UNIVERSITY HOSPITALS BIRMINGHAM NHS FOUNDATION TRUST
BOARD OF DIRECTORS
THURSDAY 25 JULY 2013

Title:	**ANNUAL INFECTION PREVENTION AND CONTROL REPORT APRIL 2012 – MARCH 2013**
Responsible Director:	Kay Fawcett, Executive Chief Nurse and Executive Director for Infection Prevention and Control
Contact:	Dr Beryl Oppenheim, Director of Infection Prevention and Control. Ext 16523

Purpose:	To provide the Board of Directors with an Annual Report which summarises the Infection Prevention and Control activity from April 2012 – March 2013	
Confidentiality Level & Reason:	Not applicable	
Annual Plan Ref:	Strategic Aim 4 : Quality of Services	
Key Issues Summary:	• To indicate any implications, eg Clinical, Financial, Human Resources • To report any benefits, risks or costs associated with the decision	
Recommendations:	The Board of Directors is asked to accept the Annual Report on Infection Prevention and Control	
Approved by:	Kay Fawcett	Date: 15 July 2013

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THURSDAY 25 JULY 2013

ANNUAL INFECTION PREVENTION AND CONTROL REPORT APRIL 2012 – MARCH 2013

PRESENTED BY EXECUTIVE CHIEF NURSE

1. Introduction

This report provides a summary of the progress with Infection Prevention and Control from April 2012-March 2013.

2012/13 was a successful year for Infection Prevention in meeting objectives related to *Clostridium difficile* infection and MRSA bacteraemia, as well as making inroads into many other important areas of prevention of HCAIs. At the beginning of 2012 Dr Pauline Jumaa stood down as DIPC and Dr Beryl Oppenheim took up this role, and in March 2013 Dr Mercia Spare left her post as Associate DIPC.

The NHS is facing the threat of multiply antibiotic resistant organisms which could potentially limit our ability to undertake healthcare of the sort we have become accustomed to such as complex surgery, bone marrow and solid organ transplantation or maintaining patients in intensive care settings. Internationally there are also a number of emerging infections which can manifest in the Trust as was the case with the recent novel coronavirus infection cases.

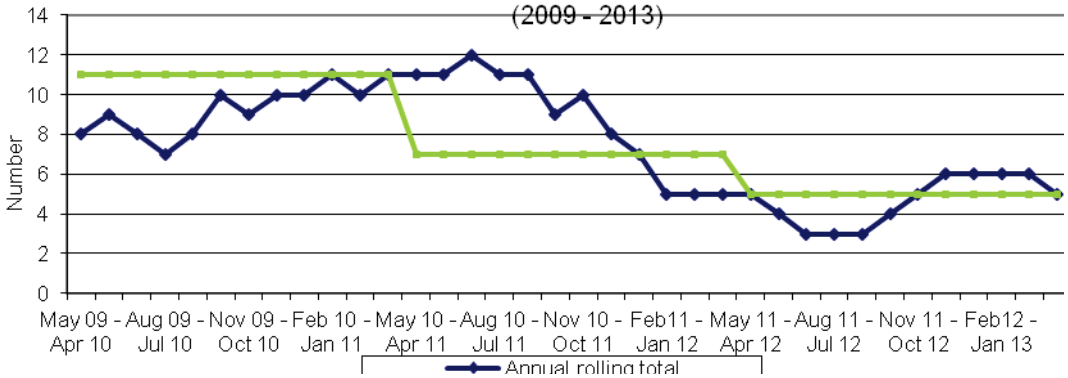
A number of guidance documents were developed at a national level addressing issues such as *Pseudomonas aeruginosa* transmitted via water supplies or the problems of carbapenemase producing Enterobacteriaceae (CPE) prove particularly challenging to implement in a large and complex tertiary referral hospital. Finally the changing picture of commissioning groups and their support services locally require a new understanding of the landscape and how we relate to the various organisations charged with responsibility for various aspects of control of HCAIs.

2. Key Target Organisms

2.1 MRSA bacteraemia

During 2012/13 the objective for Trust apportioned MRSA bloodstream infections was 5, and the outturn for the year was 5. Overall there were 9 MRSA bacteraemias, with 4 occurring within 48 hours of admission. Figure 1 shows numbers of bacteraemias against the objective over the period 2009 to 2013.

Figure 1. Annual rolling total of MRSA bacteraemias against annual objective (2009 - 2013)



For 2013/14 the national approach to MRSA bacteraemias is changing. There is a zero tolerance approach and all cases will need an urgent post-infection review across the relevant health economy to assess to which organisation the case will be apportioned. The new process requires a transparent, thorough and timely response, not only to the investigation, but also to the follow up of any learning and action points.

Screening of all relevant admissions for MRSA remains mandatory. Our own data and that of other organisations has shown a dramatic fall in the number of positive results from screening (Figure 2) and it is likely that some further guidance or direction will be made available nationally on whether changes need to be made to the programme. Even if this does not become available, in the light of the changing local picture the Trust is to fully reviewing its screening programme in collaboration with our local health economy partners and bring forward suggestions for change. The current regimen for treating individuals identified as carrying MRSA involves a topical antibiotic known as mupirocin and it is reassuring that despite the widespread use of this agent among our patients, resistance has fallen significantly and remains very low (Figure 3).

Figure 2. UHB new cases of MRSA by month and 12 month moving average; 2000-2013.

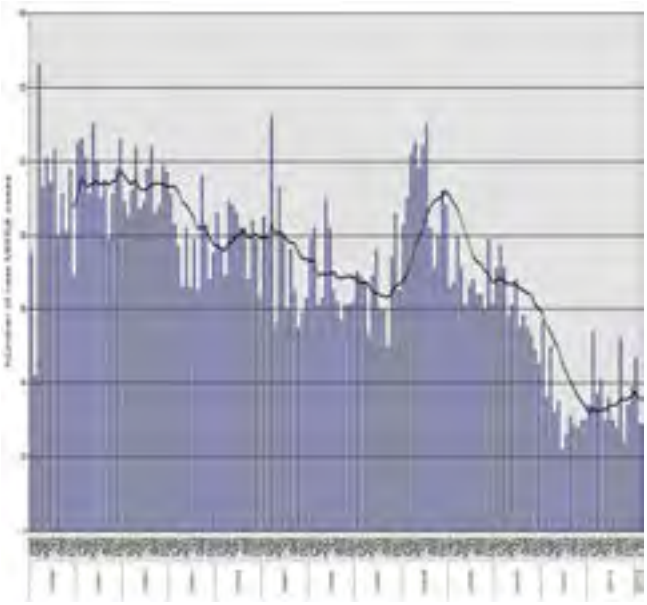
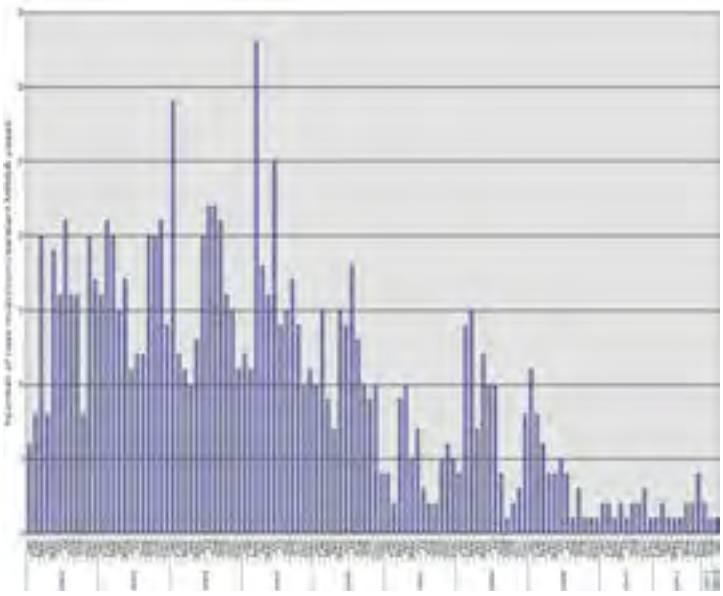


Figure 3. UHB new cases of mupirocin-resistant MRSA by month; 2002-2013.



2.2 Clostridium difficile infection (CDI)

The objective for Trust apportioned cases of *Clostridium difficile* infection (CDI) for 2012/13 was 76. Immediately prior to the start of the financial year new guidance was released from DH regarding testing and reporting of cases. On 1 April 2012 UHB changed its testing regimen to what was felt to be the most sensitive, timely and accurate method of testing whilst continuing to meet national requirements for reporting. All samples were screened using the GDH test and those that were positive were tested by PCR for toxin producing strains of *Clostridium difficile* and these results were immediately reported for action. Positive tests were also tested for pre-formed toxin and these results were reported in accordance with the guidance. Final out-turn for the year was 73. Figure 4 shows Trust apportioned cases compared to trajectory since 2009.

For 2013/14 the objective is 56 which is extremely challenging. We are piloting a system within our local health economy which is similar to the MRSA bacteraemia approach with a post infection review and following this, if cases are deemed to be unavoidable they are excluded from the locally agreed penalties.

Figure 4. Annual rolling total of *CDI* cases at UHBFT against annual objective (2009 - 2013)

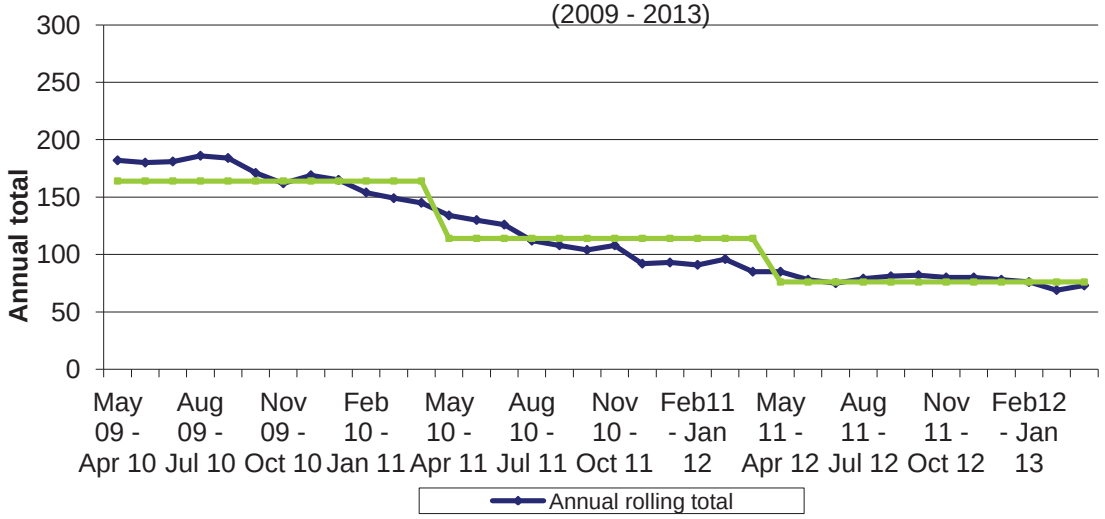


Figure 5 shows the proportion of PCR positive cases which were also positive for preformed toxin production. This has averaged out at approximately 50% which is in line with what has been found in the literature. The optimal testing regimen for clinical purposes remains controversial. The Trust system provides an excellent means of gaining highly sensitive and timely results for clinical purposes as well as meeting national reporting requirements. Figure 6 shows reportable cases according to whether they were diagnosed in the community, or on admission, or after 72 hours and designated as Trust acquired. In line with evidence elsewhere, a clear picture is emerging of "community" infections overtaking those deemed to be acquired in hospital. It will be important in coming years to further study these cases to better

understand their risk factors and possible links with healthcare.

Figure 5. Toxigenic C. difficile PCR positives Vs EIA positives (2012 - 2013)

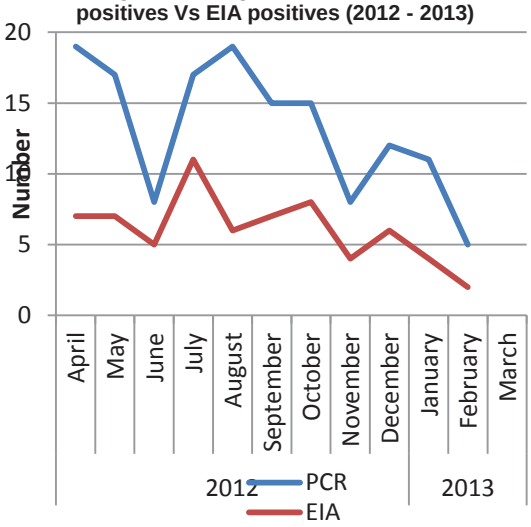
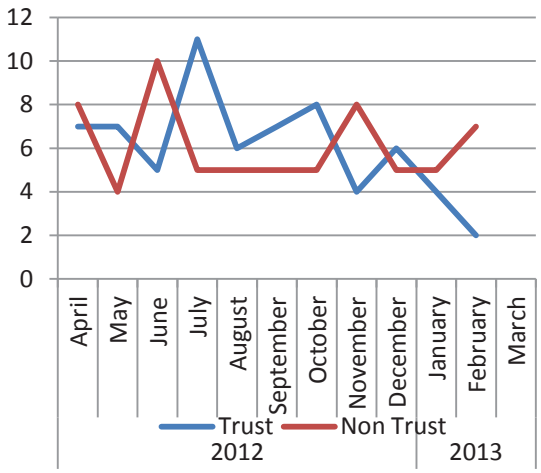
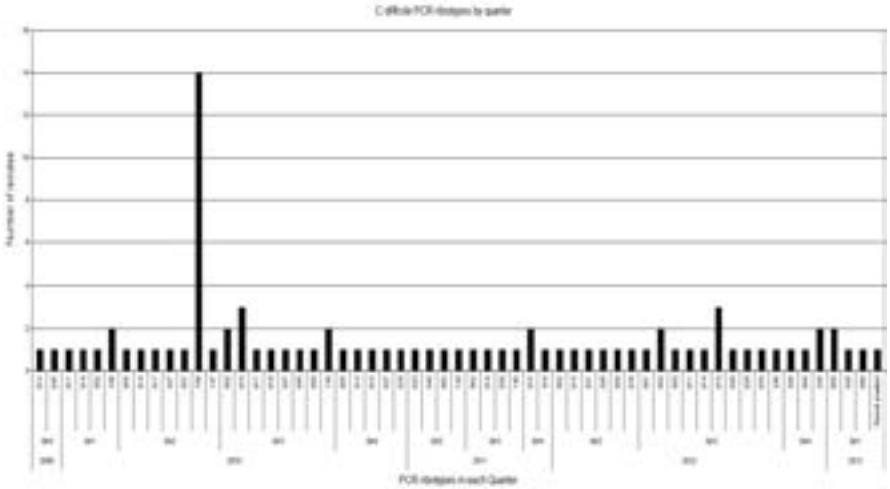


Figure 6. Toxigenic C. difficile EIA positives Trust Vs All Non Trust (2012 - 2013)



Although numbers of cases remain low there is always concern around possible transmission of *Clostridium difficile* in hospital. In order to investigate this, strains have been sent for typing in cases where there were possible clusters on wards, generally increased numbers in particular areas, or severe or fatal cases. Figure 7 shows the results of all ribotyping for UHB since the service became available. In recent years the picture has been one of extremely diverse ribotypes with very little evidence of possible transmission and no particular endemic strains to the organisation. This is in line with the national picture in many organisations where the overall impression is that hospitals are now mainly seeing "community" strains of *C difficile* with limited, if any, in-hospital transmission. The sources of these isolates remains largely unknown but it is felt that they are widespread in the environment and acquired in the same way as much of the rest of our intestinal flora. Whilst this is again a reassuring picture, it does imply, however, that further options for reductions in cases may be limited, as the remaining risk factors other than antimicrobial treatment are not amenable to modification.

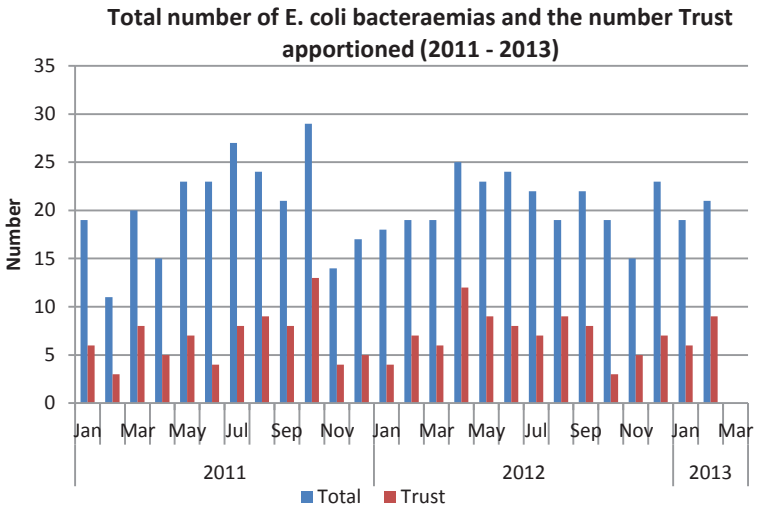
Figure 7



2.3 *E coli* bactereamias

Monthly reporting of *E coli* bactereamias continues to be mandatory. During 2012/13 there were 101 Trust apportioned and 180 non-Trust apportioned cases of *E coli* bloodstream infections. Figure 8 shows the variation in numbers over the year.

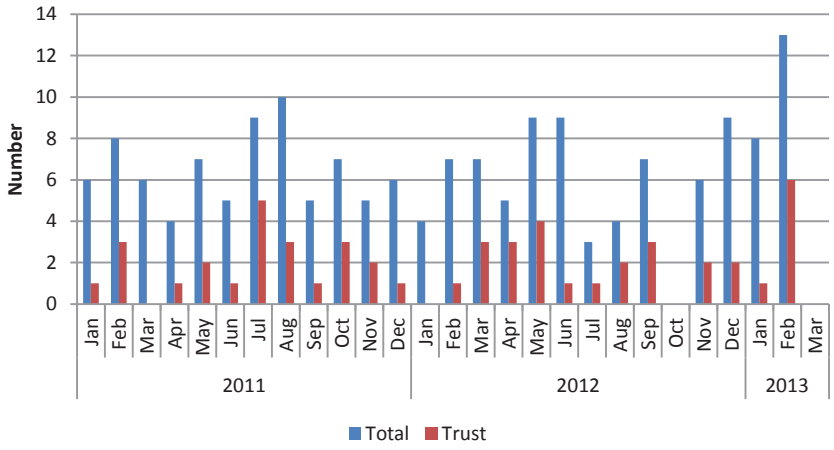
Figure 8



2.4 MSSA *bacteraemias*

Monthly reporting of meticillin susceptible Staph aureus bloodstream infections continues to be mandatory. During 2012/13 there were 29 Trust apportioned and 57 non-Trust apportioned cases. Figure 9 shows the variation in numbers over the year.

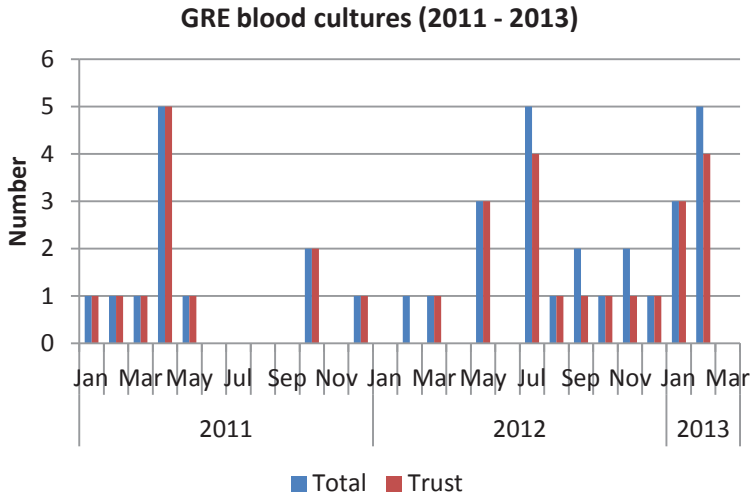
Figure 9



2.5 *Glycopeptide resistant enterococcal (GRE) bacteraemias*

During 2012/13 there were 43 GRE bacteraemias, the majority occurring in patients who were either inpatients or had recently been inpatients. There have been concerns that the numbers of infections and newly colonised patients has been increasing over recent months and it is our intention to look more closely at trends and typing data for these multiply resistant bacteria over 2013/14.

Figure 10



2.6 Multi-drug resistant *Acinetobacter (MDR-AB)*

MDR-AB has been a significant problem at UHB for a number of years, and controlling the spread of this highly resistant pathogen is a global problem. Cases are often imported by patients who have received medical treatment abroad, and UHB has seen importation of strains by military patients who have suffered combat related trauma.

Other patients at the Trust are particularly vulnerable to colonisation and/or infection with these strains and there have been several instances involving cross transmission. In July 2011 a particularly problematic strain, designated QUEE13AC-27 was introduced to the Trust and transmission continued, particularly among trauma, burns and plastics patients and those being treated in critical care, over a prolonged period, with the last new acquisition during 2012/13 occurring in January 2013 (Figure 11). While numerous efforts were made to prevent transmission over time, at the beginning of 2013 a cross Divisional group was set up to look at all aspects of the patient pathway and attempt to interrupt transmission at all points along the pathway. This involved heightened laboratory screening, consistent precautions to prevent cross infection with a strong focus on education of all grades of staff working in areas where these strains were causing problems, and particular emphasis on cleaning of the environment, not only on wards with affected patients but also in operating theatres where procedures were carried out on colonised patients.

Efforts to prevent transmission were assisted by the close collaboration with Theme 2 of the NIHR Surgical Reconstruction and Microbiology Research Centre. One of the aims of this theme is to assist in interrupting transmission of healthcare associated pathogens by using the newly emerging technology of high throughput sequencing to allow detailed tracking of chains of transmission, looking in most cases at only single changes in nucleotide patterns. Complex epidemiological data is then overlaid to give a clearer picture of the most likely modes of transmission. Figure 12 shows a schematic picture of the detail it is possible to achieve, where, although all strains were felt to be identical using conventional typing methods, some 14 different genotypes were identified over the eighteen months when transmission continued to occur and a clearer pattern of transmission began to emerge. Another part of this research involved a study of the "stickiness" (biofilm formation) of the strains and preliminary data is suggesting that those strains that were particularly prone to cause transmission had high levels of biofilm formation.

While this research only strengthens the need for basic infection control measures including strict attention to decontamination of the environment, it goes some way to explaining the challenges posed for infection prevention teams when dealing with these organisms and publication of our own experience may be helpful to others in similar settings.

Figure 11

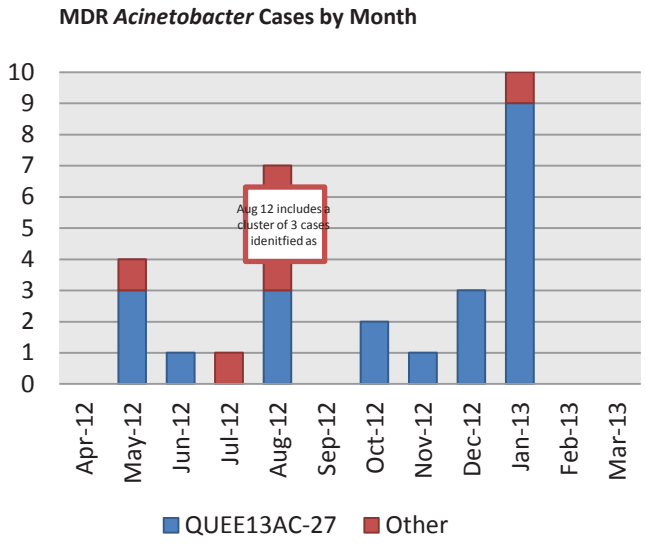
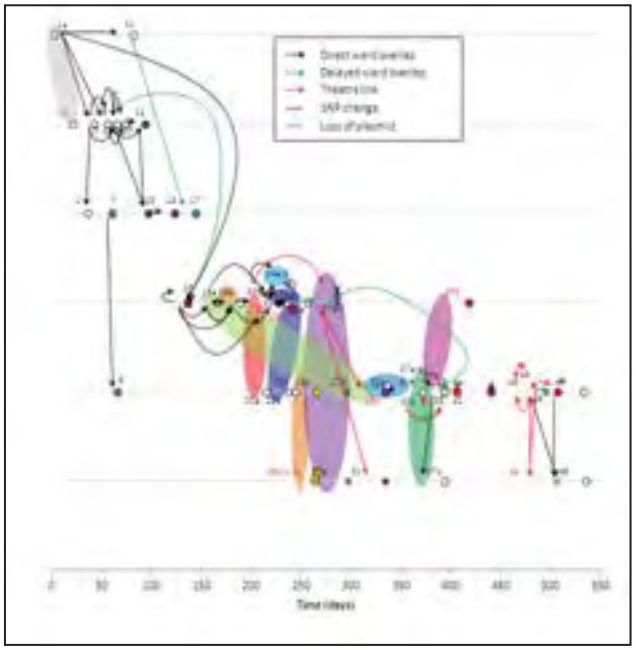


Figure 12

Whole genome sequencing of MDR-Acinetobacter strains



2.7 Multidrug resistant *Enterobacteriaceae*

No clinical isolates of carbapenemase producing Enterobacteriaceae were identified in patients treated at UHB during 2012/13. These strains have been particularly associated with individuals who have received healthcare abroad, particularly in Eastern Europe, the Middle East and the

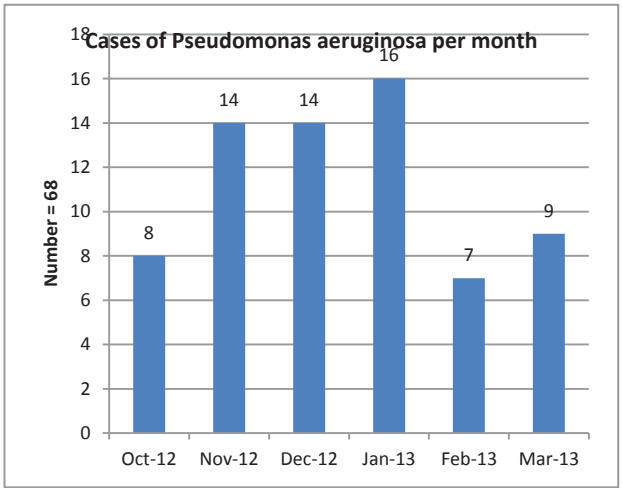
Indian subcontinent and cases have then spread within hospitals to affect local populations. In many cases these strains may have only one, or sometimes no, antibiotics which can be usefully employed for treatment, and outcomes of infection have been poor. It is anticipated that new guidance on the control of these strains will become available during 2013 which will emphasise the importance of identifying those patients at risk of carrying these strains and screening them for carriage, with colonised cases requiring strict isolation for the duration of their hospital stay.

2.8 Pseudomonas aeruginosa in Water

Investigations into a number of high profile outbreaks of *Pseudomonas aeruginosa* infection on neonatal units revealed that these infections can be transmitted via water, especially in augmented care units or where highly immunosuppressed patients are being treated, although it remains somewhat unclear as to whether the risks are as high in adults as in neonates. This information led to definitive guidance regarding water sampling, acceptable levels of *Ps aeruginosa* in water, care of water outlets, and surveillance of cases of *Ps aeruginosa* infection and colonisation. All organisations will be required to set up Water Safety Groups, undertake risk assessments, monitor water sampling and clinical surveillance data, and take action where any concerns are noted.

UHB has now set up a Water Safety Group under the chairmanship of the DIPC and this group will report regularly to the Infection Prevention and Control Committee. A clinical surveillance system for *Ps aeruginos*a has been set up for relevant augmented care units and preliminary results show small numbers of new cases each month (Figure 13) with no obvious focus of concern in any units other than the Burns Unit.

Figure 13



Ps aeruginosa has long been known to cause problems in burns wounds, but the source of the organisms has not always been clear. Our collaborations with the NIHR SRMRC have again proved valuable in allowing a clinical study looking into the epidemiology of *Ps aeruginosa* in

the Burns Centre. Preliminary results show that approximately 30% of major burns cases acquire *Ps aeruginosa* and that in some of these cases, the strains acquired are similar to those found in water supplies especially showers. An important piece of work for the next few months will be to explore realistic methods of control of the organism in water and whether this has an impact on patient colonisation.

3. Outbreaks and incidents

3.1 Norovirus

The winter of 2012/13 saw ongoing and prolonged periods of norovirus in the community and outbreaks in both community and hospital settings. At UHB 12 wards were closed between October 2012 and March 2013, all due to laboratory confirmed norovirus.

3.2 Coronavirus (nCoV)

In September 2012 information was released from the Health Protection Agency regarding a patient who had died from a severe respiratory infection following travel to the Saudi Arabian peninsula and subsequently a number of further cases were reported and the causative agent identified as a novel coronavirus (nCoV). Guidance was issued concerning diagnosis and infection prevention strategies. In February, there was one confirmed case and two suspected cases of coronavirus identified at the Trust. The confirmed case was in an oncology patient who was a family contact of another confirmed case. The two suspected cases were both confirmed as negative by the reference laboratory.

4. Surgical Site Infections

The Trust now has an active surgical site surveillance sub-group meeting under the chairmanship of Mr Mike Hallissey. In addition to the mandatory surveillance of infections following orthopaedic implant surgery there is now a programme to deliver snapshot surveillance of infections following other types of surgery with the long term aim of making each specialty able to continuously monitor their own infection rates.

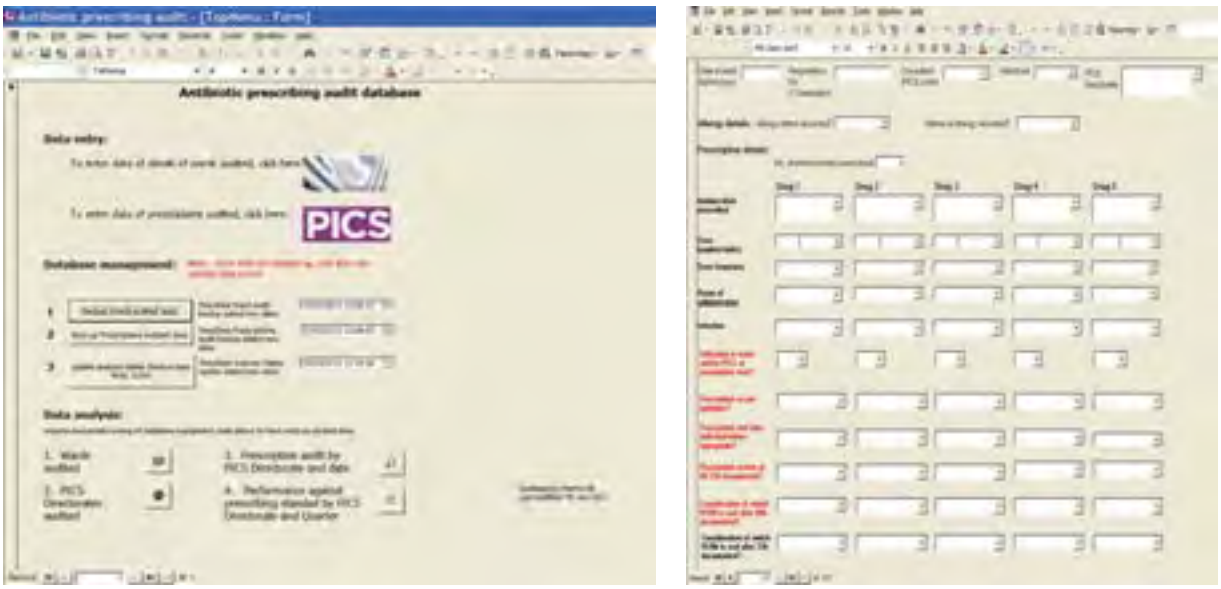
In addition to these activities the group has audited skin preparation for surgery with a view to developing standardised procedures and is also looking in detail at the appropriateness of and adherence to antibiotic prophylaxis guidance.

5. Antimicrobial Stewardship

The DIPC and the Chair of the Antimicrobial Steering Group, Dr Martin Gill, have been working closely together to strengthen the role of the Group and develop a clear programme of work encompassing all aspects of antimicrobial stewardship. It is anticipated that during 2013 a whole time Band 8b Antimicrobial Pharmacist supported by a part-time Band 8a post will be recruited which will further enhance the work of this group.

A particular innovation in 2012/13 was the development of an electronic audit tool (Figure 14), based on the major audit criteria in the Department of Health Start Smart then Focus strategy. This tool will allow consistent bedside auditing of all aspects of antimicrobial prescribing by microbiologists, pharmacists, and junior doctors with automated reports to clinical teams for action to improve where necessary. During 2013/14 the infection control contract with local commissioners will include a key performance indicator around appropriate prescribing and this tool will allow ongoing monitoring of adherence to targets with reporting to key groups throughout the year.

Figure 14



6. Training and Education

In 2012/13 the Infection Prevention and Control team (IPCT) have continued to deliver a wide variety of education. These sessions have been both formal by Trust Induction and mandatory training to informal to increase staff awareness and reduce risk. The team have delivered 27 sessions on Trust induction and 119 mandatory training sessions. Compliance with training stands at 86%.

In addition the IPCT have continued to work closely with the Learning and Development team to complete the training needs analysis, training matrix and on the development of an updated e-learning package. The team have also developed several videos including mask fit checking, and Aseptic No Touch Technique (ANTT) to act as an aide memoire available for staff on the Trust intranet.

The IPCT have also taken opportunities throughout the year to provide targeted training by developing programmes as part of Infection Prevention week, doctors' induction and volunteer sessions.

7. Research and Development

Research and development is a key component of an infection prevention programme, particularly in a high profile teaching Trust such as UHB. Close links with the NIHR SRMRC (the DIPC is also joint theme lead for Theme 2) are already reaping benefits in terms of improving our understanding of the transmission of key pathogens such as MDR Acinetobacter and *Pseudomonas aeruginosa*. Other microbes which are being studied as part of the programme include *Staph aureus* and *Candida* spp and it is hoped that the results of this research will also further our understanding of the transmission of these important microbes.

Developments within Clinical Laboratory Services are also likely to impact on our ability to provide timely interventions for the control of certain important pathogens. Using the same technology and platform that is used for CDI diagnosis, we anticipate having a rapid and accurate on-site service for tuberculosis PCR by early 2013 which will also allow for early detection of the most important mechanism of multi-drug resistance in tuberculosis. Plans are also at an advanced stage for rapid on-site testing for norovirus and influenza. The purchase of an Illumina MiSeq high throughput sequencer to be shared between Histology and Microbiology will allow the roll out of techniques previously only available in advanced research facilities for the detailed mapping of chains of transmission of important healthcare associated infections.

8. General Planning for Next Year

We have developed an ambitious but flexible and achievable programme for work over 2013/14 which we hope will place the Trust in a position where we can improve patient safety, meet national standards and guidance and continue with our research and development work. This plan is provided as part of the regular Board of Directors paper, and quarterly updates are reported.

The Board of Directors is asked to accept the Annual report on Infection Prevention and Control.

Beryl Oppenheim
Director of Infection Prevention and Control

Kay Fawcett
Executive Chief Nurse

16 July 2013