................................................................................................... 37
  Emergency ambulance service .............................................................................. 39
  Emergency hospital admissions ............................................................................ 46

Conclusions ................................................................................................................. 52
Executive Summary

Background and Purpose

There has been recent concern about ‘unprecedented’ demand and pressure on NHS Wales, especially in major A&E departments. The NHS and Welsh Government requested the public health system in Wales to examine the factors behind this.

Methods

We analysed long-term trends and recent fluctuations in major A&E waiting time performance and attendance. We considered possible factors within and external to the system that could have influenced these trends and fluctuations.

Main findings

This report shows that the increased pressure in major A&E departments and elsewhere in the system this winter and spring was most likely caused by worsening supply-side factors and problems across the system, compounded by the unusual acute events of sudden drops in temperature in October and March with a prolonged cold spell from October until April.

The situation was worsened by peaks in circulating respiratory viruses during the same period, and the likelihood of rapidly increasing cold homes from fuel poverty.

The supply-side problems suggest that the unscheduled care system is not resilient to expected and unusual surges in external demand, or demand shifted within it.

In effect, a severe acute-on-chronic condition occurred in the unscheduled care system this winter and spring, and the chronic condition is worsening.

Performance breaches

We found that the long-standing poor waiting time performance in major A&Es is not clearly related to attendance, although the numbers of very old people attending has a weak effect.
Gradual annual increases in major A&E attendance

We demonstrated a gradual increase in annual attendance at major A&Es. Most attenders are under 65. But the 65-84 group accounted for most of the increase, followed by the 45-64, then 85+. Under 2s are also increasing. We know that more under 2s cause pressure on A&E and a high turnover of short admissions. The older patients tend to have longer waits, be frail when very old and have complex chronic medical and social problems with their acute problems. They are often admitted.

Demographic changes, health status and inequalities

We calculated that demographic and population health need changes only partly explain the annual increased attendance in major A&E. Neither do they fully explain the trends’ age profile. There is a strong correlation between poverty and deprivation inequalities with increased unscheduled care use. Incomes are falling, particularly for vulnerable groups. Demand on unscheduled care is likely to increase as a result.

Figure 1: Absolute and percentage change in ED attendance from previous year by age group, 2011 and 2012.

Problems in the system?

It seems more likely that the longer-term trends in major A&E attendance and performance target breaches have their roots in unscheduled care supply side and system failures, with their complex interactions and sometimes unintended consequences.
At the same time as a gradual rise in major A&E attendance over time, there has been a very similar decline in minor A&E attendance. It is not clear whether this is due to the closure or reduced opening times of those units over the last decade or so. More people appear to be attending major A&Es, possibly instead of seeing their GP, especially for older people. A higher proportion of these older people arrive at A&E in emergency ambulances. We know there is a higher risk of admission from A&E compared to seeing a GP for the same medical problem.

**Figure 2: Emergency Department Daily Attendances to Major / Minor Units**

*Chart supplied by NHS Wales Delivery & Support Unit*

What happened this winter and spring?

The supply-side system problems continued. It appears that the system lacked resilience to manage a ‘perfect storm’ of acute events.

**Sudden temperature drops, an early winter, an unusually cold spring**

Winter started early with a large and sudden drop in temperature in October that lasted and finished late, well into April 2013. This effect was magnified by the cold temperature staying below average, but abating slightly until February. A very unusual sudden large drop in temperature followed in March along with snow. March was the coldest since 1962.
The health effects of the cold were most likely exacerbated by cold houses becoming more common due to fuel poverty. Drops in temperature result in increased risk of myocardial infarction, stroke, acute respiratory conditions and falls, especially in older people.

There is a linear association between daily mean ambient temperature and risk of myocardial infarction. A 1°C reduction is associated with a cumulative 2% increase in risk of myocardial infarction over the current and subsequent 28 days. Because myocardial infarctions are common, and ambient temperature is experienced by the whole population, even a small increase in risk translates to substantial absolute numbers of extra myocardial infarctions.

**Fuel poverty and the cold**

There is evidence that fuel poverty is getting worse. Wales has high levels of poor housing with poor energy efficiency and heating systems. The rise in energy prices and squeeze on household incomes continues rapidly, particularly amongst the most vulnerable.

**Winter viruses in spring**

Added to the above were the modest peaks in respiratory and gastric virus circulation at the time of major A&E peak attendance by older people, that extended into spring.
Usual expected demand in winter, above average for spring

The numbers attending major A&Es this winter were not unusually high. However attendance was higher than normal for March, although not unprecedented. This winter’s emergency admissions peaked only in frail older people, but the peak was on top of a rising trend.

Bed occupancy is high, and the surge resulted in bed occupancy rates that were repeatedly hitting against the ceiling of 100%. Bed occupancy rates at this level generate a negative spiral in which an overstretched system has a fall in resilience and reduced capacity to deal with high levels of demand. This is mediated by bottlenecks in queues in the system, which results in over utilisation of some parts of the system, under utilisation of others and less smooth flow through the system as a whole.

The systemic supply-side issues mean that the system has little or no resilience to deal with the annual expected peaks in demand, let alone the occasional unusual events that will occur from time to time.

Conclusions

This report shows that the increased pressure in major A&E departments and elsewhere in the system this winter and spring was most likely caused by worsening supply-side factors and problems across the system, compounded by the usual increase in winter demand, superimposed on the unusual acute events of sudden drops in temperature in October and March with a prolonged cold spell from October until April, which included an unusually cold March.

The situation was worsened by peaks in circulating respiratory viruses during the same period, and the likelihood of rapidly increasing fuel poverty prevalence. The supply-side problems mean that the unscheduled care system is not resilient to expected and unusual surges in external demand, or demand shifted within it.

In effect, a severe acute-on-chronic condition occurred in the unscheduled care system this winter and spring, and the underlying chronic condition is also worsening.
Background and purpose

There has been recent concern about ‘unprecedented’ demand and pressure on the NHS Wales, especially in major A&E departments. The NHS and Welsh Government requested Wales’ public health system to examine the factors behind this.

Methods

We analysed long-term trends and recent fluctuations in major A&E waiting time performance and attendance. We considered possible factors within and external to the system that could have influenced these trends and fluctuations.

Long term trends in major A&E attendance and waiting time performance

All ages

There is a long-term trend of a gradual annual increase in overall major A&E attendances, but with fluctuations (table 1 and figures 4 and 5, below).

Table 1: Attendances at major emergency departments, all persons, all ages, Wales

<table>
<thead>
<tr>
<th>Year</th>
<th>Count of ED attendances</th>
<th>% change from previous year</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010/11</td>
<td>752,962</td>
<td>-</td>
</tr>
<tr>
<td>2011/12</td>
<td>768,575</td>
<td>2.1</td>
</tr>
<tr>
<td>2012/13</td>
<td>766,493</td>
<td>-0.3</td>
</tr>
</tbody>
</table>

Produced by Public Health Wales Observatory, using EDDS (NWIS)
Different age groups

Most attenders at major A&Es are under 65 years. But the annual increases are not spread evenly across age groups (table 2 and figures 4 and 5). For example, the 65-84 group contributed to just over a third of the 4.1% national increase from 2010 to 2012; the 45-64 under a third; and the 85+ a fifth. Numbers also increased in the under 2s and 25-44 group, but not in the 2-15 and 16-24 groups.

Table 2: Contribution of age groups to the A&E attendance increase from 2010 to 2012

<table>
<thead>
<tr>
<th>Age Group</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>under 2</td>
<td>6%</td>
<td>-10%</td>
<td>7%</td>
</tr>
<tr>
<td>2 to 15</td>
<td>0%</td>
<td>-10%</td>
<td>7%</td>
</tr>
<tr>
<td>16 to 24</td>
<td>7%</td>
<td>29%</td>
<td>68%</td>
</tr>
<tr>
<td>25 to 44</td>
<td>7%</td>
<td>29%</td>
<td>68%</td>
</tr>
<tr>
<td>45 to 64</td>
<td>7%</td>
<td>29%</td>
<td>68%</td>
</tr>
<tr>
<td>65+</td>
<td>7%</td>
<td>29%</td>
<td>68%</td>
</tr>
<tr>
<td>85+</td>
<td>7%</td>
<td>29%</td>
<td>68%</td>
</tr>
<tr>
<td>90+</td>
<td>7%</td>
<td>29%</td>
<td>68%</td>
</tr>
<tr>
<td>All ages</td>
<td>6%</td>
<td>29%</td>
<td>68%</td>
</tr>
</tbody>
</table>

From 2010 to 2012 annual attendance increased in absolute terms in:
- 90+ group by 3,990
- 85-89 group by 2,240
- 80-84 group by 3,420
- 75-79 group by 3,340
- 70-74 group by 3,100
- 65-69 group by 4,650
- 45-64 group by 8,900 (N.B.10 year age-band)
- Under 2s: 1,890 (N.B. 2 year age-band)

Figure 4: Counts of major A&E attenders 2010-2012 by broad age bands
Prior frailty is a moderate indicator of a requirement for inpatient care when an individual becomes acutely ill. The prevalence of frailty in the community is therefore a factor likely to have a significant effect on demand for acute care. An aging society will have an increasing proportion of frail elderly. As the relationship between age and frailty is non-linear, a small increase in the elderly in a population will generate a disproportionate demand on acute care services.

Waiting time performance

Waiting time performance breaches in major A&Es are longstanding across Wales. Counter-intuitively, monthly performance was not related to overall numbers attending each month in 2012/13.
However, the number of 85+ attenders was weakly related to 4-hour performance for the 85+ year-olds and overall performance for all ages. We are planning to examine this phenomenon closer. Superimposed on the gradually increasing numbers of attenders, poor performance means more people wait for longer in A&E departments which can give the impression that there are even more people attending.

**Minor A&E**

At the same time as a gradual rise in major A&E attendance of time, there has been a very similar decline in minor A&E attendance. It is not clear whether this is due to the closure or reduced opening times of those units over the last decade or so.

*Figure 7: Emergency Department Daily Attendances to Major / Minor Units*

*Chart supplied by NHS Wales Delivery & Support Unit*
What external factors might be contributing to longer-term trends in major A&E attendance and waiting time performance?

Changing age profile of the population?

Tables 3-5 below set-out estimates of annual population numbers and proportions for 2007 to 2011.

Table 3:

Population estimates, Wales, by age band

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>90+</td>
<td>21,600</td>
<td>21,300</td>
<td>22,600</td>
<td>24,300</td>
<td>25,900</td>
</tr>
<tr>
<td>85+</td>
<td>68,900</td>
<td>70,600</td>
<td>72,100</td>
<td>73,700</td>
<td>75,300</td>
</tr>
<tr>
<td>65+</td>
<td>529,900</td>
<td>538,400</td>
<td>547,600</td>
<td>557,300</td>
<td>566,400</td>
</tr>
<tr>
<td>45 to 64</td>
<td>783,600</td>
<td>792,600</td>
<td>800,100</td>
<td>807,800</td>
<td>814,600</td>
</tr>
<tr>
<td>25 to 44</td>
<td>771,500</td>
<td>770,600</td>
<td>766,400</td>
<td>759,500</td>
<td>754,500</td>
</tr>
<tr>
<td>16 to 24</td>
<td>360,300</td>
<td>365,400</td>
<td>367,800</td>
<td>370,400</td>
<td>372,500</td>
</tr>
<tr>
<td>2 to 15</td>
<td>493,400</td>
<td>489,000</td>
<td>486,200</td>
<td>484,400</td>
<td>483,800</td>
</tr>
<tr>
<td>under 2</td>
<td>67,700</td>
<td>69,900</td>
<td>70,700</td>
<td>70,600</td>
<td>72,100</td>
</tr>
<tr>
<td><strong>All ages</strong></td>
<td><strong>3,006,300</strong></td>
<td><strong>3,025,900</strong></td>
<td><strong>3,038,900</strong></td>
<td><strong>3,050,000</strong></td>
<td><strong>3,063,800</strong></td>
</tr>
</tbody>
</table>

Produced by Public Health Observatory, using mid-year population estimates (ONS)

Table 4:

Percentage of total population within age band, Wales

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>90+</td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
<td>0.8</td>
<td>0.8</td>
</tr>
<tr>
<td>85+</td>
<td>2.3</td>
<td>2.3</td>
<td>2.4</td>
<td>2.4</td>
<td>2.5</td>
</tr>
<tr>
<td>65+</td>
<td>17.6</td>
<td>17.8</td>
<td>18.0</td>
<td>18.3</td>
<td>18.5</td>
</tr>
<tr>
<td>45 to 64</td>
<td>26.1</td>
<td>26.2</td>
<td>26.3</td>
<td>26.5</td>
<td>26.6</td>
</tr>
<tr>
<td>25 to 44</td>
<td>25.7</td>
<td>25.5</td>
<td>25.2</td>
<td>24.9</td>
<td>24.6</td>
</tr>
<tr>
<td>16 to 24</td>
<td>12.0</td>
<td>12.1</td>
<td>12.1</td>
<td>12.1</td>
<td>12.2</td>
</tr>
<tr>
<td>2 to 15</td>
<td>16.4</td>
<td>16.2</td>
<td>16.0</td>
<td>15.9</td>
<td>15.8</td>
</tr>
<tr>
<td>under 2</td>
<td>2.3</td>
<td>2.3</td>
<td>2.3</td>
<td>2.3</td>
<td>2.4</td>
</tr>
</tbody>
</table>

Produced by Public Health Observatory, using mid-year population estimates (ONS)
Table 5:

Percentage change in population (compared to previous year), Wales

<table>
<thead>
<tr>
<th>Age Group</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>90+</td>
<td>-1.5</td>
<td>5.9</td>
<td>7.6</td>
<td>6.7</td>
</tr>
<tr>
<td>85+</td>
<td>2.5</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>65+</td>
<td>1.6</td>
<td>1.7</td>
<td>1.8</td>
<td>1.6</td>
</tr>
<tr>
<td>45 to 64</td>
<td>1.1</td>
<td>0.9</td>
<td>1.0</td>
<td>0.8</td>
</tr>
<tr>
<td>25 to 44</td>
<td>-0.1</td>
<td>-0.5</td>
<td>-0.9</td>
<td>-0.7</td>
</tr>
<tr>
<td>16 to 24</td>
<td>1.4</td>
<td>0.7</td>
<td>0.7</td>
<td>0.6</td>
</tr>
<tr>
<td>2 to 15</td>
<td>-0.9</td>
<td>-0.6</td>
<td>-0.4</td>
<td>-0.1</td>
</tr>
<tr>
<td>under 2</td>
<td>3.3</td>
<td>1.2</td>
<td>-0.2</td>
<td>2.0</td>
</tr>
<tr>
<td>All ages</td>
<td>0.7</td>
<td>0.4</td>
<td>0.4</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Produced by Public Health Observatory, using mid-year population estimates (ONS)

Figure 8 below shows the percentage change in major A&E attendance including for 2010 to 2011, and for the same age groups.

Figure 8: % change in major A&E attendance from previous year by age group
Assuming that all of the percentage change in the population age groups was translated into the same percentage change of A&E attendance in the groups from 2010 to 2011 (which is unlikely to be the case), then the change in population age structure, which is ageing, does not explain a significant amount of the change in A&E attendance, especially from age 45 upwards. This is consistent with a Nuffield Trust finding that population age structure change over a 5 year period could only explain at most 40% of the rise in emergency admissions they observed in England.

**Chronic morbidity**

Current routine A&E data (EDDS) does not allow accurate assessment of presenting symptoms or initial diagnoses of attenders. However, we have attempted to identify the main symptoms and initial diagnoses of those attending A&E who are subsequently admitted to hospital from A&E using routine PEDW hospital data. We acknowledge that this does not give us the whole spectrum of conditions for everyone attending A&E, but we have assumed that our analysis, on the whole, includes those attending A&E who have more severe acute health conditions than those not admitted. We understand that there are many other factors that can lead to admission other than severity of illness. Simultaneously our analysis also provides us with information about those who use another important part of unscheduled care that is often also under ‘pressure’, namely emergency hospital admissions (see section on emergency admissions). And we know that higher levels of morbidity in a population are associated with higher levels of emergency admission. Admission rates are also correlated with chronic illness (Majeed et al 2000).

Figure 9 shows the proportions of the five commonest initial diagnosis or presenting symptoms by age group for those admitted via A&E in 2012. Further information for the first quarter of 2013 will be available soon. It shows that over a year the pattern of health conditions varies by age, as we would expect.
Looking at trends in presenting health conditions over time and by age groups is more informative about whether there is increased use of major A&Es due to increased morbidity in the population. However, because we are looking at people who end up using A&E and who are admitted we are measuring use, and not necessarily health need and demand from those conditions in the population. We may also be measuring a shift in use from another part of the system, even though there is no increase in population health need. Nevertheless, if certain conditions are changing their presentation at A&E rapidly, whilst others aren’t, this may indicate a rise in the population. But interpretation must be with caution. It is difficult from routine data to get direct evidence of whether or not increased health need in the population does or does not lead to increased use of USC. However studies suggest that this is the case, in part. Other explanation in the increasing use may be changes in the size of the age group. Although we could examine rates, if this was the main explanation, we would
expect to see all health conditions changing at the same pace in the absence of changed health need.

We have set out below trends in presenting health conditions of attenders at A&E whom are admitted.

*Under 2s*

As expected, this group present mostly with acute respiratory conditions, predominantly infections, along with other acute infections, mostly gastroenteritis or diarrhoea and vomiting symptoms. The top five diagnosis groups constitute 85% of all emergency admissions via A&E in this age group. This age group tends to have the highest admission rate of all A&E attenders, although they are not the largest group of attenders (see previous section). They tend to be admitted mainly for short spells of stay (see emergency admissions section).

Figure 10 shows the trends in numbers of the diagnoses from 2003 to 2012. We know that all major A&E attendance (admitted/not admitted) is increasing in this age group. For the large proportion that is admitted, the two commonest diagnoses of ‘respiratory’ and ‘infectious’ have rapidly increasing trends over several years. This may be consistent with increasing morbidity.

**Figure 10:**

*Emergency hospital admissions via A&E, top 5 primary diagnoses in patients under 2 years old, 2003-2012*

Produced by Public Health Wales Observatory, using PEDW (NWIS)
2 to 15 years

The top five diagnoses constitute 83% of all emergency admissions via A&E in this age group. This group has a static or decreasing trend in A&E attendance overall, and the main cause by far of injury/poisoning has a rapidly decreasing trend, which may explain part of the decrease in attendance.

**Figure 11**
*Emergency hospital admissions via A&E, top 5 primary diagnoses in patients aged 2 to 15, 2003-2012*
Produced by Public Health Wales Observatory, using PEDW (NWIS)

16 to 24

The pattern is similar to the previous group for injury/poisoning, which is the commonest diagnostic group by far, except that the other 4 diagnoses are different.

25 to 44

The top five diagnoses constitute 71% of all emergency admissions via A&E in this age group. The trajectory is similar to the previous group for injury/poisoning, which is the commonest diagnostic group by far, except that the other 4 diagnoses are different again. And this may reflect that there has been little change in the attendance of this group over recent years.
45 to 64

The top five diagnosis groups constitute 76% of all emergency admissions via A&E in this age group. The diagnostic groups are markedly different this time. There is a gradual recent increasing trend for circulatory and digestive. The latter could reflect alcohol consumption but further analysis will be needed. The small percentage changes in these could mean they are in part driving small part of change in this group’s major A&E attendance.

Figure 12:
Emergency hospital admissions via A&E, top 5 primary diagnoses in patients aged 45 to 64, 2003-2012
Produced by Public Health Wales Observatory, using PEDW (NWIS)

65+

The top five diagnosis groups constitute 77% of all emergency admissions via A&E in this age group. Very large numbers of the 65+ group are admitted via A&E. There appears to be a re-emergence of an upward trend in circulatory and respiratory presentations, particularly the latter. There is a slow but continuous increase in injury and poisoning. This does not seem as large as this group’s A&E attendance increase, but may partly explain it.
85+ and 90+

The assessment of the pattern of circulatory and respiratory categories is similar to 65+, other than numbers are lower, and the inclines are steeper. The key difference to 65+ is that falls had become the most common condition for 85+ from 2008 and further back for the 90+, with an annual upward trend. This continued upward from 2011 to 2012. It appears that the morbidity here is in line with increased population numbers in this group, especially in the 90+, although this is not definite.
It is difficult to be clear whether any changes in population health need have led to changes in the number attending major A&E, to the pattern of conditions presenting to A&E, or to the change in age profile of attenders. Some changes only partly explain the annual increased attendance in major A&E, perhaps more so in the 44 to 64 group.

**Socioeconomic factors and inequalities**

The 2011 Welsh Health Survey shows a relationship between A+E attendance and individual socioeconomic classification: 23% surveyed in the ‘never worked and long-term unemployed’ group compared to 15% in ‘managerial and professional’ group had attended A+E in the preceding 12 months, with a gradient amongst groups in between.

Emergency hospital admission rates are also strongly correlated with area deprivation (Purdy in Kings Fund, 2010). But observed increase in emergency admission rates in England saw similar percentage increase across all the deprivation groups (Nuffield Trust 2010), and the steep gradient remained.

Another study examining potentially preventable ambulatory care sensitive conditions (ACSC) in England (Kings Fund 2012) showed that the emergency admission rate for them in the most deprived areas in England was more than twice that in the least deprived.
There is a large variation in emergency admission rate between LA areas in Wales. Inequalities in deprivation explain some of the variation, other drivers we discuss here on the demand and supply-side are probably also at play.

Figure 16:

Emergency hospital admissions by local authority, persons aged under 75, 2009, European age-standardised rates per 1,000

Produced by Public Health Wales Observatory, using data from NWIS (PEDW), ONS (MYE)

Areas ordered geographically from north west to south east

Socio-demographic variables explain around 45 per cent of the variation in emergency admissions between GP practices, with deprivation more strongly linked to emergency than to elective admission (Reid et al 1999; Duffy et al 2002).

Practices serving the most deprived populations have emergency admission rates that are around 60–90 per cent higher than those serving the least deprived populations (Blatchford et al 1999; Purdy et al 2010a)

A recent literature review (University of Sheffield/DH) concluded that demand on the emergency ambulance service is related to increasing socioeconomic deprivation, as well as to other factors.
Incomes are falling in Wales due to the economic climate and welfare reform, particularly for vulnerable groups. Poverty is worsening and inequalities are increasing. This will worsen the health status of the population. Demand on unscheduled care is likely to increase as a result.

**Short-term variation in attendance and declining waiting time performance in major A&Es in 2012/13**

More recently, several commentators have focused on ‘unprecedented pressures’ this winter and spring that appear to have affected major A&Es in particular.

*All ages*

Our analysis found no significant rise in the all-age number of major A&E attenders over the 2012/13 winter season compared to the summer and previous winter, as expected. Monthly attendance was highest from May to October, with a small peak in May. It was lowest from November to February for all ages, with small monthly fluctuations. January 2013 had lower overall attendance than the preceding 9 months and January 2012. This was followed by an unexpected and relatively large dip in February 2013. But four-hour performance worsened each month from June 2012.

Spring 2013 was very different to normal. We expect a gradual rise in all-age major A&E attendance in spring most years, starting slowly, often in March or April, with a small peak in early summer. But there was an unusual and sudden large peak in all-age attendance in March 2013 from February’s dip. But 6 months in the preceding year had higher attendances than March 2013. The peak was unusually sustained in to April. There was a large drop in performance between February and March 2013.

The degree of the short-term fluctuations in major A&E attendance witnessed in 2012/13 may have been exacerbated by being superimposed on the longer term gradual annual increasing trend in the numbers of attenders.
Figure 17: Average daily A&E attendances, major units in Wales, all ages, under 65 and 65+, January 2010 to April 2013
Produced by Public Health Wales Observatory, using EDDS (NWIS)

Figure 18: Average daily A&E attendances, major units in Wales, 65+, 85+ and 90+, January 2010 to April 2013
Produced by Public Health Wales Observatory, using EDDS (NWIS)
The 75-84 age group

Older age groups normally have a different annual pattern of major A&E attendance to the overall. The latter is dominated by the majority of attenders who are under 75. More older people tend to attend major A&E in winter than in summer. However, during 2012/13 the 75-84 group had an unusual gradual, early and prolonged modest peak in spring and early summer that started in February 2012 (before the preceding winter peak of 2011/12 had declined fully). There was also an unusual early winter peak in 2012/13 that started in October 2012. Following a small dip in November, it was at its highest in December, sustained in to January, but significantly dipping again in February. Again the unusual spring peak occurred in March, but it was proportionately much larger.

Figures 19 & 20 show the total monthly A & E attendance from April 2012 up to and including April 2013. This is also broken down in to broad age groups.

**Figure 19 and Figure 20: Number of attendances at MAJOR A&E DEPARTMENTS by selected age groups for April 2012 to 2013 (a) (b)**

![Graph showing number of attendances at MAJOR A&E DEPARTMENTS by selected age groups for April 2012 to 2013 (a) (b)](chart.png)

Source: Emergency Department Data Set, NWIS

(a) Those attendances where the age group is unknown have been excluded from this chart: there were less than 25 attendances with unknown age for each month from April 2012 to 2013.

(b) Data from January 2013 onwards is not strictly comparable with data for previous months due to a change in methodology. Please see notes for more details.
The smaller 85+ group had yet a different pattern of major A&E attendance in 2012/13. Unlike the 75-84 group, there was no peak in the spring, summer or autumn. The winter peak was not early, and it started with a sudden modest peak in December, sustained in to January. A sudden drop to the lowest attendance of the year occurred in February was followed by an unusual and very large swing in March 2013 to the highest attendance of the year for the 85+. This decreased in April, but the month still had an unusually high attendance.

The declining monthly 4-hour waiting time performance fell the most between February and March 2013, for the 85+ and all-ages. It appears that the temporary unusual patterns in A&E attendance during the winter and spring worsened the existing poor waiting time performance. The low performance seen this March is not unprecedented, but it has not been seen this low for March (figure 21).
What factors may have contributed to recent short-term fluctuations in major A&E attendance?

Meteorological factors

We know that changes in daily ambient temperature can cause increased need, demand and use of unscheduled care such as A&E attendance and emergency hospital admissions, as well as causing excess mortality. The effect can be from extreme heat, and also a ‘dose-response’ as temperature drops suddenly, or over a prolonged period.

After a sudden cold ‘snap’ the risk of myocardial infarction, stroke, and respiratory conditions increase over several subsequent days. These conditions are already amongst the most common serious causes of death and unscheduled care, especially amongst older people and people with existing cardio-respiratory conditions. The cold also increases the risk of falls, again, especially in older people (snow and ice with the cold further increases the risk of falls, affecting other age groups as well). Although respiratory causes and falls show the largest percentage winter excess compared to summer, falls remain a less common cause of excess winter unscheduled care use and mortality than cardio-respiratory causes.
There is a linear association between daily mean ambient temperature and risk of myocardial infarction. A 1°C reduction is associated with a cumulative 2% increase in risk of myocardial infarction over the current and subsequent 28 days. Because myocardial infarctions are common, and ambient temperature is experienced by the whole population, even a small increase in risk translates to substantial absolute numbers of extra myocardial infarctions. For example, the UK has about 146,000 myocardial infarctions per year, so 11,600 events would be expected on average in a 29 day period – this study suggest that each 1°C reduction in temperature nationwide on a single day would be associated with around 200 extra myocardial infarction events – more with lower drops in temperature. The effects are most apparent at two to 14 days after the temperature reduction. Those aged 75-84 are most at risk. But an increased vulnerability did not extend into the 85+ group. A possible explanation is that people in this age group may spend less time outdoors and may be more likely to live in residential or nursing homes with effective heating systems. There was an increased vulnerability to cold among those with previous coronary heart disease (Bhaskaran et al, 2010).

Provisional figures indicate that the UK mean temperature was 2.2 °C for March 2013, which is 3.3 °C below the long term 1981-2010 average (1Met Office, 201). The whole of the UK was colder than normal. March 2013 was the second coldest on record tied with 1947. Only March 1962 was colder. Unusually, this March was also colder than the preceding winter months of December (mean 3.8 °C), January (3.3 °C) and February (2.8 °C). This last happened in 1975.

As well as being very cold, March has also been very snowy and joins 2006, 2001, 1995, 1987, 1979, 1970 and 1962 as years when March saw some significant snowfall.

There has been a similar pattern in Wales. Variations in maximum and minimum daily temperature for Wales as a whole from July 2008 to May 2013 are shown in figure 22. It shows a prolonged cold winter starting in October 2012 that only ended in May 2013, after an unusually cold March and April. Snow fell across Wales in March, but less so in the west and south west.

1 http://www.metoffice.gov.uk/media/pdf/i/2/March2013.pdf
In October 2012 both maximum and minimum temperatures dropped faster and lower than October 2011, and remained much lower for more days until May 2013, apart from December, which was lower in preceding years. We can see that maximum and minimum temperatures were lower in March 2013 than previous years, and for more days. These sudden temperature drops are important as they have more significant effects on health conditions than prolonged cold, although the latter is important.

Figures 23-27 show mean monthly temperature (compared to the 1981-2010 average) in Wales from 1910 to the present for December, January, February, March and April. March 2013 was the lowest on record since 1962. And although mean temperature had risen in April 2013, compared to March 2013, it was well below average for April. Temperatures were also below average for January and more so in February 2013.
Figure 23:

Figure 24:

Figure 25:
Figure 28 shows *maximum* temperatures in Wales for March from 1910. Even the maximum temperature for March 2013 was the coldest since 1915.
To conclude, the acute situation that affected major A&Es in winter and spring 2012/13 is consistent with observed temperature fluctuations and the weather. Winter started early with a large and sudden drop in temperature in October that lasted and finished late, well into April 2013. This effect was magnified by the cold staying below average, but abating slightly until February. Then a very unusual sudden large drop in temperature followed in March. March was the coldest since 1962. Snow also fell in March.

The sudden drops in temperature and their monthly pattern are consistent with the monthly pattern and peaks of major A&E attendance seen, especially in the 75-84 group (see previous section) who suffer the greatest cardio-respiratory health effects form drops in temperature. Detailed statistical correlation with daily drops is needed to increase certainty of the observed association. So the younger 74-84 age group follows the temperature pattern more closely than the 85+, which the research predicts.

Increased A&E attendance and admission for cardio-respiratory causes in older people, along with injury in the very old in 2012 are consistent with the effects of cold, snow and ice, but there is no clear proof of a link without detailed daily trend analysis of 2012 into 2013. Arrival by ambulance by older people also peaked higher this winter than previous years.
Fuel poverty

People living in fuel poverty are at particular risk of the health effects of ambient cold weather. Fuel poverty leads to cold houses during winter and cold ‘snaps’ because people may be reluctant to use the heating they have, or may not be able to heat their home adequately despite using it.

A household is in fuel poverty if they spend 10% or more of their net income on energy costs. They are in severe fuel poverty if they have to spend 20% or more (Welsh Government and NEA Cymru).

Over a third of households in Wales are in fuel poverty.

Households using a primary heating fuel other than mains gas are most likely to be in fuel poverty. Between 2004 and 2011, the price of LPG increased over 88% per cent. The likelihood of being in fuel poverty in rural areas is nearly double that in urban areas (42% of households compared with 22%). Rurality is associated with fuel poverty in part due to the lack of mains gas, the expense and inefficiency of some alternatives, and because many owner-occupier homes, especially with older people living alone, have low incomes and are in disrepair with poor energy efficiency.

People at higher risk of the health effects of cold are also at higher risk of fuel poverty. At least two-thirds of households containing a lone person aged over 60 are in fuel poverty.

Fuel poverty is worsening acutely over short recent periods in Wales as average incomes fall due to the economic climate and welfare reform in particular, and as energy prices continue to rise rapidly. This means that people vulnerable to temperature drops due to the weather are more at risk in their homes from the health effects of cold due to fuel poverty. Worsening fuel poverty this winter is very likely to have compounded the prolonged cold winter and spring of 2012/13.

Acute morbidity

Although the 2012/13 influenza season had lower activity than the pandemic and the 2010/11 influenza season, a higher consultation rate for influenza-like illness was noted this year, compared to the 2011-12 season and all seasons between 2000/01 and 200809 (Figure 29). Influenza activity is likely to have peaked during week 52, although this was not reflected in the GP consultation rate due to reduced GP opening hours during the Christmas holidays (figure 30).
Figure 29: Historical clinical consultation rate per 100,000 practice population in Welsh sentinel practices (week 42 1996 – week 23 2013).

Figure 30: Public Health Wales weekly consultation rate for influenza-like illness 2011 – 2013 (per 100,000 using data collected through Audit+ from all submitting practices in Wales, correct as at 10th June 2013).
The numbers of hospital and non-sentinel GP patients with suspected respiratory viruses, from whom samples were submitted for laboratory testing were also higher during the 2012/13 season (figure 31). Total numbers of samples testing positive for influenza, Respiratory Syncytial Virus (RSV) and rhinovirus were higher during 2012/13 than during 2011/12. The proportion of hospital and non-sentinel GP patients testing positive for influenza was also higher during 2012/13 reflecting increased influenza activity seen in the community.

**Figure 31:** Test results for respiratory samples from hospitalised and non-sentinel GP patients (data provided by Public Health Wales Specialist Virology Centre, correct as at 5th June 2013).

**Figure 32:** Weekly numbers of laboratory confirmed cases of norovirus, rotavirus, RSV, rhinovirus and influenza 2010 to present (Data source: CoSurv Laboratory confirmations module, correct as at 10th June 2013).
The timing of the modest peaks in respiratory syncitial virus (RSV) and rotavirus circulation also coincide with the timing of major A&E peak attendance in older people, whom are most susceptible. Influenza-like illness was higher this winter than last and may have peaked over Christmas and New Year, probably from influenza B and RSV. There is evidence of increased influenza A activity into March and April, again consistent with attendance amongst remaining high into April.

The incidences of these viruses are also broadly compatible with steeper increases in cardio-respiratory presentations to major A&Es and with GP consultations for asthma (see general practice section).

Historic analysis shows that influenza activity has been much higher in the past, although the fact remains that the activity has been higher this season and peaks correspond to A&E attendance. The fact that peaks have been higher in the past without such profound problems in A&E suggest that the extent of the chronic supply-side problems with the A&E system and interfaces with the other USC system parts is severe, but the acute-on-chronic effect has been worsened by the cold temperatures as well.

**Other parts of the system – trends in use and performance**

**NHS Direct Wales**

Between 2007/8 to 2012/13 there is evidence from NHS Direct Wales data that less people are being directed away from unscheduled care, and that a higher percentage of callers are advised to ring 999 or to attend A&E.

<table>
<thead>
<tr>
<th>End Disposition</th>
<th>0845 46 47 Service</th>
<th>GPOOH Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self Care + Health Information</td>
<td>41.3%</td>
<td>46.8%</td>
</tr>
<tr>
<td>GP Routine Appointment</td>
<td>13.2%</td>
<td>11.1%</td>
</tr>
<tr>
<td>Pharmacist</td>
<td>2.6%</td>
<td>2.0%</td>
</tr>
<tr>
<td>GP Urgent Appointment</td>
<td>12.9%</td>
<td>9.1%</td>
</tr>
<tr>
<td>GP Same Day Appointment</td>
<td>12.6%</td>
<td>10.9%</td>
</tr>
<tr>
<td>A&amp;E</td>
<td>8.3%</td>
<td>8.2%</td>
</tr>
<tr>
<td>999</td>
<td>2.8%</td>
<td>3.2%</td>
</tr>
<tr>
<td>Dentist</td>
<td>5.0%</td>
<td>7.5%</td>
</tr>
<tr>
<td>Other Professional</td>
<td>1.2%</td>
<td>1.2%</td>
</tr>
</tbody>
</table>
General practice

Despite the protracted cold ‘snap’ and sustained viral activity, weekly consultations to the GP out of hours services in Wales has remained within the expected average of the past 3 winters, see figure below. This pattern is different to that seen for major A&E attendance and needs further explanation. As for England, it is difficult to differentiate urgent or unscheduled care in GP practices’ routine data from planned or routine appointments.

*Figure 33: Weekly total consultations to Out of Hours services in Wales and numbers of respiratory-related diagnoses (as of 12/06/13).*

GP consultation rates for exacerbations of severe asthma began to increase during September 2012 and broadly remained elevated until March 2013. This period corresponds with increases seen in laboratory confirmed cases of rhinovirus (starting in September 2012), RSV (starting in October 2012) and influenza (starting in December 2012) (see section on acute morbidity under A&E section). Other potential causes of exacerbations of asthma may also be implicated, such as ambient temperature. The increase in asthma corresponds with the unusually prolonged winter and very cold spring in 2012/13. Peaks seen in consultation rate for exacerbations of severe asthma the 2012/13 winter period were generally higher than in 2011/12.

The age group which accounted for the highest number of weekly consultations for exacerbations of severe asthma during this winter were patients aged 65 years and older. This is consistent with presentations of respiratory conditions to A&E in older people in 2012.
and the pattern of increased admissions in them from winter to spring this year, compared to younger ages. This does not confirm a link, but is consistent.

The increase in consultation rate for exacerbations of severe asthma, which began in September 2012 was also reflected in an increase seen in the proportion of consultations with out of hours doctors in Wales that were related to respiratory illness (figure 34).

**Figure 34: Weekly GP consultation rate for exacerbations of severe asthma (per 100,000 using data collected through Audit+ from all submitting practices in Wales, correct as at 10th June 2013).**

Rates of consultations with GPs for gastroenteritis (figure 35) saw an increase during the autumn; from September to November. A second, larger increase was seen later in the winter / spring; from February to April.

The autumn peak corresponds temporally to an increase in the number of laboratory confirmations for norovirus, reported through CoSurv. The late winter/spring peak corresponds to an increase in the number of laboratory confirmations for rotavirus reported through CoSurv.

During both of the peaks seen in gastroenteritis activity during 2012/13, the largest numbers of consultations were accounted for by the very young (younger than five years) and the older adults (65 years and older).
The peak in consultation rate for gastroenteritis during the 2012/13 winter period was higher than seen in the previous two winters.

Similar patterns in seasonality and age distribution were seen in the rates of recorded reports to GPs of vomiting.

**Figure 35: Weekly GP consultation rate for gastroenteritis (per 100,000 using data collected through Audit+ from all submitting practices in Wales, correct as at 10th June 2013).**

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**Emergency ambulance service**

There have been reports of more ambulances arriving at A&E departments in Wales in recent months, and more batching of vehicles, both of which place increased pressure on the system. There have also been reports that a new clinical response model (NCRM), introduced in December 2011 to improve call handling and patient care (withdrawing ‘GP urgents’ - putting these instead into the 999 system -and abolition of Category ‘B’ calls) may have led to a rise in healthcare professional (HCP) calls and transports.

The figure below illustrates this change and also a gradual rise in total EMS activity over the period April 2008 to March 2013 with clear seasonal variation – peaks in the winter, and troughs in the summer.

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\[^2\] Differences in coding may be responsible for some of the changes and needs further investigation.
It is important to note that there is no significant change in total EMS Calls post introduction of the NCRM in December 2011.

**Figure 36:**

EMS Calls Received: All Wales

According to WAST, prior to December 2011, all HCPs calls received in the EMS system were classified as ‘GP urgents’ and there were no HCP calls in the 999 emergency categorisation system (Category ‘A’, Category ‘B’ and Category ‘C’), but after December 2011, these HCPs calls were included in the regular 999 categorisation system. The figure below shows that HCP mediated EMS calls across Wales seem to have been relatively static until August 2010. Then there was a peak in the winter of 2010/11, followed by a decline up to August 2011. However, the biggest change seems to have been in December 2011, corresponding with the introduction of the NCRM, when there was a large step-wise increase in the volume of HCP calls recorded (about 1,500 EMS calls or a 33% rise between November 2011 and January 2012). WAST agrees that a possible explanation for some of this rise is due to there being some calls from HCPs prior to December 2011 going straight to the 999 system and not therefore being categorised as HCP calls, and furthermore, these calls being correctly categorised as HCP calls post December 2011. However, they feel that it is unlikely that the volume of these would be responsible for a 1/3 increase after the introduction of the NCRM.
If we remove those calls originating from HCPs from the data to see what their impact is and the contribution of the ‘general public’, then there was a small dip in activity in the All-Wales data when the NCRM was introduced in December 2011 (about 1,500 calls or 5% between November 2011 and January 2012), shown in the next figure.

This would likely represent the number of HCP calls which went straight into the 999 Emergency system but were not captured as HCP calls pre NCRM, as HCP calls going into the 999 system are better recorded post NCRM. The decline in EMS calls post introduction of the NCRM lends evidence to the fact that a number of HCP derived EMS calls going straight to the 999 system pre December 2011 were not captured as HCP calls. Therefore, when all HCP calls going through the
999 system are excluded post-December 2011 there is a fall in the total. After this dip, EMS activity starts to go up again slightly.

The next figure shows that there has been gradual increase year on year in those aged 85+ (who are the second largest group transported) and a gradual decline in those aged 17-25. This would contribute to pressure on the system as older patients have higher mean acuity.

**Figure 39:**

![Graph showing 999 Emergency Calls Received by Age and Year: Wales](image)

The figure below shows that overall emergency transports (including HCPs) seemed to have gradually increased over the period 2008 to 2013 in Wales, with some seasonal variation. There does not seem to have been a significant change in the volume of emergency transports post introduction of the NCRM in December 2011.

**Figure 40:**

![Graph showing Emergency Hospital Transports incl. HCPs: All-Wales](image)
The next figure shows that there has been a step-change increase in transports for HCPs on the introduction of NCRM of about 2,000 transports per month; about a 50% increase.

**Figure 41:**

Emergency Transports for HCPs only: All-Wales

This exceeds the step-change in EMS calls from HCPs by about 500. This needs fuller investigation. Part of this is likely to be due to previously unrecorded HCP 999 calls and transports now being captured. When we look at emergency transports excluding those initiated by HCPs; this therefore shows the impact of the general public in driving growth in emergency transports. It can be seen than other than seasonal variation, these have been relatively flat from 2008 until December 2011. Then there seems to be a dip around the time the NCRM was introduced, followed by a period of relative flatness.

The next figure presents data on the destination of HCP-mediated transports. This shows that after the introduction of the NCRM in December 2011, there seems to have been a step-wise decrease in emergency transports to non-ED destinations (wards etc) and a step-wise increase in HCP emergency transports to EDs across Wales. Since then both destinations have increased slightly. This suggests that under the NCRM there may be a greater likelihood of a HCP derived patient ending up in an ED and a lower likelihood of a patient ending up on a ward than before the new model was introduced. Daytime weekday GPs and the out-of-hours service have been equally responsible for this change.
The figure below shows the conveyance rate percentage and tells us what proportion of 999 calls are eventually conveyed to hospital. The conveyance rate excludes HCP calls as these are all supposed to be conveyed to hospital. The overall conveyance rate has gradually declined from about 70% in April 2008 to about 60% in March 2013.

Category ‘A’ calls have the highest conveyance rate percentage and Category ‘C’ calls the lowest, which is appropriate. Category ‘A’ calls have stayed relatively static near the 80% mark. There seems to have
been a small step-wise decrease between September and December 2010 in overall conveyance rate. This can be explained by the conveyance rate of Category ‘C’ calls dropping significantly from September 2010 until a low in March 2011; this has increased since then. According to WAST, the large decline in Category ‘C’ conveyance rate in 2010 was due to the introduction of clinical telephone assessment, triaging many of our lower acuity incidents without the need for a vehicle response. The sharp rise up again in December 2011 was due to the introduction of the NCRM, a key component of which was the scrapping of Category ‘B’. Much of what used to be Category ‘B’ are now ‘C’. The data describes a decrease in overall conveyance rate percentage over the last few years in all health boards. The category ‘A’ conveyance rate has stayed the same or increased slightly.

One of the performance targets under which WAST operates is that it is expected to take no more than 15 minutes for a patient to be handed into the care of hospital emergency department staff by ambulance staff. The next figure shows that 15 minute handover performance has declined significantly across Wales from close to 70% in April 2009 to less than 50% in March 2013, showing the pressure on the unscheduled care system. The introduction of the NCRM does not seem to have had an effect on 15 minute handover.

Overall, this analysis has found that there has been a gradual rise in total EMS activity and transports across Wales which do not seem to have been influenced by the change in clinical response model in
December 2011. In terms of age, it is EMS calls for those aged 85+ which have increased and calls for those aged 18-25 which have decreased; older patients are normally of greater acuity, leading to increased pressure on hospitals. The large step-wise increase in HCP mediated calls and transports is largely related to the ‘unmasking’ of HCP mediated calls which were undetected in the 999 system prior to this change, although WAST believe that it is only responsible for part of this. However, there does seem to have been a change in the destination of HCP mediated transports with a step-wise decrease in emergency transports to non-A&E destinations (wards etc) and a step-wise increase in HCP emergency transports to A&Es. This suggests that under the NCRM there may be a greater likelihood of a HCP derived patient ending up in an A&E and a lower likelihood of a patient ending up on a ward; this could explain some of the increased pressure on A&Es recently and the batching of ambulances, leading to a decline in 15 minute handover performance. There has been a decline in the conveyance rate percentage for EMS calls across Wales, largely driven by a reduction in the proportion of Category ‘C’ calls conveyed. This may be related to the introduction of clinical telephone assessment, triaging many of our lower acuity incidents without the need for a vehicle response. This is a positive development.

**Emergency hospital admissions**

*Longer-term trends*

Unlike attendances at major A&Es, emergency hospital admission numbers remain reasonably stable at present. Depending on the exact methodology used, routine hospital data (PEDW) shows either a very gradual slight increase or decrease over recent years. Work is ongoing to resolve these methodological issues.

The current preferred methodology of Public Health Wales shows that the number of emergency admissions increased marginally by 0.6% from 345,100 per annum in 2010 to 347,100 in 2012. As for major A&E attendances, the majority of emergency admissions are in under 65s, many in ‘middle age’ groups and the very young.

In the 65+ age group, admissions increased by 1.7% over the same period. The 65+ accounted for about 40% of all emergency admissions in both 2010 and 2012. Admission numbers in the 85+ decreased by 2.9%. Their proportion of all emergency admissions also remained the same at about 11%.
Figures below show that admissions via different sources have different trends. For all ages admissions via A&E are increasing, whilst those through a GP are decreasing by a similar degree. The divergence appears to have started around March 2011. For the 65+ and its 85+ sub-group the rise in the A&E route and decline in the GP route appear to be steeper.

The divergence may partly reflect a possible gradual shift to attending A&E away from accessing unscheduled care from a GP, especially amongst older people. More people accessing A&E than previously accessed both A&E and GPs may also contribute. The 4 and 8 hour waiting time targets for A&E may have contributed to further admissions in older people than would have otherwise occurred - older people tend to be in A&E for longer periods which can lead to a surge in admissions as the target approaches. Furthermore, we know that once someone reaches A&E rather than seeing a GP for the same problem, on average they are more likely to be admitted, especially if they are older or under 2.

We also know that of the increased number of older people accessing major A&Es, a greater proportion are arriving by 999 emergency ambulance. This may possibly represent a change in health seeking behaviour or difficulty accessing GP USC from surgeries or GP OOH. There have also been changes to the system of how health care professionals can access emergency ambulances. This may have also played a part.

Recent shorter-term fluctuations in emergency admissions

All ages

Unlike previous years, the small winter peak in emergency admissions via A&E for 2011/12 did not subside fully. After a steep rise in spring 2012, admissions were sustained at a high level until a sharp drop in January 2013. We are conducting further analysis on new data for 2013. The GP route continued its downward trend with a brief peak from August to November 2012.

65+ and 85+

The pattern was different for these groups. The 2011/12 winter rise in admissions via A&E was much higher than the previous year. The peak did not subside fully and remained level and relatively high throughout
January to October 2012. The 2012/13 winter peak started sooner in October. It peaked slightly higher in December than the previous year, before subsiding in January 2013 to a level higher than the previous January. In the 85+ age group the numbers were smaller, but the pattern similar apart from a larger winter peak in 2011/12.

**Figure 45:**

Emergency admissions by source, all Welsh providers, all ages, Jan 2010 - Jan 2013
Produced by Public Health Wales Observatory, using PEDW (NWIS)

![Graph showing emergency admissions by source, all Welsh providers, all ages, Jan 2010 - Jan 2013](image)

**Figure 46:**

Emergency admissions by source, all Welsh providers, age 65+, Jan 2010 - Jan 2013
Produced by Public Health Wales Observatory, using PEDW (NWIS)

![Graph showing emergency admissions by source, all Welsh providers, age 65+, Jan 2010 - Jan 2013](image)
A study by the Nuffield Trust (2010) showed that most emergency admissions occur in those under-65 years in England. The largest percentage increases in emergency hospital admission numbers were in the under-ones and in middle-aged groups. In the study, increases in admissions were mainly due to new short spell admissions of 24 hours or less, the majority via A&E and in under 65 year olds. Although short spell admissions are known to decrease with age, over a five year period they increased by similar proportions across all age groups, longer stays remained constant or decreased in number. The gradual increase in emergency admissions was mainly due to new admissions rather than readmissions. We are planning to examine these issues further with PEDW data with an agreed analysis method.

Although A&E performance measures can partly contribute to problems with in-hospital admissions, inefficiency and bed occupancy due to a high turnover of short spell stays across all ages, transfers between wards, combined with winter peaks of admissions amongst older people with longer lengths of stay. In turn this can compound waits in A&E for people who need to be admitted.
The effect of bed occupancy on queues

Mathematical models based on the Erlang equation have been described that accurately predict the relationship between bed occupancy and the consequent rate at which admissions have to be ‘turned away’. Turning away admissions does not mean permanently rejecting the admission but, for example, by being asked to wait on a trolley in A&E until a bed is free (See Table 7).

By way of illustration, the model in table 7 above predicts that a 10 bed pool with a 92% occupancy will temporarily turn away (or ask to wait) 50% of patients referred to it. A ‘turn away’ rate of 50% is clearly problematic. However, many pools in Wales with around 10 beds currently operate at over 92% occupancy, suggesting that high ‘turn away’ rates are inevitable in the current system. It should be noted that the average length of the wait after ‘turn away’ will also be related to the average length of stay of patients in that bed pool.

Queuing theory demonstrates that the most sustainable systems are those that are simple rather than complex. One of the problems, from a systems level perspective, with the solutions that have been adopted in relation to unscheduled care over the last decade is that they have made the system more compartmentalised and more complex. For example, a system with a pool of general surgeons and a pool of general physicians is much more resilient in the face of fluctuations in demand than a system where there are, for example, ten medical and ten surgical specialties but no cross cover. This generates 20 queues and a greater probability that one of the 20 queues will be overloaded at any given time.
Table 7: Percentage occupancy giving rise to different levels of turn-away for different size beds pools

<table>
<thead>
<tr>
<th>Size of bed pool</th>
<th>Percentage ‘turn-away’</th>
</tr>
</thead>
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<tr>
<td></td>
<td>0.1%</td>
</tr>
<tr>
<td>10</td>
<td>30%</td>
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<td>50</td>
<td>65%</td>
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<tr>
<td>100</td>
<td>74%</td>
</tr>
<tr>
<td>500</td>
<td>88%</td>
</tr>
</tbody>
</table>

Figure 48:

All Wales Bed Occupancy
(excludes Mental Health, Paediatrics, Obstetrics and Community)

Figure 49:

All Wales Average Bed Availability Trends
Conclusions

This report shows that the increased pressure in major A&E departments and elsewhere in the system this winter and spring was most likely caused by worsening supply-side factors and problems across the system, compounded by the usual increase in winter demand, superimposed on the unusual acute events of sudden drops in temperature in October and March with a prolonged cold spell from October until April.

The situation was worsened by peaks in circulating respiratory viruses during the same period, and the likelihood of rapidly increasing fuel poverty prevalence. The supply-side problems mean that the unscheduled care system is not resilient to expected and unusual surges in external demand, or demand shifted within it.

In effect, a severe acute-on-chronic condition occurred in the unscheduled care system this winter and spring, and the chronic condition is worsening.

We found that the long-standing poor waiting time performance in major A&Es is not clearly related to attendance, although the numbers of very old people attending has a weak effect.

We demonstrated a gradual increase in annual attendance at major A&Es. Most attenders are under 65. But the 65-84 group accounted for most of the increase, followed by the 45-64, then 85+. Under 2s are also increasing. We know that more under 2s cause pressure on A&E and a high turnover of short admissions. The older patients tend to have longer waits, be frail when very old and have complex chronic medical and social problems with their acute problems which adds to departmental pressure. They are often admitted.

We calculated that demographic and population health need changes only partly explain the annual increased attendance in major A&E. Neither do they fully explain the trends’ age profile.

It seems more likely that the longer-term trends in major A&E attendance and performance target breaches have their roots in unscheduled care supply side and system failures, with their complex interactions and sometimes unintended consequences.

For example, there is circumstantial evidence that much of the demand for A&E has shifted from minor A&E units to major A&Es. More
people appear to be attending major A&Es, possibly instead of seeing their GP, especially for older people. A higher proportion of these older people arrive at A&E in emergency ambulances. Added to this, following a change in ambulance call processes, it appears there may now be a greater likelihood of a patient seen by a GP or other health care provider ending up in an A&E rather than referred to a ward, which may be one explanation. It may also partly explain why emergency admissions via GPs are decreasing, whilst admissions via A&Es are increasing at a marginally higher rate. We know there’s a higher risk of admission from A&E compared to seeing a GP for the same medical problem.

The acute pressures on A&E and the rest of the system this winter and spring were caused by these ongoing long-term system problems, compounded by the usual predictable winter rise in demand, but with the added effect of a combination of some unusual events lasting from winter into spring.

The acute situation that affected the system failures in 2012/13 was the result of a ‘perfect storm’ of winter starting early with a large and sudden drop in temperature in October that lasted and finished late, well into April 2013. This effect was magnified by the cold temperature staying below average, but abating slightly until February. A very unusual sudden large drop in temperature followed in March along with snow. March was the coldest since 1962. The health effects of the cold were probably exacerbated by cold houses becoming more common due to fuel poverty. The temperature fluctuation was consistent with the monthly pattern of major A&E attendance, especially in the 75-84 group, although further analysis is required.

There is evidence that fuel poverty is getting worse in Wales. Wales has high levels of poor housing with poor energy efficiency, build quality and poor heating systems. There has been a significant rise in energy prices and a financial squeeze on household incomes, particularly amongst the most vulnerable. When combined with the average effect of cold weather it is reasonable to presume that in areas where poor housing is common the effect of the combined effects of cold weather and poor housing may have had a higher than average effect.

Added to this were the modest peaks in respiratory and gastric virus circulation at the time of major A&E peak attendance by older people that extended into spring.
The systemic supply-side issues mean that the system has little or no resilience to deal with the annual peaks in demand, let alone the occasional unusual events that will occur from time to time.

This report shows that the increased pressure in major A&E departments and elsewhere in the system this winter and spring was most likely caused by worsening supply-side factors and problems across the system, compounded by the usual increase in winter demand, superimposed on the unusual acute events of sudden drops in temperature in October and March with prolonged a prolonged cold spell from October until April.

The situation was worsened by peaks in circulating respiratory viruses during the same period, and the likelihood of rapidly increasing fuel poverty prevalence. The supply-side problems mean that the unscheduled care system is not resilient to expected and unusual surges in external demand, or demand shifted within it.

In effect, a severe acute-on-chronic condition occurred in the unscheduled care system this winter and spring, and the chronic condition is worsening.

In summary, the degree of the short-term fluctuations in major A&E attendance witnessed in 2012/13 may have been exacerbated by being superimposed on the longer term gradual annual increasing trend in the numbers of attendees. However, a combination of factors coming together, primarily precipitated by unseasonably cold weather appear to have been ‘the straw that broke the camel’s back’. In the future, it is essential that unscheduled care systems are re-designed to be more resilient.