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Public Health  
Wales

**Surveillance:** *Clostridium difficile* (*C. difficile*)

**Report:** *C. difficile* in Wales – an overview

**Time period:** Up to 31<sup>st</sup> March 2013

**Health Board:** All Wales

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## Summary

In 2011 *C. difficile* still contributed to 0.76% (232/30,426) of all deaths in Wales. In 2009-2011 *C. difficile* contributed to 1.7 per cent of all deaths in NHS hospitals in Wales.

In 2012 two Health Boards accounted for two thirds of the deaths associated with *C. difficile* in Wales.

Health Boards and NHS Trust should monitor and report 30 day all cause mortality for cases of *C. difficile*, and should audit the death certificates of all these patients to check that they accurately record deaths associated with Healthcare Associated Infection.

The Welsh Government introduced a minimum 20% reduction target for *C. difficile* in inpatients aged over 65 for each Health Board in Wales for the 2010/11 financial year.

The introduction of this target was associated with a steep reduction in the incidence of *C. difficile* but this reduction appears to have ceased.

Renewed action is required by all Health Boards and NHS Trusts in Wales to reduce the incidence of *C. difficile* and associated mortality.

## 1. *C. difficile* mortality data based on place of residence

### 1.1 *C. difficile* mortality in England and Wales at a population level, 2001 - 2011

The Office of National Statistics (ONS) publishes an annual statistical bulletin describing death associated with *Clostridium difficile* in England and Wales. The latest ONS publication, *Deaths Involving Clostridium Difficile: England and Wales, 2011*, was published on 22<sup>nd</sup> August 2012. It is available from:

<http://www.ons.gov.uk/ons/rel/subnational-health2/deaths-involving-clostridium-difficile/2011/stb-deaths-involving-clostridium-difficile-2011.html>

### 1.2 *C. difficile* mortality in Wales at a population level, 2008 – 2012

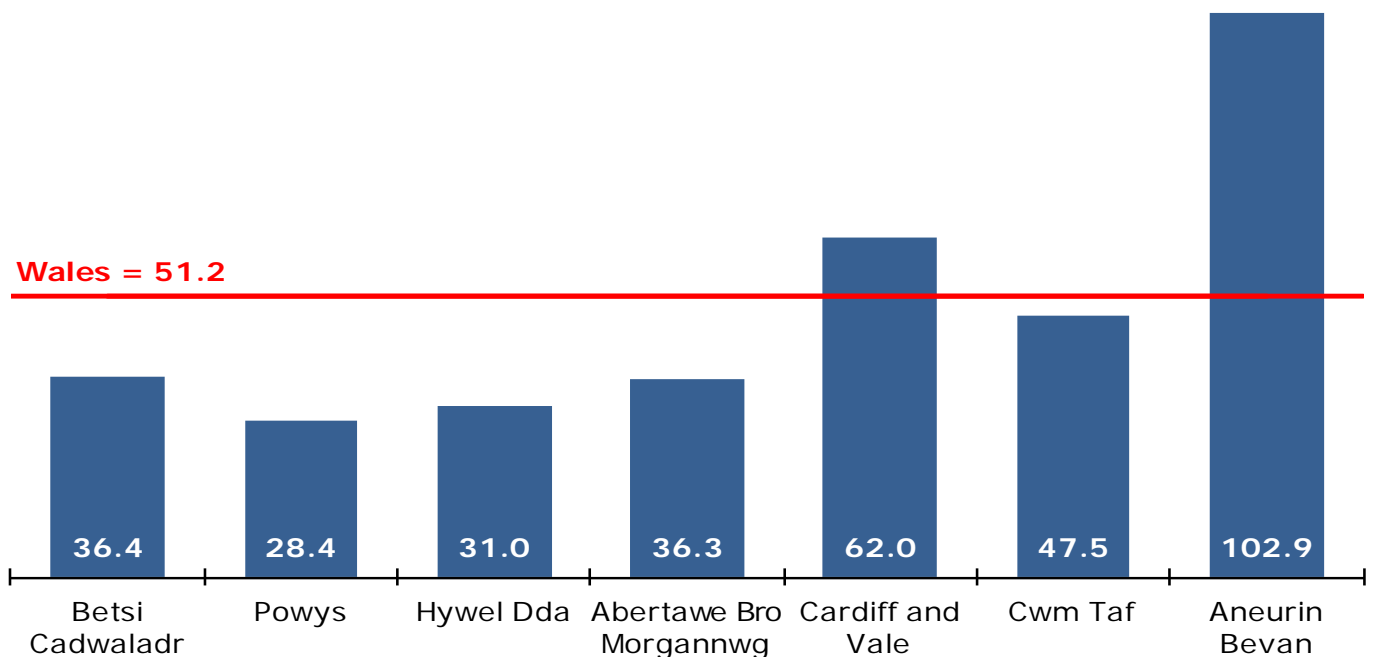
Data for the past five years shows significant variation in age standardised mortality rates in residents of different Health Boards within Wales (figure 1). The Welsh Government introduced a minimum 20% reduction target for *C. difficile* in inpatients aged 66+ for each Health Board in Wales for the 2010/11 financial year. A large reduction in deaths associated with *C. difficile* has been observed in Wales as a whole over the past 5 years. However, in 2012 two Health Boards accounted for two thirds of the deaths associated with *C. difficile* (table 1). Mortality in residents of Aneurin Bevan Health Board has reduced substantially since 2008, but the number of deaths still remains high in comparison to Wales as a whole. Although historically mortality in residents of Betsi Cadwaladr University Health Board were not high relative to other parts of Wales, this is the only area in Wales that has not seen substantial reductions in deaths since 2008. Mortality in residents of Betsi Cadwaladr University Health Board is now high in comparison to Wales as a whole.

In 2011 *C. difficile* contributed to 0.76% (232/30,426) of all deaths in residents in Wales. In that year it contributed to 1.4% (78/5,565) of all deaths in residents of Aneurin Bevan Health Board.

Not all *C. difficile* infection is acquired in hospital and when it is, this may not be in a hospital in an area where the patient resides. From 2009-11, 94.6 per cent of deaths involving *C. difficile* in Welsh residents occurred in Welsh NHS hospitals. This represents 1.7 per cent of all deaths in NHS hospitals in Wales during this period of time. The majority of deaths will be associated with health care in the area where the individual resides.

**Figure 1. Deaths mentioning C. difficile (as underlying cause or mentioned on death certificate), by Health Board area of residence, all persons, 2008 - 2012\***

European age standardised rate (EASR) per million population



\*2012 rate calculated using 2011 MYE as the denominator

Produced by Public Health Wales Observatory using Public Health Mortality File and mid-year population estimates. The original analysis file can be accessed via the following link;

[http://www2.nphs.wales.nhs.uk:8080/WHAIPDocs.nsf/3dc04669c9e1eaa880257062003b246b/7573ac4e27b8349f80257baa004c103a/\\$FILE/Observatory%20Mortality%20Analysis%202008-12.xlsx](http://www2.nphs.wales.nhs.uk:8080/WHAIPDocs.nsf/3dc04669c9e1eaa880257062003b246b/7573ac4e27b8349f80257baa004c103a/$FILE/Observatory%20Mortality%20Analysis%202008-12.xlsx)

Archive data from 2005 to 2009 can also be accessed via;

[http://www2.nphs.wales.nhs.uk:8080/WHAIPDocs.nsf/3dc04669c9e1eaa880257062003b246b/4fd1ff870ab8100f80257baa004c20b1/\\$FILE/Observatory%20Mortality%20Analysis%202005-09.xls](http://www2.nphs.wales.nhs.uk:8080/WHAIPDocs.nsf/3dc04669c9e1eaa880257062003b246b/4fd1ff870ab8100f80257baa004c20b1/$FILE/Observatory%20Mortality%20Analysis%202005-09.xls)

**Table 1. Deaths mentioning C. difficile (as underlying cause or mentioned on death certificate), by Health Board area of residence, all persons, 2008 - 2012**

Area	Year				
	2008	2009	2010	2011	2012
<b>Abertawe Bro Morgannwg</b>	52	51	37	27	15
<b>Aneurin Bevan</b>	174	132	122	78	60
<b>Betsi Cadwaladr</b>	55	67	56	54	45
<b>Cardiff and Vale</b>	78	53	85	35	12

Public Health Wales	<i>C. difficile</i> in Wales – an overview				
<b>Cwm Taf</b>	56	19	25	14	8
<b>Hywel Dda</b>	32	43	33	15	11
<b>Powys</b>	11	13	10	9	6
<b>Wales</b>	<b>458</b>	<b>378</b>	<b>368</b>	<b>232</b>	<b>157</b>

Source: Public Health Wales Observatory. Deaths due to *Clostridium difficile* (as underlying cause or mentioned on death certificate). 21 June 2013.

### 1.3 Certification of deaths associated with *C. difficile*

Statistics on mortality are derived from the information provided when deaths are certified and registered. Guidance on death certification, with specific reference to healthcare associated infections, was issued to all doctors by the Office of National Statistics in 2005 and again in 2010.

If a patient with *C. difficile* dies, the death certificate should state whether *C. difficile* was part of the sequence of events leading directly to death or whether it was the underlying cause of death. If either case applies, *C. difficile* should be mentioned in Part 1 of the certificate. If *C. difficile* was not part of the sequence of events leading directly to death, but contributed in some way to it, this should be mentioned in Part 2. The data presented includes deaths where *C. difficile* was mentioned in any part of the death certificate. Mortality trends are usually monitored by the underlying cause of death. Healthcare associated infections are often not the underlying cause of death. Individuals who die with *C. difficile* are usually patients who are being treated for other serious illness which may be the underlying cause of death. The data presented is for deaths where *C. difficile* was mentioned anywhere on the death certificate and therefore caused or contributed to the death. (Source: Office National Statistics. Deaths Involving Clostridium Difficile: England and Wales, 2011. London: ONS, 2012)

If a doctor is in doubt about the circumstances of death when writing the certificate, they should consult with a senior colleague or the coroner. Doctors have a legal duty to mention *C. difficile* on a death certificate if it was part of the sequence of events directly leading to death or contributed in some way. Medical directors should ensure that training is provided on death certification and should audit certificates to check that they accurately record Health Care Associated Infection (Source: Health Protection Agency. *Clostridium difficile* infection: How to deal with the problem. London: HPA, 2008.)

Despite all of these efforts to standardise the reporting of deaths from *C. difficile* it is inevitable that there will be some variation between doctors in the certification of deaths.

## 2. Incidence of *C. difficile* in Wales

### 2.1 Incidence *C. difficile* in Wales, 2012/13

A total of 1934 cases of *C. difficile* were identified in Wales in the 2012/13 financial year. 71% (1365/1934) of the *C. difficile* cases were identified from patients in inpatient wards in hospitals in Wales. The other cases were from non-inpatient wards in hospitals (eg A&E, Admission Units, Outpatients) and from community locations.

The provisional rate of *C. difficile* in inpatients aged 66+ per 1000 admissions in Wales for the 2012/13 financial year is 6.2/1000 admissions; this compares with a rate of 7.2/1000 in the previous financial year. Provisional rates of *C. difficile* in inpatients aged 66+ by Health Board and NHS Trust for 2012/13 are provided in table 2. The rates of *C. difficile* for 2012/13 for all Health Boards and NHS Trust are lower than for 2011/12. Of all the Health Boards and NHS Trust in Wales, the rate was highest in Betsi Cadwaladr University Health Board and lowest in Cwm Taf Health Board.

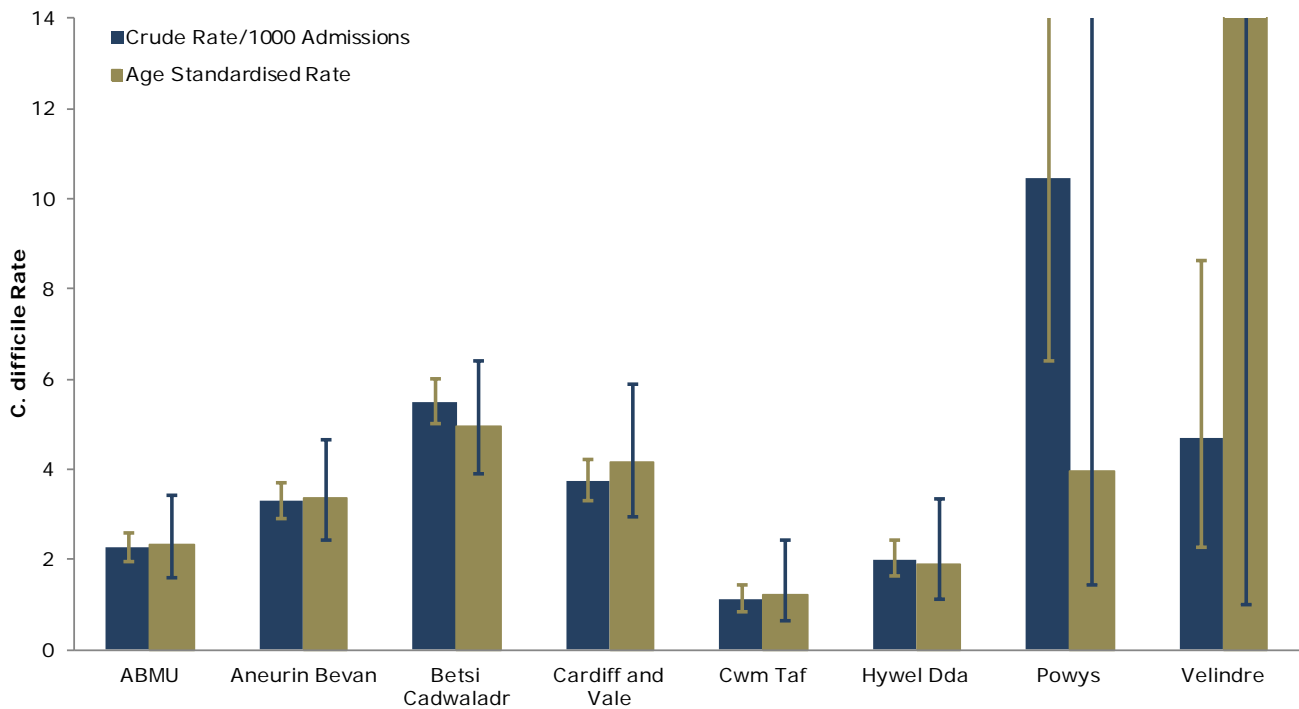
**Table 2. Provisional Rates of *C. difficile* per 1,000 admissions in inpatients aged 66+ by Health Board and NHS Trust in Wales, 2012/13**

Health Board	Provisional rate of <i>C. difficile</i> 2012/13	Rate of <i>C. difficile</i> 2011/12
Abertawe	4.6	6.4
Bro Morgannwg	6.6	8.7
Aneurin Bevan	9.6	9.8
Betsi Cadwaladr	7.0	7.7
Cardiff and Vale	2.5	2.8
Cwm Taf	3.8	5.4
Hywel Dda	12.1	3.5
Powys*	2.6	9.6
Velindre		

\*Changes have occurred in data collection methods in Powys Teaching Health Board over time

Difference in the age structure of patients treated in different health boards does not explain these differences (figure 2).

**Figure 2. Crude and age standardised rates of *C. difficile* in inpatients aged 2+ by Health Board and NHS Trust in Wales, 2012/13**



NB: The error margins for Powys or Velindre cannot be contained within the limits of this chart due to the small numbers of *C. difficile* cases and admission numbers in this Health Board/Trust

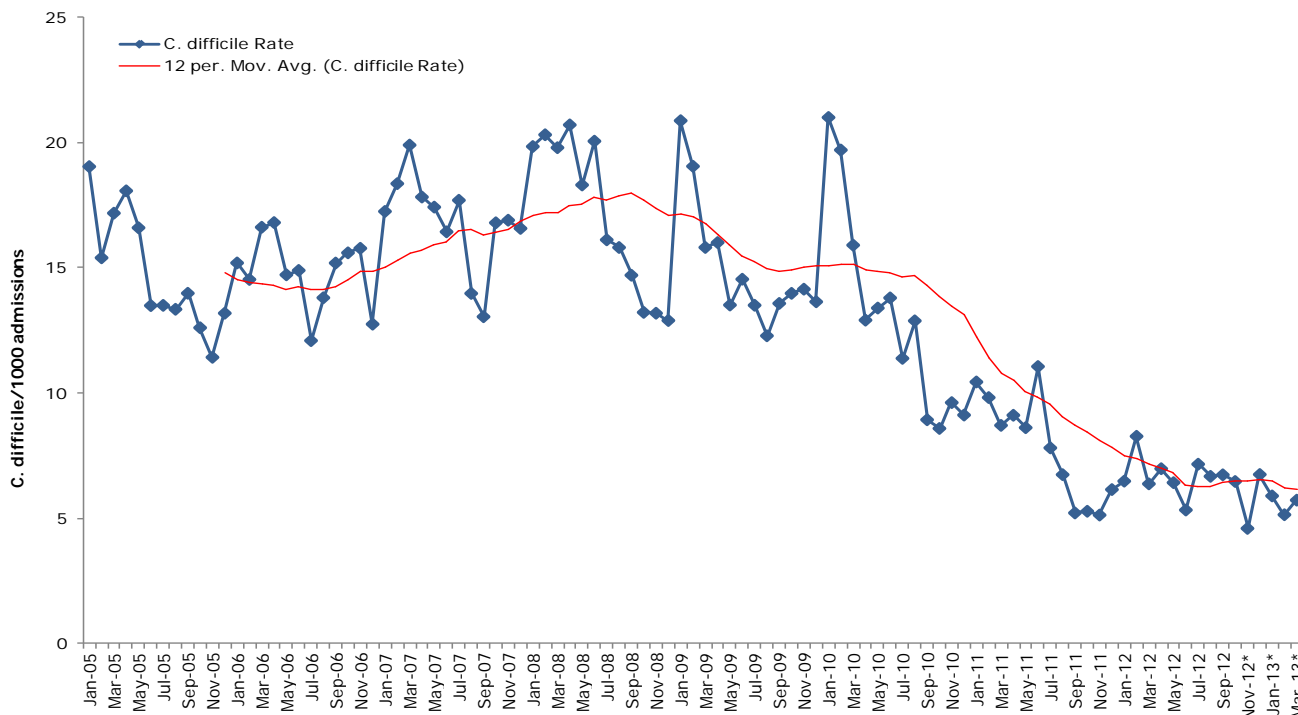
## 2.2 Trends in *C. difficile* incidence in Wales, 2005 - 2013

Rates of *C. difficile* in inpatients aged 66+ in Wales started to rise from the end of 2006 and peaked in mid 2008; rates started to go down until they reached a plateau in the second half of 2009; rates then started to go down again around the introduction of the target at the beginning of the 2010/11 financial year; a major reduction in rates then occurred until mid 2012; rates have generally remained steady since then (figure 3).

The highest number of cases in inpatients aged 66+ occurred in the 2007/08 financial year (2978); there has been a 63% reduction in numbers of cases in this group since 2007/08 (2012/13 financial year: 1094).



**Figure 3. C. difficile monthly rates and 12 month moving average per 1,000 admissions in inpatients aged 66+ in Wales, 2005 - 2013**



### 2.3 Trends in C. difficile incidence in Health Boards, 2008 – 2013

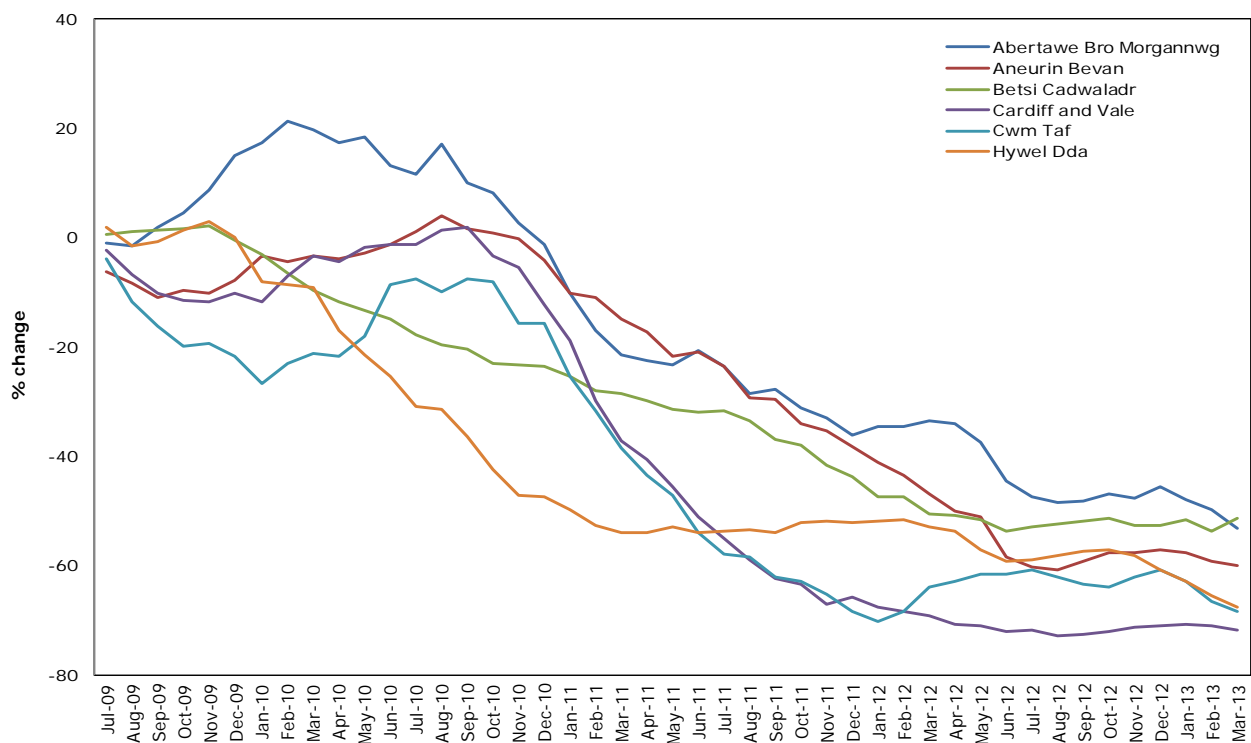
All of the Health Boards with acute hospitals in Wales have achieved at least a 50% reduction in numbers of cases in inpatients aged 66+ against the original Jul 08- Jun 09 baseline (Table 3). The greatest percentage reduction in numbers has occurred in Cardiff and Vale University Health Board (71.6%) and the smallest in Betsi Cadwaladr University Health Board (51.4%).

**Table 3. Numbers of C. difficile in inpatients aged 66+ by Health Board in Wales for 2012/13 financial year and the target baseline year**

Health Board	C. difficile (Jul 08 – Jun 09)	C. difficile 2012/13	% Change
Abertawe	344	161	-53.2
Bro Morgannwg	537	215	-60.0
Aneurin Bevan	805	391	-51.4
Cardiff and Vale	585	166	-71.6
Cwm Taf	161	51	-68.3
Hywel Dda	272	88	-67.6

Figure 4 compares trends in reductions against the baseline year for six of the Health Boards using percentage change. Powys Teaching Health Board has been excluded because of the changes in their data collection over this period. Figure 5 provides individual trends in the average monthly cases in each Health Board against the baseline. These show that there has clearly been some variation in the timing and speed of the reduction in cases in the Health Boards and also shows that most of the Health Boards appear to have now reached a plateau.

**Figure 4. Monthly % change in average numbers of C. difficile in inpatients aged 66+ compared to Jul 08 – Jun 09 baseline year in Health Boards in Wales**

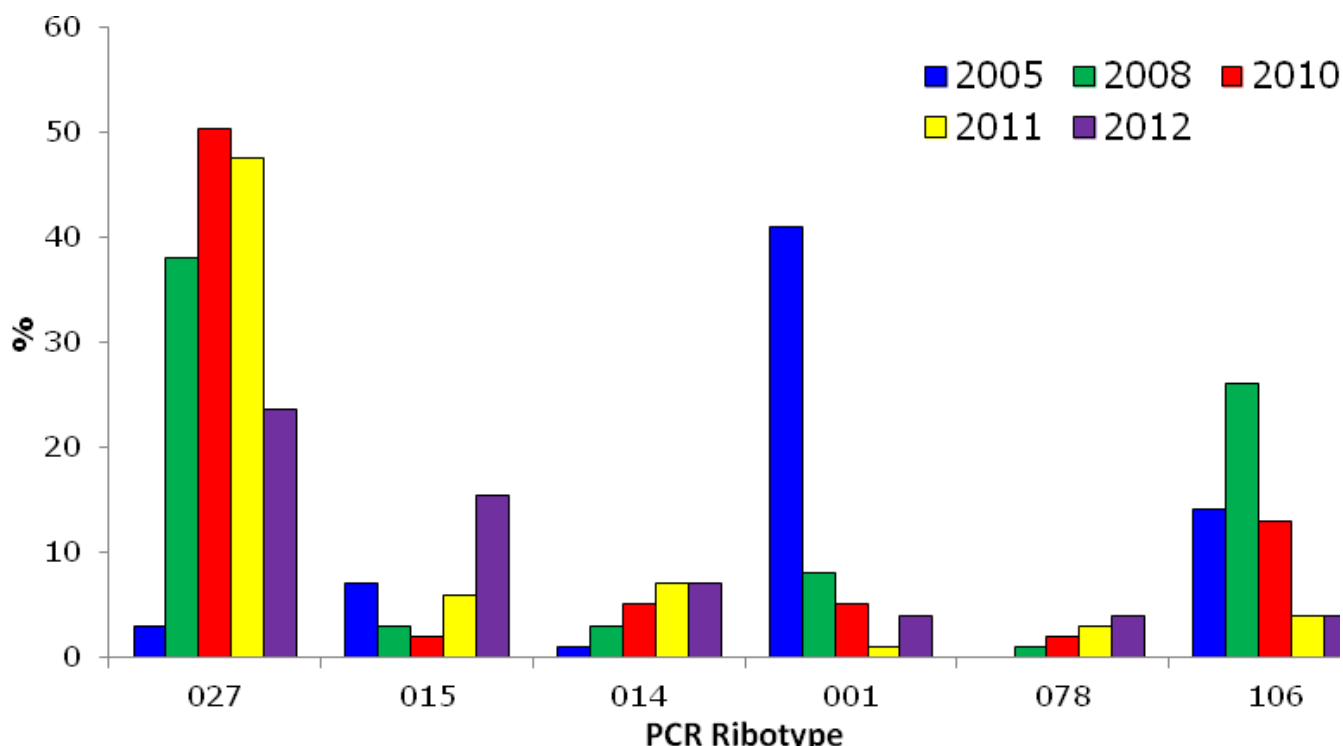




### 3. C.difficile Ribotype

The latest PCR ribotype survey in Wales was completed in 2012. A total of 31 PCR ribotypes were identified. PCR ribotype 027 was the most commonly isolated strain, accounting for 24% of the sample. The proportion of the sample that was PCR ribotype 027 peaked in 2010 and has halved since the last survey in 2011 (figure 6).

**Figure 6. Changes in the percentage distribution of C. difficile PCR ribotypes 027, 015, 014, 001, 078 and 106 in the PCR ribotyping surveys in Wales, 2005, 2008, 2010, 2011 and 2012**



Source: *Clostridium difficile*. PCR Ribotype Surveillance 2012. WHAIP 1 May 2013

[http://www2.nphs.wales.nhs.uk:8080/WHAIPDocs.nsf/3dc04669c9e1eaa880257062003b246b/4bd02d4b70e2e8c480257b600037966a/\\$FILE/Clostridium%20difficile%20ribotypes%20Report%202012.pdf](http://www2.nphs.wales.nhs.uk:8080/WHAIPDocs.nsf/3dc04669c9e1eaa880257062003b246b/4bd02d4b70e2e8c480257b600037966a/$FILE/Clostridium%20difficile%20ribotypes%20Report%202012.pdf)

There has been striking decrease in the prevalence of *C. difficile* ribotype 027 in England since 2007/08, with 'compensatory' increases in the other main types. This phenomenon may reflect the success of control measures to reduce cross-infection in hospitals in England caused by the predominant epidemic strain. (Source: *Clostridium difficile* Ribotyping Network for England and Northern Ireland 2010/11 Annual Report. Health Protection Agency, 2012). A similar picture is emerging in Wales since 2010/11.

## Conclusion

These data suggest that, despite the excellent achievements by the NHS in Wales in recent years, the incidence and mortality from *C. difficile* in Wales is still higher than it needs to be. The reduction in the incidence of *C. difficile* that occurred after 2010 has now stopped in most, if not all, areas in Wales.

Health Boards and NHS Trust should be monitoring and reporting 30 day all cause mortality for cases of *C. difficile*. Health Boards and NHS Trust should audit the death certificates of all these patients to check that they accurately record deaths associated with Health Care Associated Infection.

Renewed action is required in all parts of Wales to reduce the incidence of, and mortality from, *C. difficile*.