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Wales

Surveillance: *Clostridium difficile*

Report: PCR Ribotype Surveillance

Time period: 2012

Health Board: All Wales

Content:
Pg 1 – Summary
Pg 2 – Introduction
Pg 3 – Methods

Results

Pg 4 – PCR Ribotyping Results
Pg 10 – Antimicrobial Susceptibility Results

Pg 12 – Acknowledgements

Issued by: Welsh Healthcare Associated Infection Programme (WHAIP)

Issue date: 1st May 2013

SUMMARY

- 110 *C. difficile* samples from Health Boards in Wales were PCR ribotyped as part of the survey.
- A total of 31 PCR ribotypes were identified. PCR ribotype 027 was the most commonly isolated strain, accounting for 24% of the sample.
- 027 predominated in 3 of the 7 Health Boards. The proportion of samples that were 027 varied from 33% in Betsi Cadwaladr University (BCU) Health Board (Velindre NHS Trust excluded - 1 of the 2 samples was 027) to 0% in Abertawe Bro Morgannwg University (ABMU) and Powys Teaching Health Boards.
- The proportion of the sample that was PCR ribotype 027 has halved since the last survey while the proportion of 015 has more than doubled. The proportions of PCR ribotypes 106 and 001 have decreased substantially since the original pilot PCR ribotyping survey in 2005.

INTRODUCTION

Because of increasing concerns regarding the incidence and severity of cases of *Clostridium difficile* (*C. difficile*) across the UK, a *C. difficile* Task Group was set up in Wales by the Welsh Healthcare Associated Infection Sub-Group (WHAISG) of the Welsh Assembly Government. The task group made recommendations regarding changes to the surveillance of *C. difficile* in Wales, which were agreed by the WHAISG in May 2008. One of the changes was to develop a regular survey of the *C. difficile* PCR ribotypes that are causing disease in Wales, coupled with enhanced surveillance of the severity and outcome of disease. This would allow some understanding to be gained on the contribution different PCR ribotypes of *C. difficile* are currently making to the epidemiology of *C. difficile* in Wales.

A pilot snapshot PCR ribotyping survey took place in 2005 and there have been subsequent surveys in 2008, in the winter of 2009/2010 and in 2011. This report presents the ribotyping results of the snapshot surveillance that took place in 2012.

METHODS

Between July and September 2012, Health Boards in Wales were requested to culture consecutive stool samples positive for *C. difficile* toxins and submit the pure isolates to the Anaerobe Reference Unit (ARU) in Cardiff. Health Boards submitted a pre-determined number of samples or all samples within a 12 week period, whichever was reached soonest. The number of samples requested was based on the numbers of cases reported in the mandatory *C. difficile* surveillance scheme in the preceding six months. A total of one hundred and eleven samples were requested.

At the ARU, the samples were PCR ribotyped and susceptibility tested against 9 antibiotics (metronidazole, vancomycin, erythromycin, moxifloxacin, imipenem, co-amoxiclav, piperacillin/tazobactam, penicillin G and rifampicin) using the agar plate MIC method. Please note that this is a different method from the one that has previously been used for MIC testing in the surveillance, so susceptibility results are not directly comparable to results from previous years.

Results were returned to the originating laboratories and to WHAIP for analysis.

RESULTS

1. PCR Ribotyping Results

All Health Boards submitted samples to the survey but one laboratory in one of the Health Boards did not participate. 119 *C. difficile* samples were submitted to the ARU. Six samples were not processed because they were identified as duplicates submitted from the same laboratory. *C. difficile* was not identified from an additional three samples. PCR ribotyping results were therefore available from 110 samples.

Table 1.1 Number of *C. difficile* samples PCR ribotyped by Health Board for the PCR ribotyping survey in Wales, 2012

Health Board	Number of Samples
ABMU Health Board	19
Aneurin Bevan Health Board	26
BCU Health Board	30
C&VU Health Board	20
Cwm Taf Health Board	5
Hywel Dda Health Board	6
Powys Teaching Health Board	2
Velindre NHS Trust	2

The specimen source was provided for all samples. 66% (73/110) of samples originated from patients in major acute hospitals within the Health Boards, 15% (17/110) from other hospitals in the Health Boards and 18% (20/110) were from patients in the community.

The proportion of samples from the major acute hospitals within the Health Boards is lower than the proportions reported in previous surveys (2010 – 82%, 2011 – 74%, 2012 – 66%). The proportion of samples from both other hospitals and community locations is higher in 2012 compared to previous surveys (other hospitals: 2010 – 11%, 2011 – 13%, 2012 – 15%; community: 2010 – 7%, 2011 – 12%, 2012 – 18%).

The proportion of each varied by Health Board (Table 1.2). The location of the patient when the sample was submitted does not necessarily reflect the location of acquisition of the *C. difficile*.

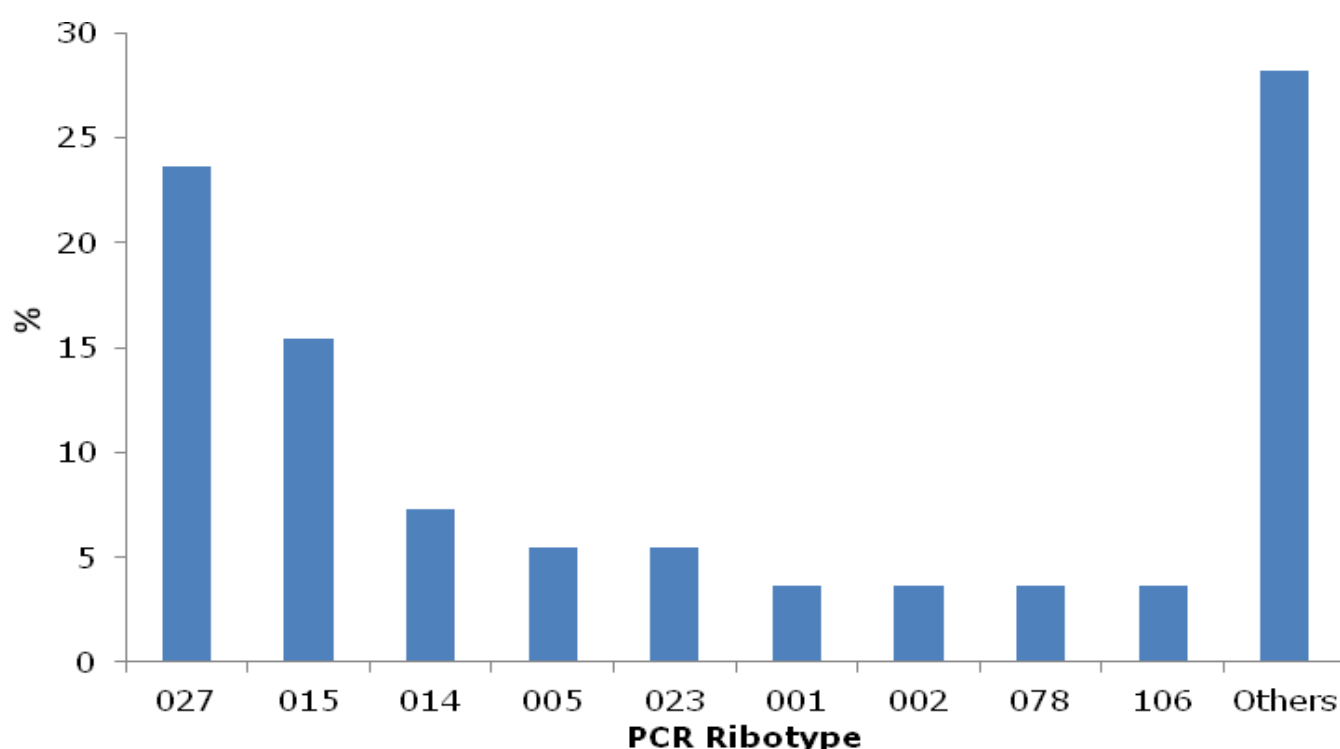
Table 1.2 Proportion* of Health Board *C. difficile* samples by source location for the PCR ribotyping survey in Wales, 2012

Health Board	% Major Acute Hospital	% Other Hospital	% Community
ABMU Health Board (N=19)	89	5	5
Aneurin Bevan Health Board (N=26)	54	19	27
BCU Health Board (N=30)	67	20	13
C&VU Health Board (N=20)	70	5	25
Cwm Taf Health Board (N=5)	60	20	20
Hywel Dda Health Board (N=6)	50	17	33
Powys Teaching Health Board (N=2)		100	
Velindre NHS Trust (N=2)	100		

*Please note because of rounding totals may not add up to 100%.

A total of 31 PCR ribotypes were identified. PCR ribotype 027 was the most commonly isolated strain, accounting for 24% (26/110) of the sample (Figure 1.1).

Figure 1.1 Percentage distribution of PCR ribotypes of *C. difficile* in the PCR ribotyping survey in Wales, 2012



NB "Others" encompasses 22 PCR ribotypes with <4 samples each (N=31).

PCR ribotype 027 was the most common ribotype in the samples from major acute hospitals, other hospitals and community locations (Table 1.3). There has been a decrease in the proportion of 027 in specimens from major acute hospitals (2010 – 51%, 2011 – 45%, 2012 – 23%), other hospitals (2010 – 63%, 2011 – 59%, 2012 – 29%) and from community locations (2010 - 25%, 2011 – 52%, 2012 – 20%).

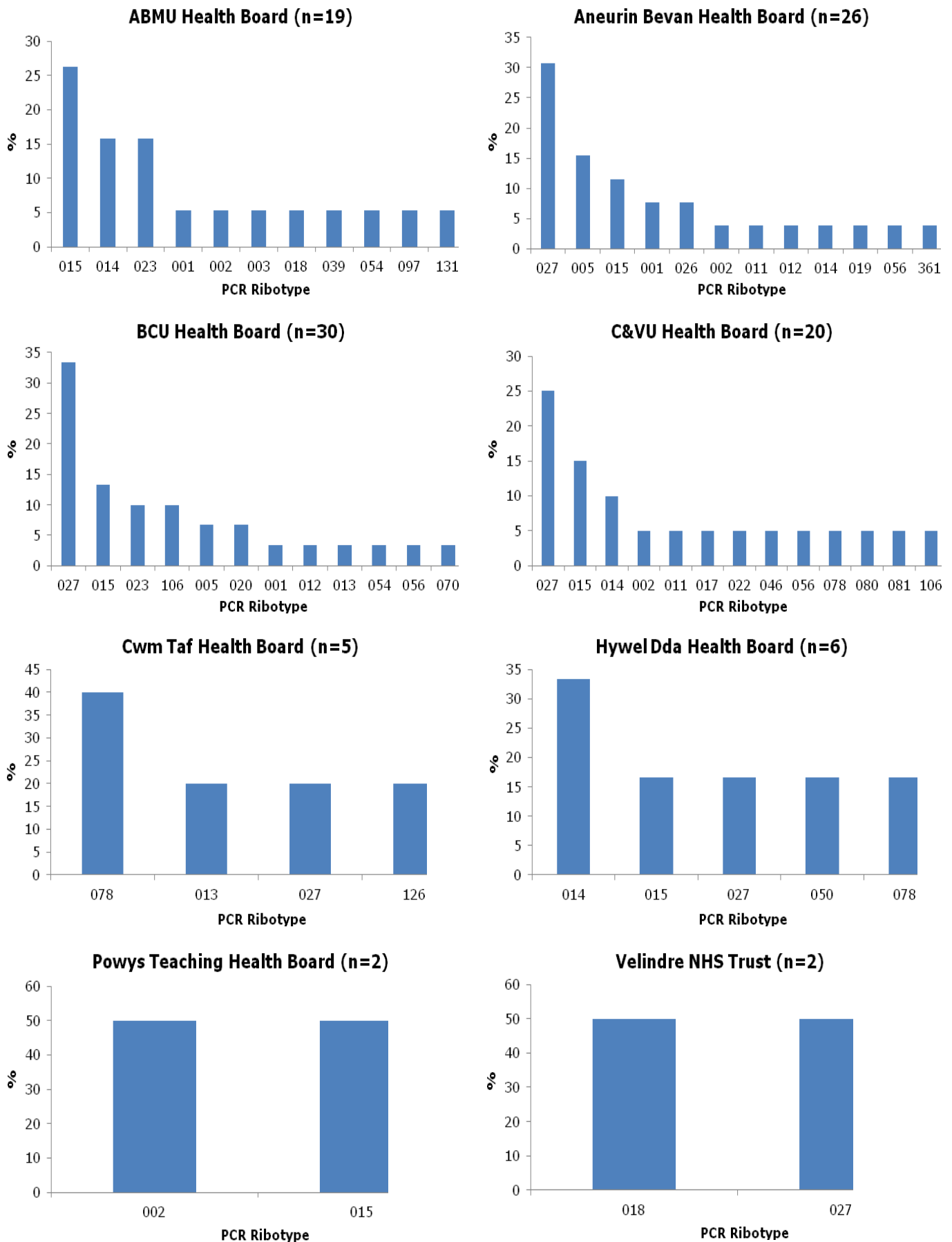
Table 1.3 Percentage* distribution of the common *C. difficile* PCR ribotypes by location of patient in the PCR ribotyping survey in Wales, 2012

PCR Ribotype	Major Acute Hospital (n=73)	Other Hospital (n=17)	Community (n=20)
027	23%	29%	20%
015	15%	18%	15%
014	7%	6%	10%
005	3%	6%	15%
023	7%	0	5%
001	3%	6%	5%
002	3%	6%	5%
078	4%	6%	0
others	36%	24%	25%

*Please note because of rounding totals may not add up to 100%.

Results were not uniform across Health Boards (Figure 1.2). PCR ribotype 027 was not reported from ABMU or Powys Teaching Health Boards. It was the most common PCR ribotype in three of the other Health Boards. The proportion of the sample that was 027 varied, with the highest proportion in BCU Health Board at 33% (excluding Velindre NHS Trust where 1 of the 2 samples was 027).

Figure 1.2 Percentage distribution of PCR ribotypes of *C. difficile* by Health Board in the PCR ribotyping survey in Wales, 2012



Trends over Time

There has been a major decrease in the frequency of PCR ribotype 027 since the last survey (Figure 1.3).

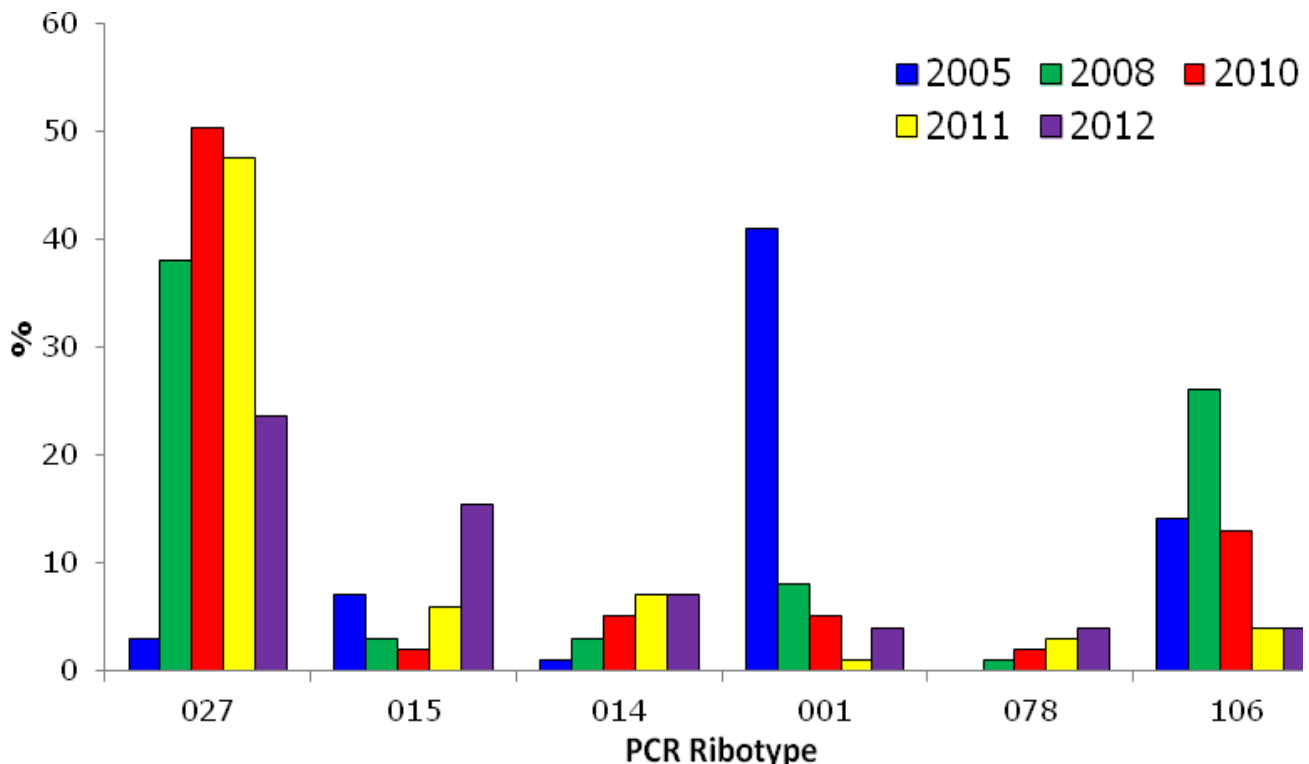
PCR ribotype 015 was the second most common ribotype overall, constituting 15% of the sample. It was reported from 6 Health Boards and was the most common ribotype in ABMU Health Board (5/19). The proportion of the sample attributable to ribotype 015 has risen in comparison with earlier surveys (Figure 1.3).

PCR ribotype 014 was the third most common ribotype overall, constituting 7% of the sample, the same proportion as in 2011. It was reported from 4 Health Boards and was the most common ribotype in Hywel Dda Health Board (2/6) (Figure 1.3).

The proportions of the previously common PCR ribotypes of 001 and 106 have not decreased any further compared to 2011 (Figure 1.3).

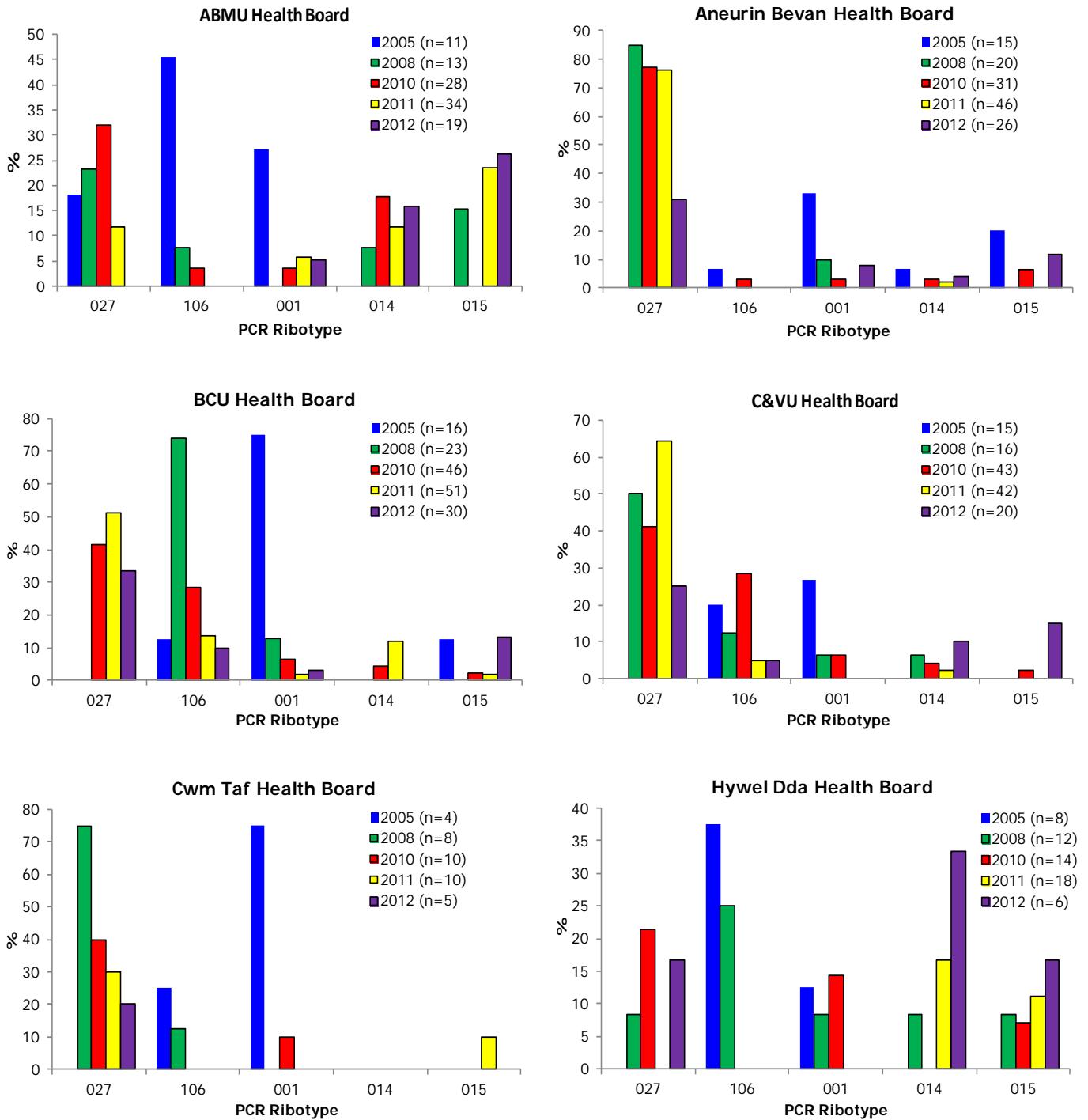
PCR ribotype 078 has increasingly been reported from other parts of the UK. There have been small increases in the proportion of 078 in Wales between the surveys. It was reported in three Health Boards in 2012 and was the most common ribotype in Cwm Taf Health Board (2/5).

Figure 1.3 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



Changes in distribution of PCR ribotypes have not been uniform across Wales. The changes in the frequencies of PCR ribotypes 027, 015, 014, 106 and 001 by current Health Board areas are provided in Figure 1.4.

Figure 1.4 Changes in the % distribution of *C. difficile* PCR ribotypes 027, 015, 014, 106 and 001 by current Health Board areas in the PCR ribotyping surveys in Wales, 2005 - 2012



2. Antimicrobial Susceptibility Results

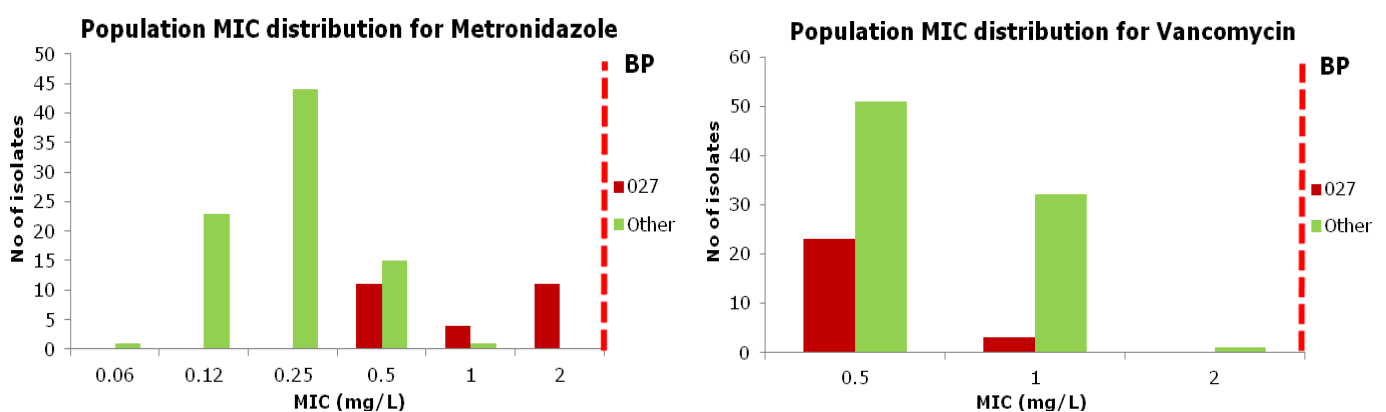
Summary susceptibility results for the 9 antimicrobials tested are provided in Table 2.1.

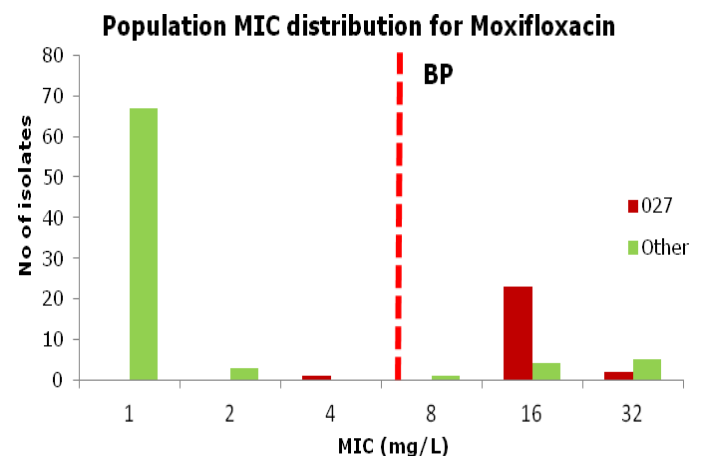
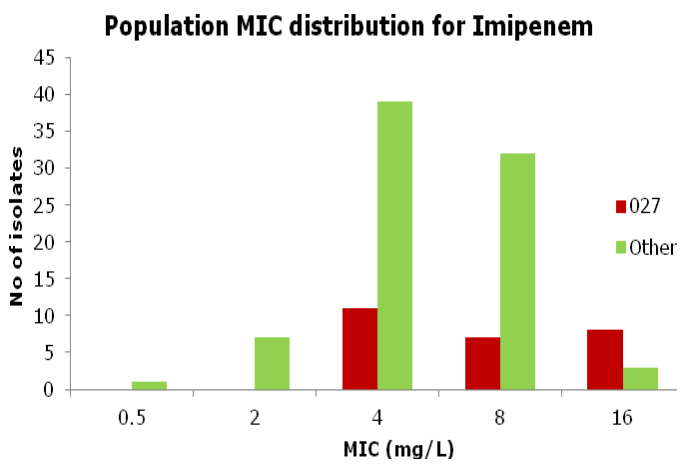
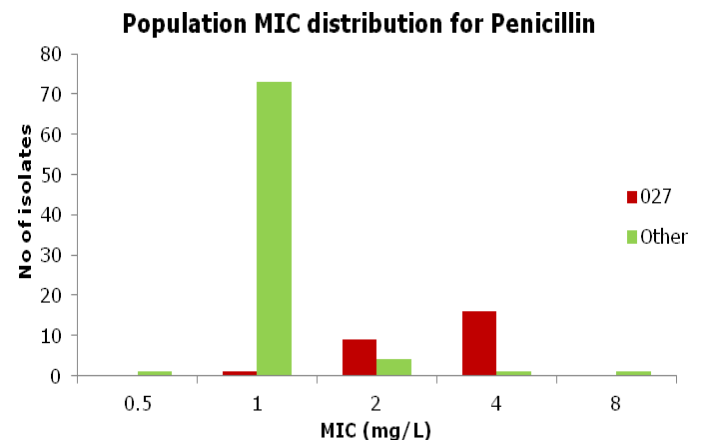
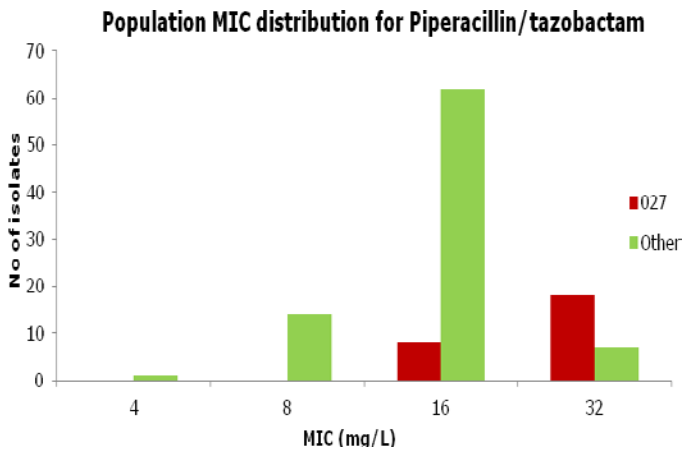
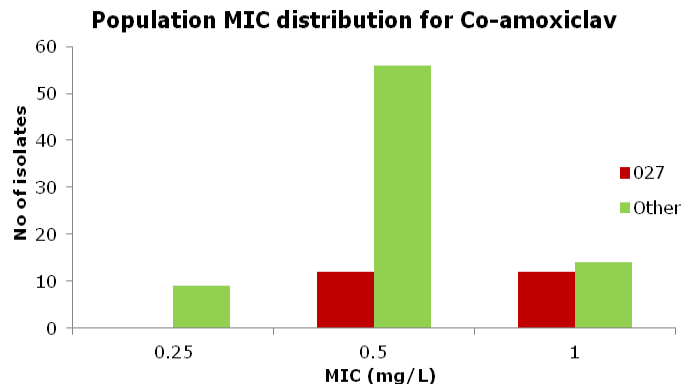
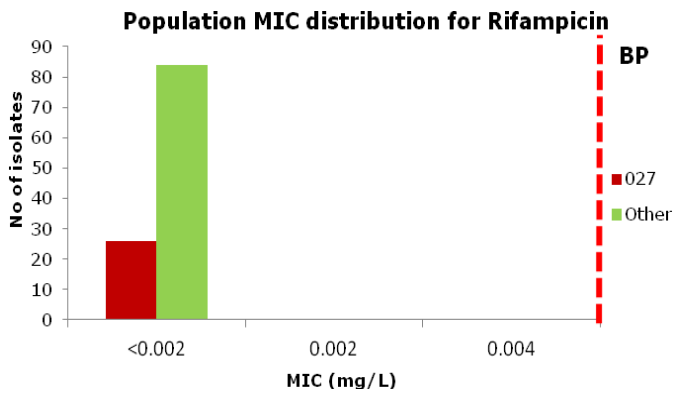
Table 2.1 Minimum Inhibitory Concentrations (MICs) of *C. difficile* isolates to 9 antimicrobials in the PCR ribotyping survey in Wales, 2012

Antimicrobial	MIC (mg/L)		
	Range	MIC50	MIC90
Metronidazole	0.06 - 2	0.25	1
Vancomycin	0.5 - 2	0.5	1
Rifampicin	All <0.002		
Co-amoxiclav	0.25 - 1	0.5	1
Piperacillin/Tazobactam	4 - 32	16	32
Penicillin	0.5 - 8	1	4
Imipenem	0.5 - 16	4	8
Moxifloxacin	1 - 32	1	16
Erythromycin	0.25 - >128	1	>128

MIC distributions for selected antimicrobials are provided in Figure 2.1. Distributions are provided for 027 and non-027 isolates for comparison. Where they were available, BSAC breakpoints have been displayed as a red line.

Figure 2.1 Population distributions of MICs of *C. difficile* to metronidazole, vancomycin, rifampicin, co-amoxiclav, piperacillin/tazobactam, penicillin, imipenem and moxifloxacin by PCR ribotype in the PCR ribotyping survey in Wales, 2012





ACKNOWLEDGEMENTS

We would like to acknowledge the staff of the ARU, SACU, WHAIP, the microbiology laboratories and infection prevention and control teams in the Health Boards in Wales, for their contributions to this report.