University Hospitals Birmingham
NHS Foundation Trust

Infection Prevention & Control
QEHB Annual Report 2017/18

Title:	**INFECTION PREVENTION & CONTROL ANNUAL REPORT APRIL 2017 – MARCH 2018**
Responsible Director:	Michele Owen, Interim Executive Chief Nurse and Director for Infection Prevention and Control
Contact:	Dr Mark Garvey, Clinical Scientist and Associate Director of Infection Prevention and Control; Ms Kerry Holden, Lead Nurse Infection Prevention and Control; Dr Elisabeth Holden, Consultant Microbiologist and Lead Infection Control Doctor

Purpose:	To provide the Board of Directors with an annual report on infection prevention and control from April 2017 – March 2018	
Confidentiality Level & Reason:	None	
Annual Plan Ref:	Strategic Aim 4 : Quality of Services	
Key Issues Summary:	The annual report provides details of the infection prevention and control activity from April 2017 – March 2018	
Recommendations:	The Board of Directors is asked to accept the annual report	
Approved by:	Michele Owen	Date: 18 October 2017

Contents

1.0 Introduction

Infection prevention and control is a top priority for University Hospitals Birmingham NHS Foundation Trust (UHB). Keeping our patients safe from avoidable harm is everyone's responsibility. The Trust has a wide ranging programme of activity that focusses on continual improvement in order to deliver the best in care.

This report provides details of the progress with infection prevention and control from April 2017 - March 2018.

2017/18 has been a challenging year with national objectives for Meticillin Resistant *Staphylococcus aureus* (MRSA) and *Clostridium difficile* infection aimed at delivering a zero tolerance approach to avoidable infections. Progress has been made throughout when compared to recent years, primarily due to the decrease in MRSA bacteraemias and other healthcare-associated infection seen within the Trust.

The Infection Prevention and Control Team work in line with national guidance on the prevention of infections in the healthcare setting. Adherence to policies and procedures based on national guidance and the evidence base supports the Trust in continually reducing the risk from avoidable infection for our patients and staff. All the policies and procedures are readily available on the Trust's intranet page for all staff and are regularly kept up to date. A list of policies and procedures can be found in Appendix 1.

The Trust is a teaching hospital and tertiary referral centre providing clinical services to over one million patients each year. The Trust has one of the largest co-located critical care units in the world and is a specialist centre for burns, plastic, liver, cardiac surgery and neurosciences; and has a specialist cancer centre. The Trust also has the largest transplant programme in Europe, is the regional major trauma centre and hosts the Royal Centre for Defence Medicine.

The Infection Prevention and Control Team work closely with external agencies. A strong working relationship is maintained with the local Clinical Commissioning Groups, Public Health England (PHE) and NHS Improvement. The team meet monthly with Birmingham CrossCity Clinical Commissioning Groups as the coordinating commissioners for the Trust to primarily discuss *C. difficile* Post Infection Reviews (PIR). During outbreaks of infections, PHE are notified and invited to support outbreaks meetings. NHS Improvement are kept up to date on the Trust's performance. The Trust has an open approach to infection prevention and control; sharing learning and experience. As a result, several other Trusts have visited the Infection Prevention and Control Team to learn from the experiences the Trust has faced which can often be complex.

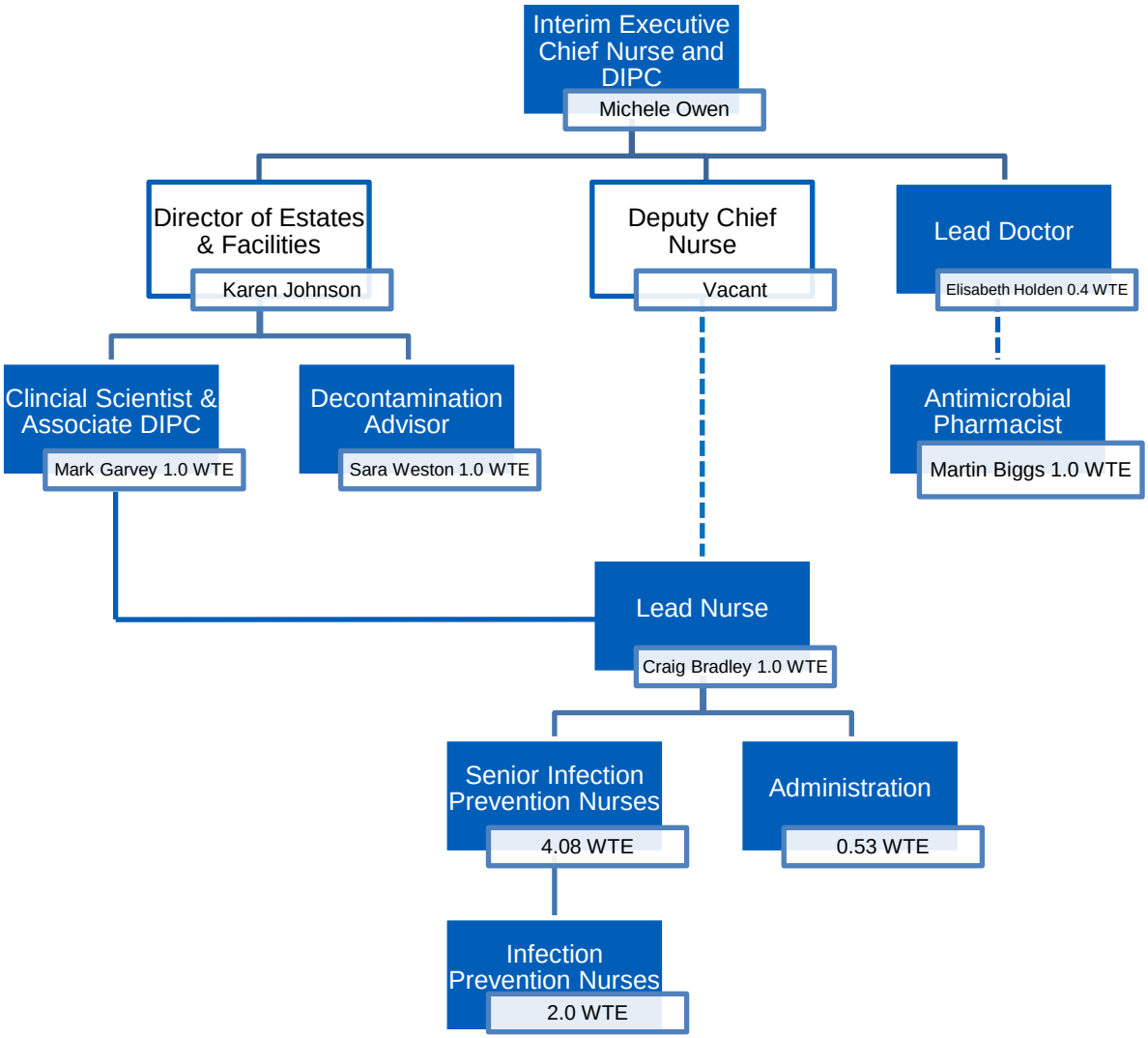
1.1 Where to find evidence of compliance with the code of practice (2015) on infection prevention and control from the Health and Social Care Act 2012

Criterion	What the registered provider will need to demonstrate	Location in annual report
1	Systems to manage and monitor the prevention and control of infection. These systems use risk assessments and consider the susceptibility of service users and any risks that their environment and other users may pose to them.	Section 2 and 4
2	Provide and maintain a clean and appropriate environment in managed premises that facilitates the prevention and control of infections.	Section 9 and 12
3	Ensure appropriate antimicrobial use to optimise patient outcomes and to reduce the risk of adverse events and antimicrobial resistance.	Section 7
4	Provide suitable accurate information on infections to service users, their visitors and any person concerned with providing further support or nursing/ medical care in a timely fashion.	Section 6, 8, 11 and 12
5	Ensure prompt identification of people who have or are at risk of developing an infection so that they receive timely and appropriate treatment to reduce the risk of transmitting infection to other people.	Section 3, 4 and 12
6	Systems to ensure that all care workers (including contractors and volunteers) are aware of and discharge their responsibilities in the process of preventing and controlling infection.	Section 6, 8 and 12
7	Provide or secure adequate isolation facilities.	Section 2
8	Secure adequate access to laboratory support as appropriate.	Section 2, 3 and 4
9	Have and adhere to policies, designed for the individual's care and provider organisations that will help to prevent and control infections.	Section 1; appendix 1
10	Providers have a system in place to manage the occupational health needs and obligations of staff in relation to infection.	Section 10

2.0 Infection Prevention and Control Team Structure 2017/18

In April 2017 Dr Mark Garvey was appointed the Associate Director of Infection Prevention and Control. In addition, the team has recruited one new Senior Infection Prevention and Control Nurse and an Infection Prevention and Control Nurse. The Executive Chief Nurse is the Director for Infection Prevention and Control; the Infection Prevention and Control Team also consists of a Lead Infection Control Doctor, a Lead Nurse, a Clinical Scientist, a Principal Antimicrobial Pharmacist and the team of specialist nurses. The Infection Prevention and Control Team structure at the end of the year is shown in Figure 1. Job titles in dark blue are core members of the team.

Figure 1 Infection Prevention and Control Team Structure on 30th March 2018.



2.1 Infection Prevention Reporting Framework

The Infection Prevention and Control Group met monthly throughout 2017/18 with the exception of August and December.

Membership comprises of:

- Executive Chief Nurse/Director for Infection Prevention and Control (Chair)
- Deputy Chief Nurse (Deputy Chair)
- Lead Doctor in Infection Prevention and Control
- Lead Nurse for Infection Prevention and Control
- Associate Director of Infection Prevention and Control/ Infection Prevention and Control Clinical Scientist
- Principal Antimicrobial Pharmacist
- Associate Director of Nursing (for all 4 divisions)
- Divisional Directors or Deputy (for all 4 divisions)
- Director of Facilities and Estates
- Allied Health Professional representative
- Lead Nurse for Quality & Clinical Standards
- Head of Facilities
- Health and Safety Lead
- Head of Risk and Compliance
- Head of Estates (Quarterly attendance)
- Occupational Health Lead Nurse (Quarterly attendance)
- Decontamination Advisor (Quarterly attendance)
- Cross City Clinical Commissioning Group Lead for Infection Prevention and Control
- Public Health England representative

The Executive Chief Nurse and DIPC has monthly meetings with the Lead Doctor, Lead Nurse and ADIPC/ Clinical Scientist.

Members of the Infection Prevention and Control Team sit on the following Groups within the Trust:

- Health and Safety Steering Group
- Water Safety Group
- Medical Devices Group
- Decontamination Group
- Continence Action Group
- Emergency Planning Committee
- Antimicrobial Steering Group
- Preventing Harm Meetings
- Product Evaluation Group
- Equipment Standards Group

A member of the Infection Prevention and Control Team also attends the Divisional Matrons meetings. Senior Infection Prevention and Control Nurses undertake regular clinical walkabouts with their Matrons for each clinical area. Members of the Infection Prevention and Control Team attend relevant meetings of groups dealing with

developments, procurement and commissioning when appropriate.

A Consultant Microbiologist (Lead Doctor for antimicrobial stewardship) sits on the Medicines Management Advisory Group. The Consultant Microbiologists continue to work with the Principal Antimicrobial Pharmacist in monitoring, auditing and providing education on the use of antimicrobials, and an Antimicrobial Stewardship and Sepsis Steering Group meets regularly. The ward pharmacists monitor antimicrobial use around the hospital.

The Infection Prevention and Control Team meets formally every week to discuss a range of topics including; governance, assessing progress against the annual programme of work, performance targets, discussion and resolution of issues, review of surveillance data and ensure necessary information, including feedback from groups, committees and meetings attended, is disseminated appropriately to the wider team.

At every Board of Directors meeting, the Chief Nurse, as part of the Care Quality Report, gives an overview of the most recent infection prevention performance data. All members of the Board of Directors, therefore, have access to information concerning the Trust's performance against the external and internal infection prevention targets and other infection related issues.

2.2 Laboratory services

The Infection Prevention and Control Team work closely with the clinical microbiology department which provides comprehensive bacteriology, virology, parasitology, and mycology services. The department is UKAS accredited and participates fully in external quality assurance schemes for the full repertoire of tests. The department is based at the Queen Elizabeth Hospital Birmingham and has a satellite laboratory at the Genitourinary Medicine Clinic in Whittall Street, Birmingham. There are 50 scientific, support and clerical staff offering a 24-hour diagnostic and monitoring service for routine and urgent detection of patient infections, caused by bacterial, viral and fungal agents, using specialized automated and manual techniques. The clinical microbiology department provides support to the Infection Prevention and Control Team through reporting of results and processing of clinical samples. Out of hours, the on call duty microbiologist will provide Infection Prevention and Control advice for the Trust.

2.3 Isolation facilities

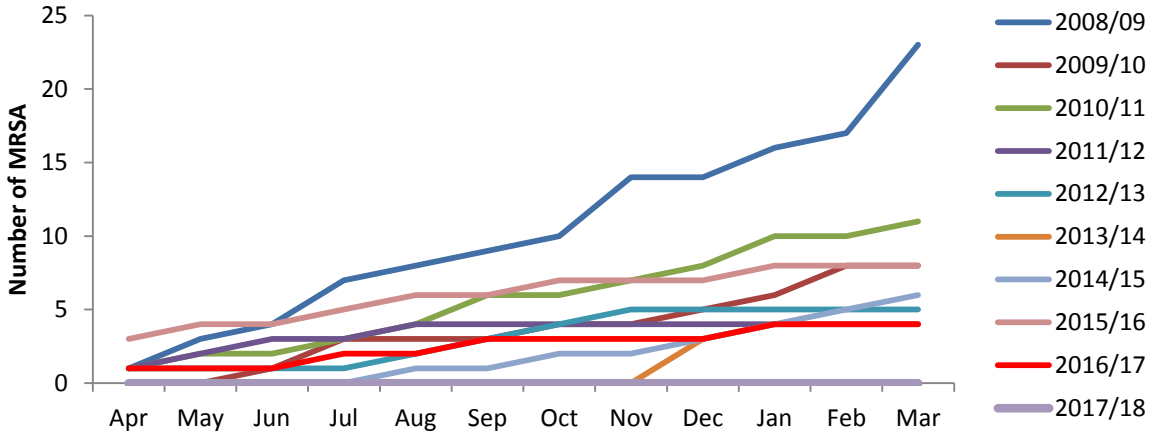
There are over 1400 inpatient beds and of these, 474 are side rooms, providing facilities to isolate patients with alert organisms. The Trust has 9 rooms with positive pressured lobbies which the Infection Prevention and Control Team can utilise to isolate patients with infections such as Middle East respiratory syndrome coronavirus or pulmonary MDR Tuberculosis. In addition, the Trust has two negative pressured side rooms on Critical Care D. The Heritage site provides challenges for the Infection Prevention and Control Team due to the lack of side rooms, however close working relations with the clinical site managers is maintained to reduce the transfer of infected patients to the Heritage site if no isolation facilities are available.

3.0 Performance

3.1 MRSA bacteraemia

During 2017/18 the objective for Trust apportioned MRSA bloodstream infections was zero. The Trust was pleased to report no avoidable cases. Overall, there were 3 MRSA bacteraemias reported, all of which were non-Trust apportioned. Figure 2 shows the annual number of bacteraemias from 2008-2018. To continue with improving MRSA performance, the annual infection control action plan developed in conjunction with the Clinical Commissioning Group focused on the following: hand hygiene, MRSA screening and decolonisation therapy, antimicrobial stewardship, Infection Prevention and Control nurse-led MRSA acquisition ward rounds and investigations such as Post Infection Reviews for MRSA acquisition cases.

Figure 2. Cumulative annual MRSA bacteraemias from 2008-2018.



There is a zero tolerance approach to MRSA bacteraemias and all cases undergo an urgent Post Infection Review across the relevant health economy to assess whether any learning points can be extracted to prevent a repeat in the future. The process also determines which organisation is best placed to implement those learning points and requires a transparent, thorough and timely response.

3.2 MRSA acquisitions

Targeted admission screening for MRSA has enabled the Trust to monitor the acquisition of MRSA and use this as another key performance indicator for the organisation.

Figure 3 shows the number of MRSA acquisitions across the Trust from 2013. The performance for 2017/18 has improved compared with that of 2016/17. Since monitoring MRSA acquisitions within the Trust, 2017/18 was the lowest year for MRSA acquisitions. This was in part due to the re-introduction of universal MRSA decolonisation therapy within critical care and nurse-led MRSA acquisition ward rounds. Figure 4 shows how the incidence of MRSA bacteraemias and MRSA acquisitions have reduced in relation to a number of interventions including the reintroduction of routine decolonisation into critical care, MRSA Infection Prevention

and Control nurse-led ward rounds and environmental cleaning interventions.

Figure 3. Cumulative attributable MRSA acquisitions since 2013.

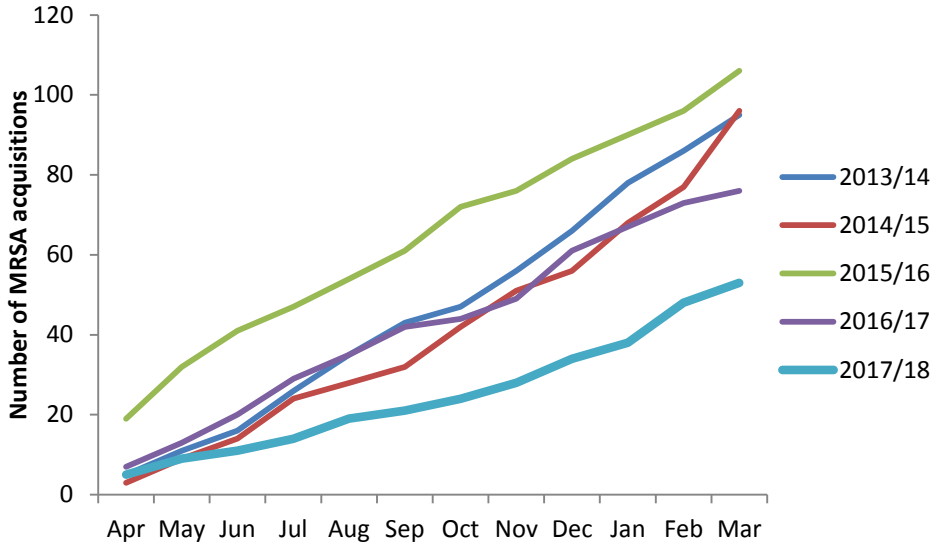
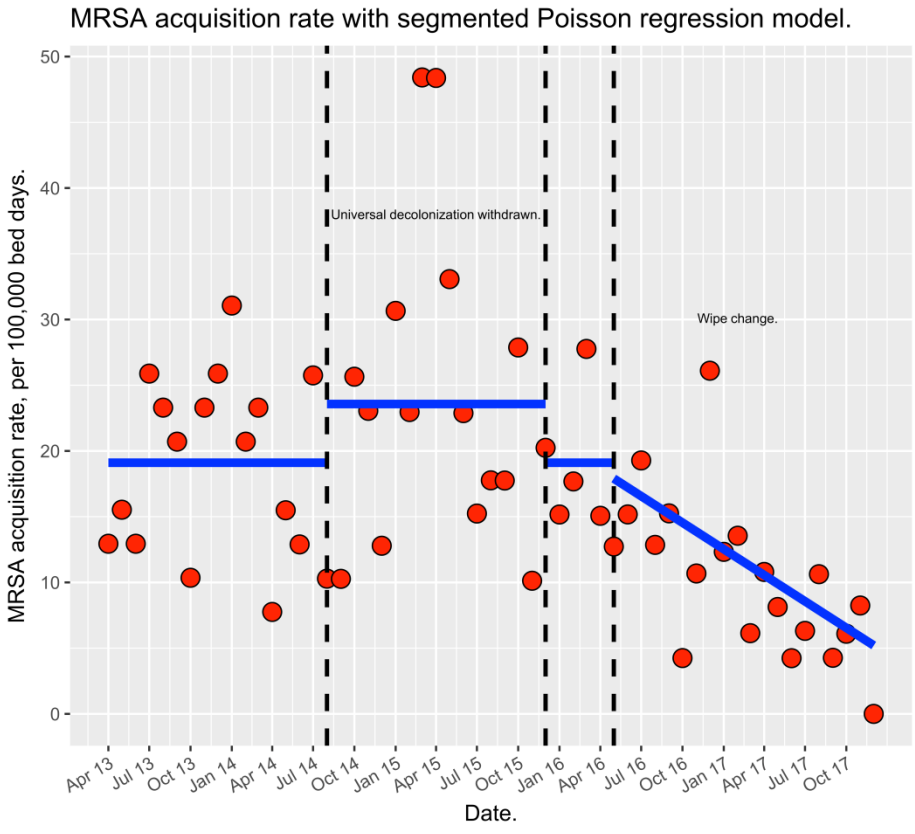


Figure 4. Using a segmented Poisson regression model changes in hospital wide monthly MRSA acquisition rates (A) and MRSA bacteraemia rates (B) per 100,000 bed days between April 2013-December 2017.

A.



B.

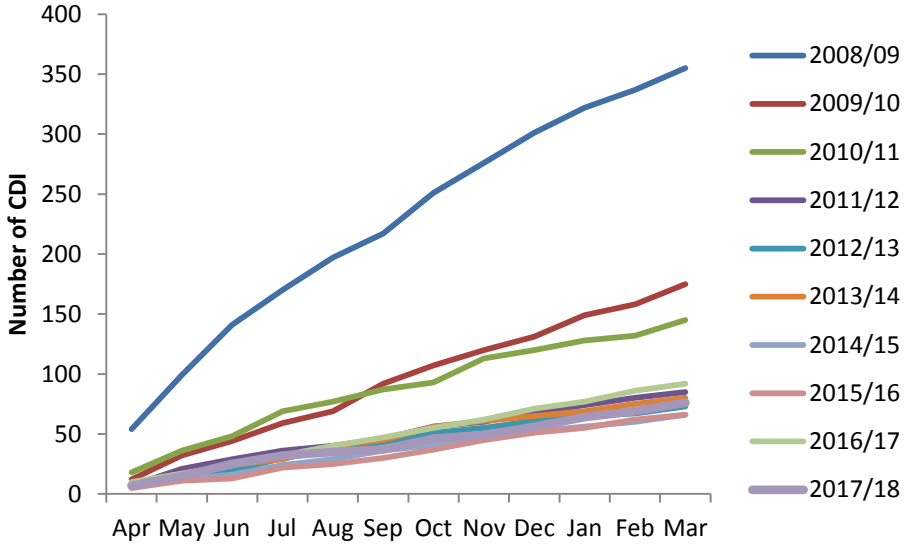
Key: A two wipe regime for nurse-led cleans was undertaken at QEHB between April 2013 to April 2016; a one wipe regime for nurse-led cleans was undertaken at QEHB between May 2016 to December 2017; the removal of MRSA decolonisation therapy in the ICU at QEHB occurred during August 2014-December 2016; the reintroduction of universal MRSA decolonization therapy in the ICU at QEHB occurred between January-December 2017.

3.3 *Clostridium difficile* infection

Objectives for the number of *C. difficile* infections for Acute Trusts and Clinical Commissioning Groups were set for the year 2017/18 by the Department of Health; based on nationally set target and performance rates of each Trust and Clinical Commissioning Group. The objective for Trust apportioned cases of *C. difficile* infection for 2017/18 was a rate of 17.3 cases per 100,000 bed days; Trust performance was 76 cases giving an overall rate of 13.1 cases per 100,000 bed days. Figure 5 shows the number of Trust apportioned cases annually 2008-2018.

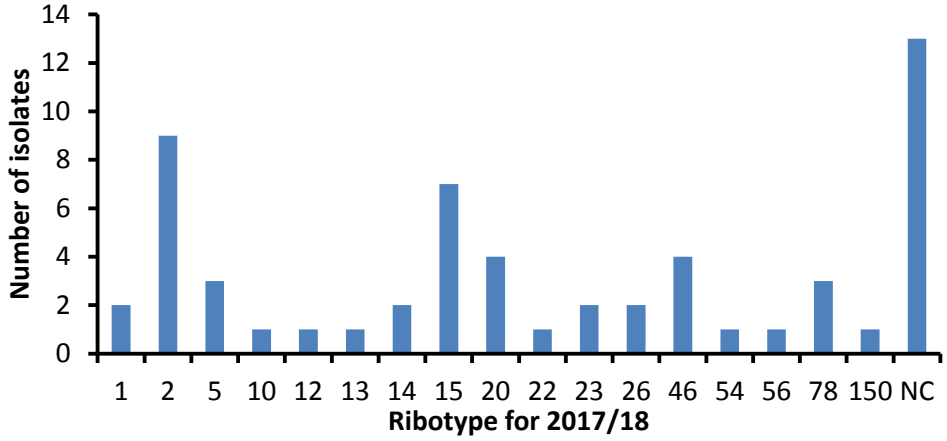
NHS England published *C. difficile* infection objectives for acute trusts and Clinical Commissioning Groups for 2017/18. NHS England calculated these objectives and suggested Clinical Commissioning Groups consider sanctions for breach of *C. difficile* infection objectives only where those *C. difficile* infections were associated with lapses in care. With agreement from the Clinical Commissioning Groups, all Trust apportioned cases of *C. difficile* infection were reviewed against avoidability criteria and those deemed to have no lapses in care were excluded from consideration of local penalties. Of the 76 Trust apportioned cases, 13 (17%) were deemed to have lapses in care, most commonly (80%) related to inappropriate antimicrobial prescribing.

Figure 5. Cumulative annual number of Trust apportioned *C. difficile* infections from 2008-2018.



This year, the number of *C. difficile* cases was above our target, however, using the rate per 100,000 bed days as a measure we were actually under our target. The rate of *C. difficile* per 100,000 days is a better marker of measuring the *C. difficile* burden as it will take into account the hospitals increased patient activity. This shows improvement compared to 2016/17, where we reported 92 *C. difficile* cases at a rate of 22.7 per 100,000 bed days, with 31 cases deemed to have avoidable factors. Although we have seen a reduction in the number of reportable *C. difficile* cases, there is always concern around possible transmission of *C. difficile* infection in the hospital. In order to investigate this, strains have been sent for typing in cases where there were possible clusters in clinical areas and generally increased numbers in particular areas. Figure 6 shows the ribotype results for the Trust in 2017/18. For 2017/18 as in previous years, the picture was one of extremely diverse ribotypes, with very little evidence of possible transmission and no particular endemic strains to the organisation.

Figure 6. Number of different *C. difficile* ribotypes during 2017/18.



To continue with improving *C. difficile* performance, the annual infection control action plan developed in conjunction with the Clinical Commissioning Group focused on the following: particular actions around improving time to isolation of patients with diarrhoea to prevent transmission of *C. difficile*, improving timeliness of *C. difficile* specimen collection and timely treatment of patients with *C. difficile* infection. In addition, the team undertake nurse-led *C. difficile* ward rounds improving access to expert review of patients with *C. difficile*. In line with the national antimicrobial CQUIN, the antimicrobial stewardship programme has been reinvigorated with a particular focus on reducing the use of broad spectrum antibiotics. In the next financial year, there will be a focus on gaining access to Faecal Microbiota Transplant therapy for patients who fail first line treatment, strengthening the feedback of the post infection review process for *C. difficile* infection and feedback of learning to a wider audience, as well as a key focus on appropriate antimicrobial stewardship. Concentrating on these actions should see the Trust maintain/ reduce its current levels of *C. difficile*.

3.4 *Escherichia coli* bacteraemias

Mandatory surveillance of *E. coli* commenced in June 2011. The intention is to allow assessments to be made nationally on the possible reasons for the increasing number of cases seen over recent years. With the bloodstream infections quality premium 2017-2019, there will be an enhanced focus on Gram negative bacteraemias, specifically reducing *E. coli*, *Klebsiella spp.* and *Pseudomonas aeruginosa* bacteraemias by 10% across the whole health economy. It is well known that many *E. coli* infections arise from the patient's own normal flora and that there is little evidence at present of the interventions that can be made to reduce the majority of these infections. The Trust has robust data on *E. coli* bacteraemias for the past 5 years. We have seen a year on year increase in the number of *E. coli* bacteraemias since implementation of mandatory surveillance. During 2017/18, there was a 12% increase in *E. coli* bacteraemias compared to the last financial year, with 100 Trust apportioned and 230 non-Trust apportioned cases. Figure 7 shows the total number of *E. coli* bacteraemias over the year.

Urinary tract infections are the most common source of an *E. coli* bacteraemia (Figure 8). The NHS Safety Thermometer tool looks for the presence or absence of harms, one of these being urinary tract infections in patients with a urinary catheter. National data from the Safety Thermometer showed in 2015/16, 32% of patients at the Trust had a urinary catheter in situ making us a potential higher user for catheter insertion. Literature shows catheterising patients can increase the risk of acquiring urinary tract infections. The Infection Prevention and Control Team have used a urinary tract infection Post Infection Review tool during 2017/18 in patients where a new harm has been identified through the Safety Thermometer, with the aim of identifying any lessons to be learnt in this group of patients. This work has been fed into the Continence Action Group, leading to practice changes within the Trust. This has resulted in a reduction in the amount of new harms identified from the Safety Thermometer, with 24 being identified in 2016/17, decreasing to 19 in 2017/18; and a reduction in the number of catheters being inserted across the Trust which decreased to 19.2% in 2017/18.

Figure 7. Cumulative total number of Trust apportioned *E. coli* bacteraemias from 2013-2018.

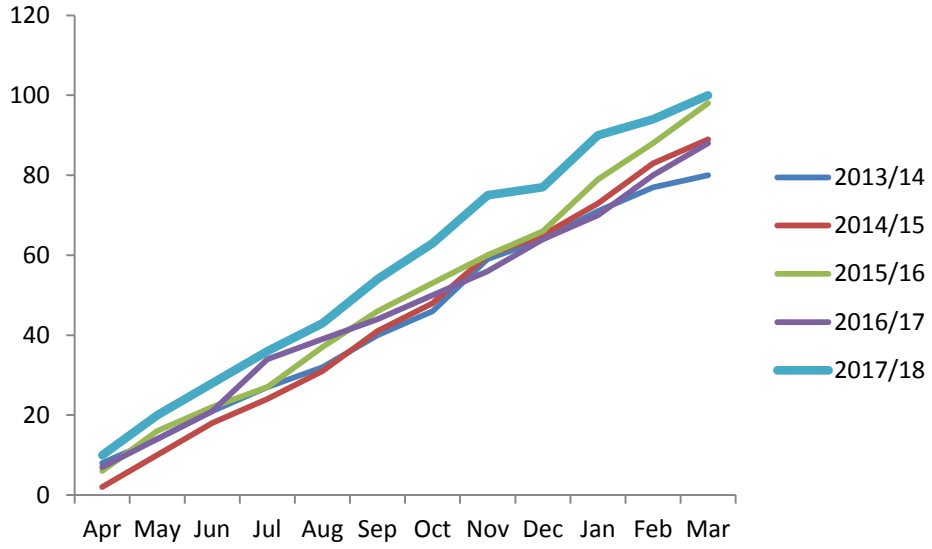
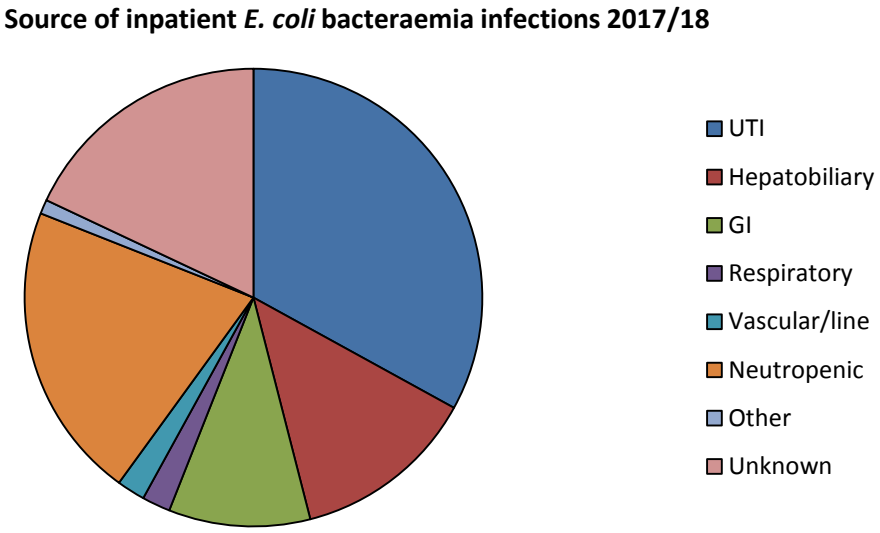


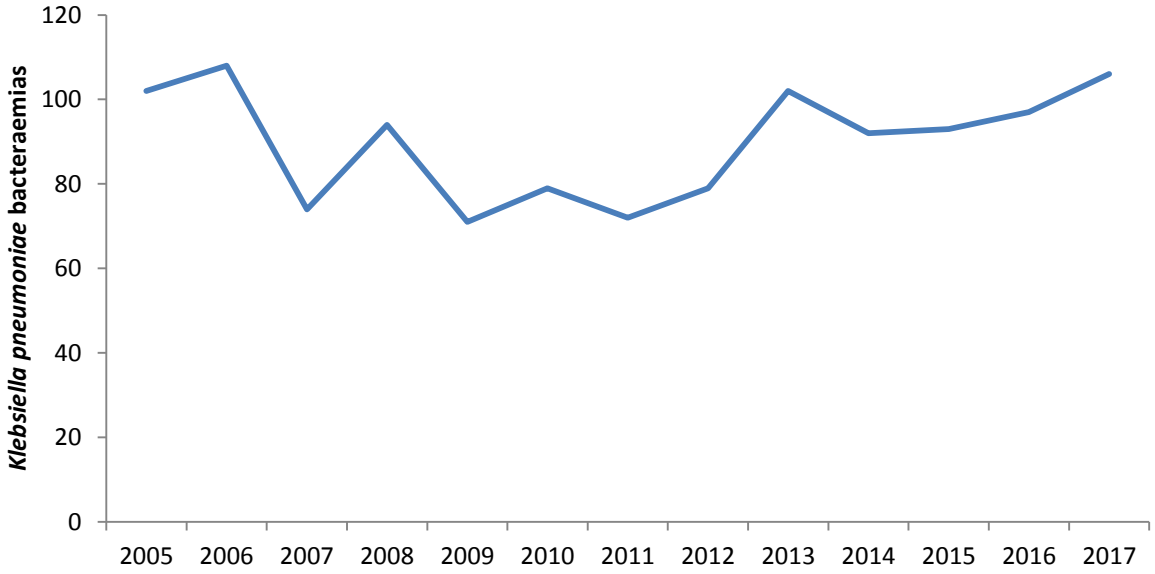
Figure 8. Source of *E. coli* bacteraemia infections during the financial year 2017/18.



3.5 *Klebsiella spp.* bacteraemias

Mandatory surveillance of *Klebsiella spp.* commenced in April 2017 in line with the bloodstream infections quality premium 2017-2019, with the aim of reducing *E. coli*, *Klebsiella spp.* and *Pseudomonas aeruginosa* bacteraemias by 10% across the whole health economy. *Klebsiella spp.* are usually harmless colonisers of the human gut. *K. pneumoniae* is an opportunistic pathogen and tends to cause nosocomial infections in immunocompromised host. The Trust has collected *Klebsiella spp.* bacteraemia data over the past financial year, reporting 48 Trust apportioned and 59 non-Trust apportioned cases. Figure 9 shows the total number of *Klebsiella spp.* bacteraemias since 2005 with a plateauing trend seen. In the new financial year, there will be a focus on reducing the number of Gram negative bacteraemias seen, with specific focuses on reducing hospital acquired pneumonia and specific interventions on antimicrobial stewardship.

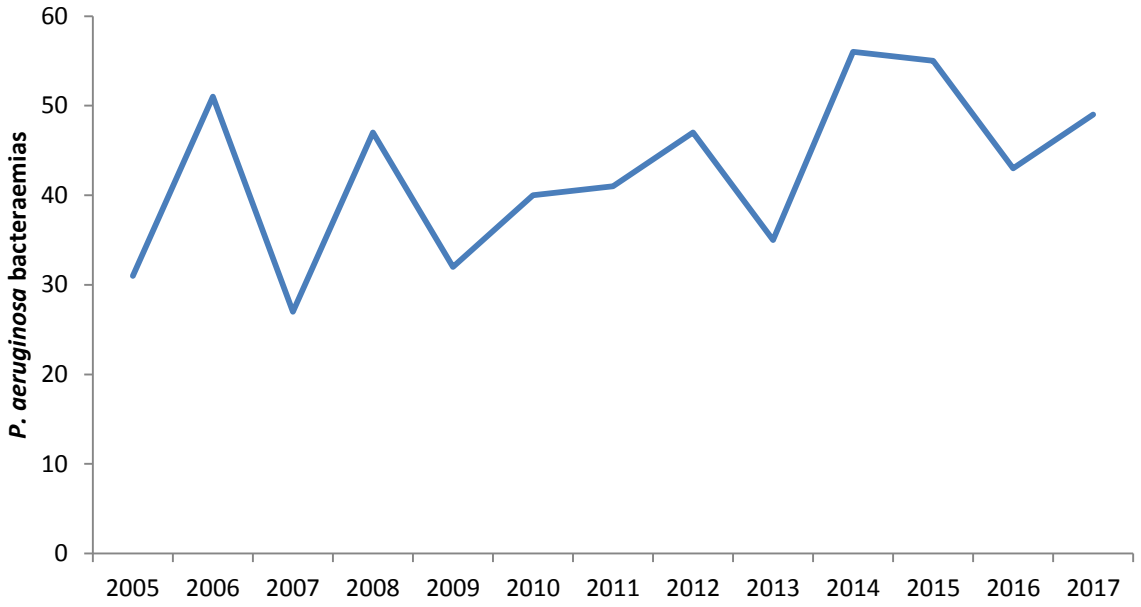
Figure 9. Total number of *Klebsiella spp.* bacteraemias seen across the Trust since 2005.



3.6 *Pseudomonas aeruginosa* bacteraemias

Mandatory surveillance of *P. aeruginosa* commenced in April 2017 in line with the bloodstream infections quality premium 2017-2019, with the aim of reducing *E. coli*, *Klebsiella spp.* and *P. aeruginosa* bacteraemias by 10% across the whole health economy. *P. aeruginosa* is widespread in the environment, specifically moist environments. *P. aeruginosa* is an opportunistic pathogen in immunocompromised patients and is often associated with water borne outbreaks in the hospital setting. The Trust has collected *P. aeruginosa* bacteraemia data over the past financial year, reporting 27 Trust apportioned and 25 non-Trust apportioned cases. Figure 10 shows the total number of *P. aeruginosa* bacteraemias since 2005 with an increasing trend of total bacteraemias seen. In the new financial year, there will be a focus on reducing the number of Gram negative bacteraemias seen, with specific focuses on reducing hospital acquired pneumonia, specific interventions on antimicrobial stewardship and water microbiology interventions as discussed in section 3.11.

Figure 10. Total number of *P. aeruginosa* bacteraemias seen across the Trust since 2005.

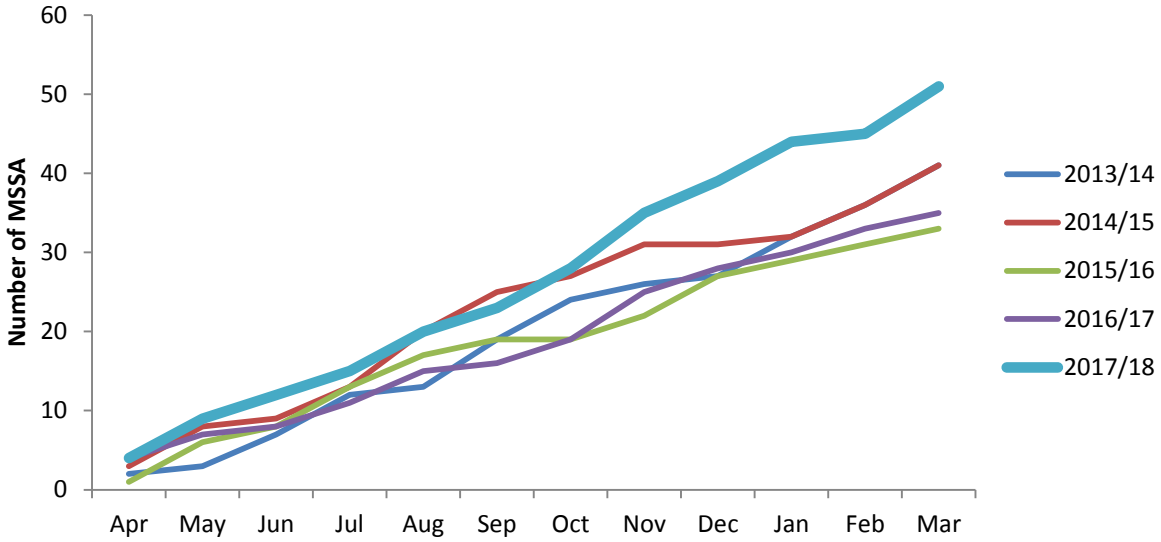


3.7 Methicillin Sensitive *Staphylococcus aureus* (MSSA) bacteraemias

National mandatory surveillance of MSSA bacteraemia began in January 2011. During 2017/18, there were 51 Trust apportioned cases and 88 non-Trust apportioned cases; a significant increase in numbers compared to the previous financial year. Statistical analysis of the years MSSA bacteraemias revealed the increase coincided with a change to a new needle free connector; the rate of MSSA bacteraemias for the 6 months preceding the change was 1.1 per 100,000 patient days, which increased to 5.3 per 100,000 patient bed days following the change in needle free connectors. Figure 11 shows the annual numbers of MSSA bacteraemias over the past five years.

Similarly to *E. coli* bacteraemias, many of these represent infections that cannot be predicted or prevented, however all cases are reviewed to assess whether they were related to the presence of a medical device, such as a peripheral or central venous access device or urinary catheter, as this may assist in determining any key actions for improvement. Of the 51 Trust apportioned cases: 34% were associated with intravenous lines, 14% were secondary to skin or soft tissue infections, 4% were due to endocarditis, hospital acquired pneumonia 4%, osteomyelitis 2%, 33% being other sources. Surveillance data shows the majority of Trust apportioned MSSA bacteraemias are related to devices which is not an uncommon picture nationally. In 2017/18, the Infection Prevention and Control Team have implemented Post Infection Reviews of Trust apportioned MSSA bacteraemias related to invasive devices across the Trust, with any learning/actions being fed back to the clinical areas, changing practice if necessary.

Figure 11. Cumulative total number of Trust apportioned MSSA bacteraemias between 2013-2018.



3.8 Vancomycin Resistant Enterococci (VRE) bacteraemia

During 2017/18, there were 29 Trust apportioned and 0 non-Trust apportioned cases, an increase in the numbers compared to the previous year. Figure 12 shows the total number of Trust Apportioned VRE bacteraemias over the past five years. Although numbers of cases remain low, there is the potential for possible transmission of VRE in hospital. In order to investigate this, strains have been sent for molecular typing in cases where there were possible clusters. In general, the typing data rarely identifies cross transmission; often diverse types with very little evidence of possible transmission are seen (Figure 13).

Figure 12. Cumulative total number of Trust apportioned VRE between 2013-2018.

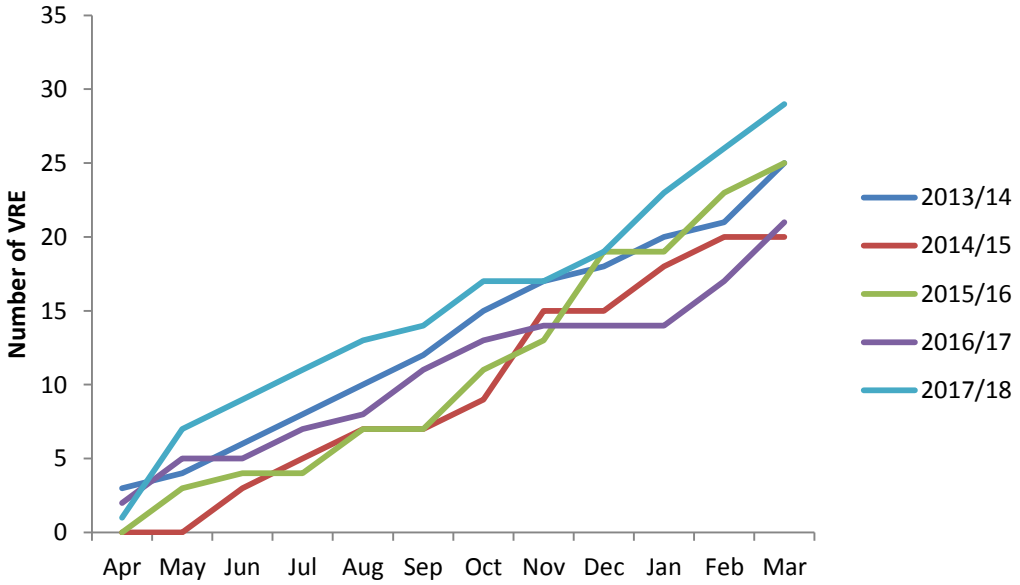
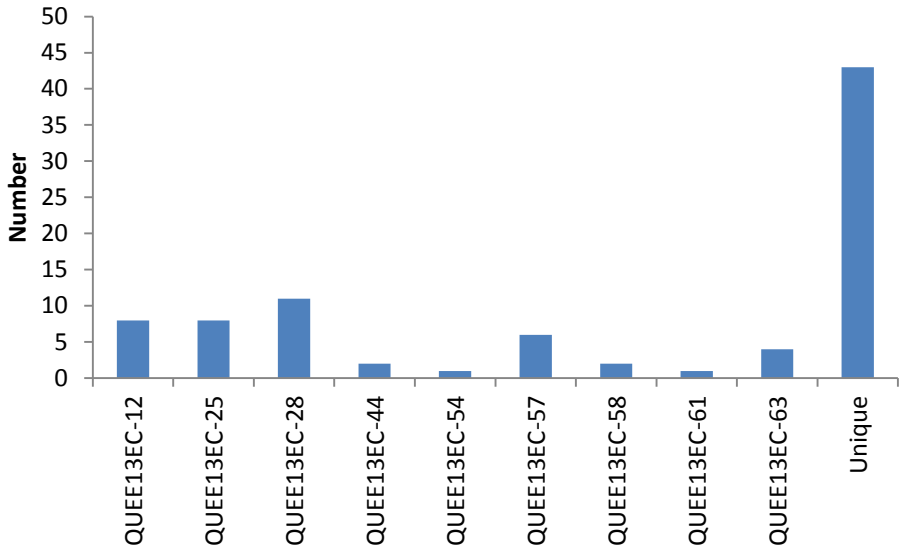


Figure 13. Typing of VRE during 2017/18



3.9 Multi-drug Resistant *Acinetobacter baumannii* (MDR-AB)

MDR-AB has been a challenge in healthcare settings 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 the Trust has seen importation of strains by military patients who have suffered combat related trauma in the past. During 2017/18, we saw an increase, with 18 MDR-AB cases reported. There were 5 small outbreaks which contributed to the increase in cases seen; most of the index patients of these outbreaks were patients repatriated from abroad. The need for basic infection control measures including strict attention to decontamination of the environment remains vitally important in the control of this pathogen.

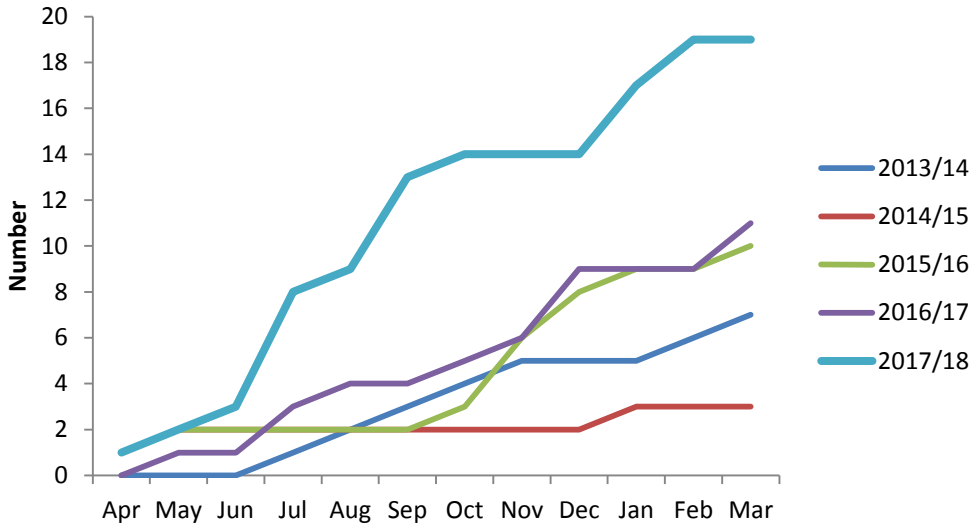
3.10 Carbapenemase Producing Enterobacteriaceae (CPE)

Carbapenems are the antimicrobials of last resort used to treat severe infections caused by multi-drug resistant organisms. Over the last decade, CPEs have emerged worldwide, becoming a public health issue. Increasing incidence of CPEs continues to cause potentially serious and occasionally untreatable infections in healthcare settings. Acquisition of these bacteria is mainly nosocomial, being endemic in some countries around the world. The incidence of CPEs in the UK remains low, and implementation of Public Health England's 'acute trust toolkit for early detection, management and control of CPE' has thus far, kept the emergence of widespread CPEs at bay. However, these organisms have become endemic in some hospitals in London and the North West of England.

During 2017/18, there was a large increase in the number of CPE identified in inpatients at the Trust, with 19 cases compared to 11 reported the previous year (Figure 14). The majority of CPEs are identified in patients who have had healthcare abroad, but a change in epidemiology was seen at the Trust this year, with the majority of cases admitted from the local community. The total number of CPE at the Trust has increased dramatically in 2017/18, with 28 cases as compared to 20 cases

reported the previous year. Evidence from other countries including the UK has shown the potential spread of these organisms within hospitals affecting local populations. In many cases, these strains may have only one, or sometimes no, antibiotics which can be usefully employed for treatment, making this a potentially serious concern to patient management and treatment. Further efforts are needed to prevent transmission, with emphasis on 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. Initiatives to control the spread of CPE include identifying if patients have had healthcare abroad, following the national toolkit for management and control of CPEs and enhanced cleaning of a room or bay of known patients harbouring CPEs. As there are no new antibiotics to be licensed for CPEs, we are dependent on adherence to hygienic precautions in health care to prevent the spread of CPEs. We have worked closely with facilities to ensure appropriate cleaning of bed spaces occupied with patients harbouring CPEs to minimise onward transmission of these organisms.

Figure 14. Cumulative CPE cases since 2013 until present.



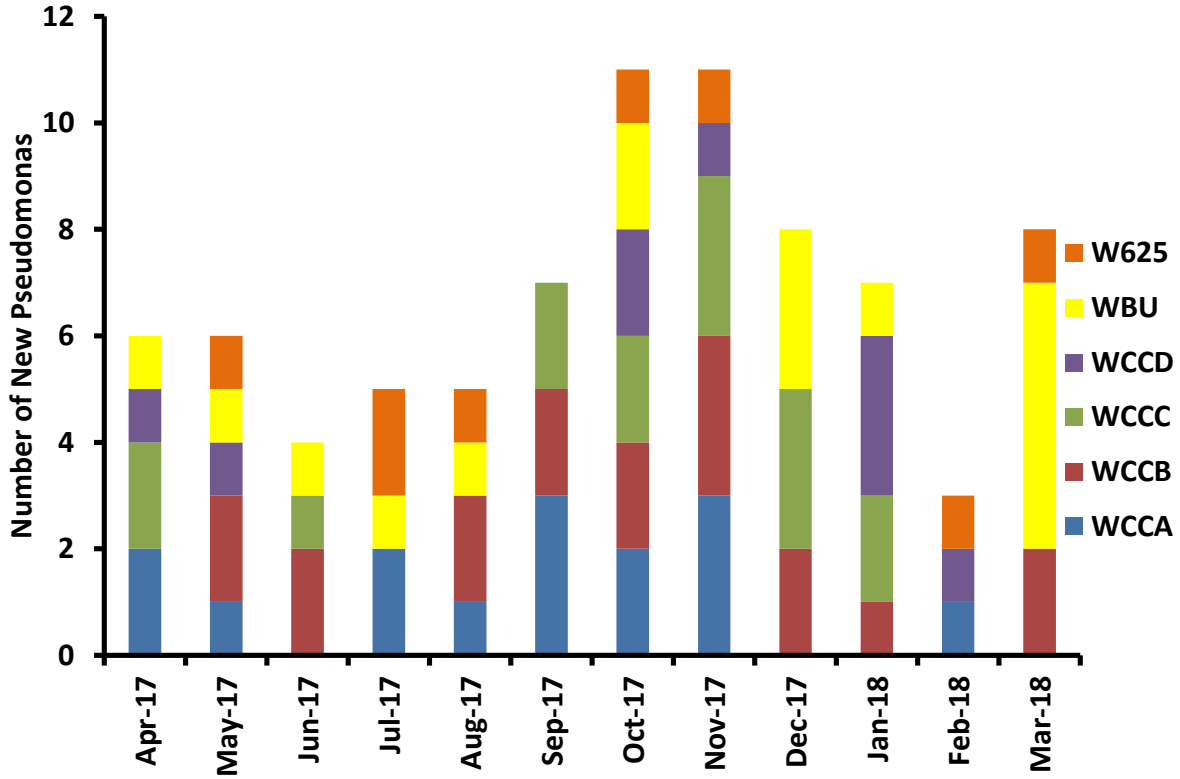
3.11 *Pseudomonas aeruginosa*

P. aeruginosa is a ubiquitous and important opportunistic pathogen in the healthcare setting, particularly affecting those with impaired host or mucosal immunity. It is found in a wide range of moist, nutrient-limited environments and may colonise hospital and domestic water taps, sinks, drains, toilets, and showers. *P. aeruginosa* forms biofilms that allow persistence of micro-organisms in water systems for long periods, and this helps to explain why high colonisation rates may be seen in hospital water systems. Nosocomial *P. aeruginosa* outbreaks have previously been reported in some healthcare settings as associated with hospital water sources. Other potential routes of transmission include cross infection, for example carriage on the hands of healthcare workers, and through contaminated medical equipment.

In the UK, the role of water in the transmission of *P. aeruginosa* in healthcare settings has become an increased area of focus in response to a high-profile outbreak affecting a neonatal critical care unit in Belfast, Northern Ireland. In the Belfast outbreak, the source was eventually determined to be hand wash basin taps. National guidance is now in place in England detailing procedures for routine water

sampling on augmented care units, with directed interventions such as disinfection and replacement of high-risk plumbing parts required. The national guidelines recommend sampling water outlets in augmented care units on a six-monthly basis and taking remedial action for outlets which are positive for *P. aeruginosa*. Additional general infection prevention and control precautions for dealing with high-risk outlets within clinical areas and routine surveillance of clinical isolates are recommended. The Trust Water Safety Group has implemented the guidance and monitors water sampling and clinical surveillance data (Figure 15), taking action where any concerns are noted.

Figure 15. Clinical isolates of *P. aeruginosa* per month for 2017/18 in augmented care areas.

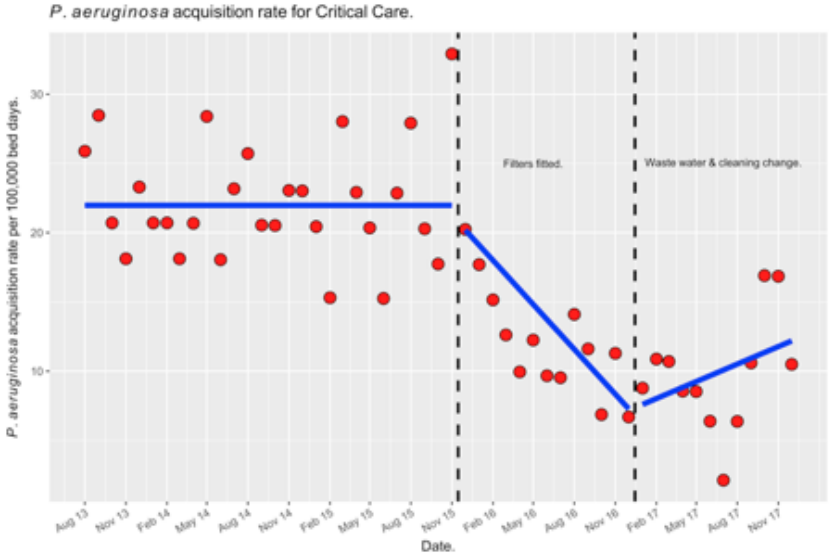


Water sampling in line with the national addendum has shown 27% of the outlets were positive for *P. aeruginosa* in 2017. Since 2013, there has been a 10% increase in the amount of water outlets being colonised with *P. aeruginosa* across the Critical Care unit. Molecular typing results of the water isolates and the patient clinical isolates in 2014 revealed 30% of the patient isolates matched the water isolates. To reduce the risk of transmission at the Trust, we have focussed on holistic and engineering factors – for example: the role of disposal of waste water, the installation of new tap outlets (that are redesigned either to prevent contamination or enable decontamination) and the cleaning of taps appropriately. With these interventions, there was a 67% decrease in the acquisition of *P. aeruginosa* across the critical care unit (Figure 16A).

A Poisson regression model used to analyse the clinical isolates from critical care as a whole suggests that the two most important interventions were the fitting of filters to selected taps across ICU, and the alteration of the disposal of waste water and cleaning protocols (‘holistic factors’) (Figure 16A). Across critical care unit A, a

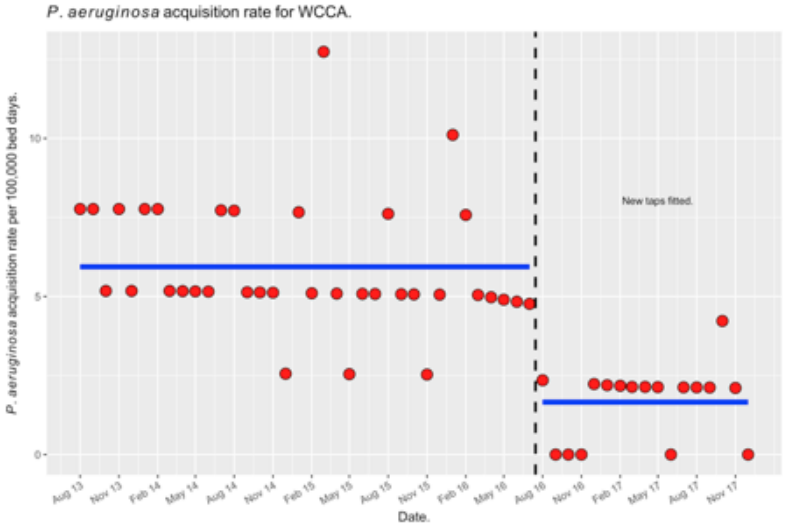
number of the tap outlets were replaced with new specialised taps, the regression model used to analyse this engineering intervention showed a 72% decrease in the incidence of *P. aeruginosa* acquisition (Figure 16B).

Figure 16A. Rate of *P. aeruginosa* clinical isolates per 100,000 bed days in the entire critical care.



Key: The dotted lines represent the infection prevention and control interventions. The blue lines represent the mean values predicted by the Poisson regression model.

Figure 16B. Rate of Pseudomonas aeruginosa clinical isolates per 100,000 bed days in the critical care unit A.

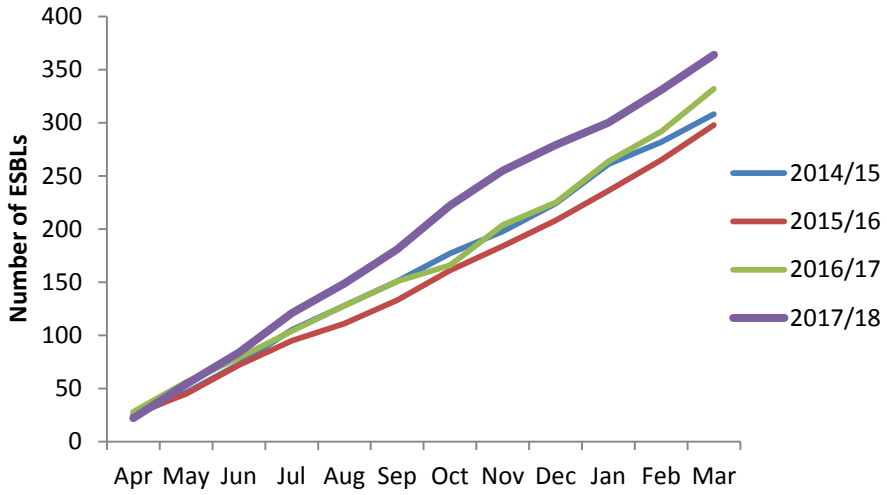


Key: The dotted line represents the infection prevention and control intervention. The blue lines represent the mean values predicted by the Poisson regression model.

3.12 Extended spectrum beta lactamase (ESBL) producers

Bacteria that produce enzymes called extended-spectrum beta-lactamases (ESBLs) are resistant to many penicillin and cephalosporin antibiotics and often to other types of antibiotic. The two main bacteria that produce ESBLs are *E. coli* and *Klebsiella* species. The ESBLs that *E. coli* most often produce are called CTX-M enzymes. *E. coli* with ESBLs may cause urinary tract infections that can sometimes progress to more serious infections such as septicaemia. Resistance can make these infections more difficult to treat. Figure 17 shows the number of patients found to be colonised or infected with ESBL-producing organisms. The vast majority of these patients come into hospital from the community; it is unknown where or how these organisms are arising. Further efforts are needed to prevent transmission with colonised cases requiring isolation if presenting with diarrhoea and strict attention to hand hygiene.

Figure 17. Cumulative number of new ESBLs identified from 2014 to 2017.



4. Outbreaks and learning from incidents

The infection prevention and control team have a comprehensive surveillance programme that allows early detection of emerging incidents. The Trust investigates incidents to extract learning points in order to continually improve the quality of our services.

4.1 Norovirus

Norovirus is a self-limiting diarrhoea and vomiting bug that usually lasts 48 – 72 hours. During 2017/18, seven outbreaks of norovirus were reported by the Trust, compared to nine outbreaks the year previously. In addition, three outbreaks of diarrhoea and vomiting were reported in 2017/18, however the causative agent of these outbreaks was not identified. In recent years, outbreaks of norovirus have been occurring towards the end of spring. The Trust needs to remain aware of patients presenting with symptoms typical of norovirus, including diarrhoea and vomiting.

4.2 Seasonal Influenza

Moderate to high levels of influenza activity were seen in the UK of 2017/18, with influenza B and influenza A (H3) co-circulating. The public health impact was predominantly seen in older adults – with many care home outbreaks being recorded. Peak admission rates to hospitals and critical care units were the highest seen for the last 6 seasons, according to laboratory-confirmed case data. Levels of excess all-cause mortality were elevated, particularly in the elderly, as they had been in the 2016 to 2017 season, but were lower than observed in 2014 to 2015 in England and Wales.

There were 253 laboratory confirmed cases of influenza A and 413 laboratory cases of influenza B between 1 December 2017 and end of March 2018 at the Trust. This was significantly more than previous years, where the Trust had 51 cases in 2016/17, 71 cases in 2015/16 and 155 cases in 2014/15. Influenza vaccine uptake in 2017/18 in England was higher than the 2016/17 in healthcare workers, primarily due to the national CQUIN on staff health and wellbeing. One part of this CQUIN focused healthcare providers achieving a 75% uptake of the Influenza vaccination in front line staff. The Trust achieved greater than 75% vaccination in front line staff.

4.3 Infection prevention and control incidents recorded on Datix

Every incident (clinical/ non-clinical) or near miss at the Trust should be reported to the Risk Management Team via the online electronic reporting system Datix. Hospitals use Datix to improve safety for patients, healthcare workers, visitors and contractors. During 2017/18, the Infection Prevention and Control Team have continued to report incidents through Datix, reporting incidents such as: Serious Incidents Requiring Investigation, Post Infection Reviews and Periods of Increased Incidences of Infections for example. This enables more transparency to infection

prevention and control incidents and enables feedback to patients and staff if any lapses in care are identified, via Duty of Candour. In addition, staff can report any other infection prevention and control incidents, enabling the Infection Prevention and Control Team to identify any areas for improvement. During 2017/18, 329 infection prevention and control incidents were reported through Datix, which consisted off: 47% incidents relating to acquisitions of infections, 22% inadequate handover of the infection status of the patient by a clinical area, 15% issues with patients not being isolated appropriately, 11% issues with the cleanliness of the clinical area, 3% ward or bay or bed closures, 1% with an issue related to the patients peripheral venous cannulae/line, 1% sharps disposal issue, other issues included: inappropriate personal protective equipment usage and inappropriate hand washing technique. All these incidents are formally worked through in the Datix incident reporting system and are fed back quarterly to the Infection Prevention and Control Group.

4.4 Serious Incidents (SI)

The Trust has a Serious Incidents (SI) Policy with serious incidents being reported and managed in line with this policy. Outbreaks/Incidents are managed by Post Infection Reviews held within seven working days wherever practicable and chaired by the Lead Infection Control Doctor or Associate Director of Infection Prevention and Control, supported by key healthcare professionals. All SIs are reported to the coordinating Clinical Commissioning Group with a thirty day report being compiled if required.

Frequent meetings are held to manage and monitor the outbreak/incident, to discuss individual cases and arrange appropriate infection prevention interventions to reduce the risk of spread to other patients/areas, whilst maintaining the operational function of the hospital (Table 1). Different outbreaks/incidents demand different responses but are managed with precision and collaborative working between the multi-disciplinary teams across the Trust.

Table 1. 2017/18 Serious incidents and outbreaks

Date Reported to Risk	STEIS No.	Description of Incident	Investigation Level	Outcome
Quarter 1 2017/18				
18/04/2017	2017/10131	*C. difficile* outbreak	Post Infection review meeting held	No further cases on wards after Infection Control interventions
18/04/2017	2017/10137	MRSA outbreak	Post Infection review meeting held	No further cases on wards after Infection Control interventions
18/04/2017	2017/10245	*C. difficile* death	Post Infection review meeting held	No lapses in care identified
19/04/2017	2017/10449	*C. difficile* outbreak	Post Infection review meeting held	No further cases on wards after Infection Control interventions
26/05/2017	2017/11492	*C. difficile* death	Post Infection review meeting held	No lapses in care identified
05/06/2017	2017/13828	VRE outbreak	Post Infection review meeting held	No further cases on wards after Infection Control interventions
12/06/2017	2017/14870	MDR *A. baumannii* outbreak	Post Infection Review meeting held	No further cases on ward after Infection Control interventions
19/06/2017	2017/15393	*C. difficile* death	Post Infection review meeting held	No lapses in care identified
Quarter 2 2017/18				
12/07/2017	2017/17789	TB Case	TB incident meeting held	Incident meeting held appropriate staff and patient letters written
24/07/2017	2017/18658	MDR *A. baumannii* outbreak	Post Infection Review meeting held	No further cases on ward after Infection Control interventions
28/07/2017	2017/19326	*C. difficile* outbreak	Post Infection review meeting held	No further cases on wards after Infection Control interventions
04/08/2017	2017/21224	*P. aeruginosa* outbreak	Post Infection review meeting held	No further cases on wards after Infection Control interventions
12/09/2017	2017/23379	CPE outbreak	Post Infection review meeting held	No further cases on wards after Infection Control interventions
21/09/2017	2017/23380	*C. difficile* outbreak	Post Infection review meeting held	No further cases on wards after Infection Control interventions
26/09/2017	2017/23757	MDR *A. baumannii* outbreak	Post Infection Review meeting held	No further cases on ward after Infection Control interventions
Quarter 3 2017/18				
24/08/2017	2017/24347	*C. difficile* outbreak	Post Infection review meeting held	No further cases on wards after Infection Control interventions
03/11/2017	2017/27515	*C. difficile* outbreak	Post Infection review meeting held	No further cases on wards after Infection Control interventions
28/10/2017	2017/27632	*C. difficile* death	Post Infection review meeting held	No lapses in care identified
02/11/2017	2017/28425	*C. difficile* outbreak	Post Infection review meeting held	No further cases on wards after Infection Control interventions
04/11/2017	2017/31588	MRSA outbreak	Post Infection review meeting held	No further cases on wards after Infection Control interventions
23/12/2017	2018/66	*C. difficile* outbreak	Post Infection review meeting held	No further cases on wards after Infection Control interventions
Quarter 4 2017/18				
24/12/2017	2018/217	*C. difficile* outbreak	Post Infection review meeting held	No further cases on wards after Infection Control interventions
31/12/2017	2018/220	MRSA outbreak	Post Infection review meeting held	No further cases on wards after Infection Control interventions
18/01/2018	2018/1584	Norovirus outbreak	Daily outbreak meetings	No lapses in care identified
18/01/2018	2018/1745	Norovirus outbreak	Daily outbreak meetings	No lapses in care identified
16/01/2018	2018/1799	MDR *A. baumannii* outbreak	Post Infection Review meeting held	No further cases on ward after Infection Control interventions
23/01/2018	2018/2333	*C. difficile* outbreak	Post Infection review meeting held	Infection Control interventions put in place
26/01/2018	2018/2725	Norovirus outbreak	Daily outbreak meetings	No lapses in care identified
26/01/2018	2018/2727	Diarrhoea and vomiting outbreak	Daily outbreak meetings	No lapses in care identified
02/02/2018	2018/3127	Diarrhoea and vomiting outbreak	Daily outbreak meetings	No lapses in care identified
05/02/2018	2018/3210	Diarrhoea and vomiting outbreak	Daily outbreak meetings	No lapses in care identified
05/02/2018	2018/3215	Influenza A outbreak	Daily outbreak meetings	No lapses in care identified
02/02/2018	2018/3286	*C. difficile* outbreak	Post Infection review meeting held	Infection Control interventions put in place
05/02/2018	2018/3288	Norovirus outbreak	Daily outbreak meetings	No lapses in care identified
12/02/2018	2018/3950	Norovirus outbreak	Daily outbreak meetings	No lapses in care identified
13/02/2018	2018/4000	Norovirus outbreak	Daily outbreak meetings	No lapses in care identified
06/03/2018	2018/6032	Norovirus outbreak	Daily outbreak meetings	No lapses in care identified
20/03/2018	2018/7304	Influenza B outbreak	Daily outbreak meetings	No lapses in care identified
07/02/2018 – 15/03/2018	2018/7921	MRSA outbreak	Post Infection review meeting held	No further cases on wards after Infection Control interventions

4.5 Patient Advice and Liaison Services (PALS) Contacts

The Trust is committed to working in partnership with patients and staff to help improve patient experience. Patient Relations is part of this commitment to provide high standards of care and to support patients, carers and the public who use Trust services. During 2017/18, there were eleven complaints received by the Trust in relation to infection prevention and control issues. The principal issues raised related to patients acquiring infection whilst in hospital, as well as around communication of infections to patients and their families. These issues are tackled in the everyday work of the Infection Prevention and Control Team, for example the team works with the wards providing education on infections and communicating these to the patients. Acquisitions of infections and periods of increased incidences of infections are reported through Datix incidents and reviewed through a Post Infection Review.

5.0 Surgical Site Infections

Surgical site infection is a type of healthcare-associated infection in which a wound infection occurs after an invasive (surgical) procedure. Surgical site infections have been shown to compose up to 20% of all of healthcare-associated infections. Around 5% of patients undergoing a surgical procedure develop a surgical site infection.

A surgical site infection may range from a spontaneously limited wound discharge within 7–10 days of an operation to a more serious postoperative complication, such as a sternal infection after open heart surgery. Most surgical site infections are caused by contamination of an incision with microorganisms from the patient's own body during surgery. Infection caused by microorganisms from an outside source following surgery is less common. The majority of surgical site infections are preventable. Measures can be taken in the pre-, intra- and postoperative phases of care to reduce risk of infection.

Surgical site infections can have a significant effect on quality of life for the patient. They can be associated with increased morbidity and extended hospital stay. In addition, surgical site infections result in increased financial costs to healthcare providers. Advances in surgery and anaesthesia have resulted in patients who are at greater risk of surgical site infections being considered for surgery. In addition, increased numbers of infections are now being seen in the community as patients are allowed home earlier following day case and fast-track surgery.

Mandatory surveillance of surgical site infections started in 2004, specifying each Trust should conduct surveillance for at least 1 orthopaedic surgical category for 1 period in a financial year. The categories include: hip replacements, knee replacements, repair of neck of femur and reduction of long bone fracture. The Trust has a Trauma audit team which undertakes the mandatory surveillance, reporting on repair of neck of femur and hip replacement surgical site infections. In 2014/15 the Trust reported 0% surgical site infections in hip replacements and 0.7% surgical site infections in repair of neck of femur fractures. This increased in 2015/16 with rates of surgical sites infections of 1.5% and 2.6% in repair of neck of femur fractures and hip replacements respectively. During 2016/17 the Trust reported an increase in hip replacement surgical site infections rates (2.7%); however a decrease in repair of neck of femur fractures was seen with a rate of 0.7%. No mandatory surveillance was reported during 2017/18.

A programme to deliver snapshot surveillance of infections following various types of surgery with the long term aim of making each specialty able to continuously monitor their own infection rates is a priority. One of the targets in the new financial year will be to identify specialities with increased rates of surgical site surveillance; one means of achieving this could be by the development of electronic surveillance systems. Manual snapshot surveillance in areas may need to be undertaken to validate the electronic systems. In addition compliance audits on National Institute for Health and Care Excellence (NICE) guidance for reduction in surgical site

infections needs to be undertaken.

Getting it right first time (GIRFT) is a national clinician led programme designed to improve the quality of medical care within the NHS by reducing unwarranted variations. As part of this programme surgical site infection has been included. The audit has been established to identify the surgical site infection rates of specific procedures within key specialities, assess local practice in the prevention of surgical site infection for the specified procedures. This is something the Trust in conjunction with the Infection Prevention and Control team have started working on in 2017/18 and will aim to move this forward in the new financial year. GIRFT has been implemented into cardiac and neuro surgery.

Saving Lives 'high-impact interventions' are evidence based tools that allow staff to monitor compliance with clinical guidance and provide feedback so that compliance can improve consistently. High impact interventions provide the means to ensure that staff undertake clinical procedures correctly every time they are needed. When these HIIs are performed appropriately they can help reduce the risk of infection. During 2017/18, these high impact interventions were updated in line with new national and international guidance. One of the high impact interventions focuses on prevention of surgical site infection, with the aim to reduce surgical site infections based on the World Health Organisation (WHO) and NICE guidelines. These new tools were implemented towards the end of 2017/18 and are being rolled out across the Trust in the new financial year.

In 2018/19, the development on an electronic means of monitoring surgical site surveillance with the GIRFT and new HIIs should enable the Infection Prevention and Control Team to start monitoring surgical site infections more readily.

6.0 Audit

The Infection Prevention and Control Team have a comprehensive audit programme for assurance purposes that has been successfully delivered during 2017/18.

Cleaning hands is one of the most important actions anyone can carry out to prevent infection. Hand hygiene audits are undertaken by the clinical area and are reported every month at the Infection Prevention and Control Group. Audits are undertaken weekly by the clinical area if hand hygiene compliance is above 90%, if compliance drops below 90% then daily audits are undertaken. Regular hand hygiene audits are performed by the Infection Prevention and Control Team to further validate the results.

The saving lives (high impact interventions) audits are regularly undertaken by clinical areas every month and results are reported monthly at the Infection Prevention and Control Group. During 2017/18 these high impact interventions were updated in line with new national and international guidance. The high impact interventions include guidance and tools for: central venous catheter care, peripheral venous catheter care, antimicrobial stewardship, prevention of surgical site infection, care for ventilated patients, urinary catheter care and preventing chronic wound infections. These new tools were implemented towards the end of 2017/18 and have been rolled out across the Trust in the new financial year. The new tools will enable more robust data to be collected and match current guidelines for the above outlined clinical procedures.

A regular infection control audit of clinical areas is carried out by an Infection Prevention Nurse. The audit consists of: observation of practice, review of care and management of patients with infections, observations on correct use of personal protective equipment, observations of environmental cleanliness and review of patient indwelling devices. The results of the audit are feedback to the clinical area and Matron.

A sharps audit was completed in March 2018 by the Trusts Sharps provider. The survey endeavoured to: raise sharps awareness, assess practice, discuss problems and advise on compliance with current legislation. The overall compliance for sharps practice was 98.4%.

A rolling programme of monthly independent environmental audits, led by the Estates Team, are in place to monitor the compliance of clinical and non-clinical areas against the national cleaning standards framework. Audit results are made available to areas with robust action plans monitored as part of a quarterly summary report to the Infection Prevention and Control Group.

The Infection Prevention and Control Team are active members in the Patient Led Assessments of the Care Environment (PLACE) inspections. PLACE inspections assess the quality of the patient environment. The assessments see local people go into hospitals as part of teams to assess how the environment supports the patient's privacy and dignity, food, cleanliness and general building maintenance. During

2017/18, the Infection Prevention and Control Team took part in these assessment audits, driving improvements in the care environment.

Each year an annual audit of mattresses is carried out within the Trust. The main aim of the foam mattress audit is to identify equipment that is no longer providing pressure reduction. Although Infection control issues should be identified at regular mattress inspections throughout the year, the audit also provides the opportunity for any unresolved problems to be actioned. In conjunction with Tissue Viability, the Infection Prevention and Control Team actively take part in the annual audit. The 2017/18 mattress audit results showed the greatest number of acceptable mattresses with less being condemned when comparing results from the last 10 years. In general, a change in culture towards mattresses has been seen across the trust with engagement and interest from staff; however the audits in 2017/18 revealed there were more damaged covers and foams, suggesting the mattresses were not being inspected internally on a regular basis. Tissue viability and the Infection Prevention and Control will work with the ward teams to address some of these issues.

Both patients and NHS staff have high expectations for safe, good quality care, delivered in welcoming and clean environments. The Productive Ward programme helps the NHS to deliver this ambition. The Productive Ward (sometimes known as the releasing time to care) programme supports staff to identify time wasting activities, duplication and inefficiencies that takes time away from caring for patients. The programme identifies simple changes like protecting meal times, protecting drug rounds and preventing interruptions at staff handovers; these improvements can reduce errors and improve safety. In implementing the Productive Ward programme, staff have freed up on average 20-30% of additional time, which can be spent with patients. This has a huge impact on improving the quality of care for patients in a visible and tangible way. In turn this programme has sparked the development of “The 15 Steps Challenge”, a toolkit to help look at hospital care through the eyes of patients and relatives, helping to hear what good looks like. During 2017/18, the Infection Prevention and Control Team, in conjunction with CDU and governors have implemented the 15 steps challenge into CDU. CDU is our busiest area with constant constraints on the Trust due to bed pressures and activity. There are numerous reports in the literature detailing how front door services are constantly being exposed to various nosocomial infections, such as MRSA and *C. difficile*, seeding the hospital environment. Undertaking the 15 step challenge will help free up time for a busy department such as CDU and improve infection control practices in that area as a result.

7.0 Antimicrobial Stewardship

Antimicrobial resistance (AMR) has risen alarmingly over the last 20 years, and inappropriate prescribing and overuse of antimicrobials is a key driver for this. Between 2010 and 2013, total antibiotic prescribing in England increased by 6%, which was one of the largest increases in recent years. As a result, a national CQUIN aimed at reducing antimicrobial consumption was implemented. The main aim was to reduce antimicrobial usage in secondary care back to levels before 2013. Following completion of the antimicrobial resistance (AMR) CQUIN in 2016/17, the Trust was instructed to complete the national 'Serious infection CQUIN (2017/19). This two year CQUIN is worth approximately £1 million and is a combination of the AMR and Sepsis CQUIN. Martin Biggs – Principal Antimicrobial Pharmacist was assigned operational lead, with Cherry West as executive lead.

The Trust's performance around sepsis was below local and national targets. The antimicrobial stewardship group (ASSG) was changed to include sepsis as part of its terms of reference. Dr Mav Manji stepped down as sepsis lead at the end of March 2017. Dr Miruna David (Consultant Microbiologist) was successfully assigned as clinical lead for stewardship and sepsis.

The group's main focus for the year has been on improvement in sepsis screening and treatment.

The serious infection CQUIN was divided into for main parts (A, B, C and D):

Part A: Timely identification of sepsis in emergency departments (ED) and acute inpatient settings

Patients who meet the criteria for screening for sepsis as per the NICE guideline for sepsis must be reviewed promptly and evidence for screening made. The sepsis audit methodology was agreed with clinicians, risk department and service improvement.

Quarterly target milestones: 0-49% = No payment, 50-89% = 40% of payment, ≥ 90% = 100% of payment.

Table 2. Queen Elizabeth Hospital Performance for Part A of the serious infection CQUIN.

Percentage of patients screened	Inpatients	Emergency department	Trust Total	Achieved Target
Quarter 1	36%	100%	**59%**	**Partial**
Quarter 2	74%	99%	**82%**	**Partial**
Quarter 3	97%	100%	**98.5%**	**Yes**
Quarter 4	100%	100%	**100%**	**Yes**

Improvement in Trust performance seen as a result of sepsis education and training programme to clinical staff. Work overseen by sepsis education subgroup reporting into ASSG.

National Performance (quarter 3)

- Average England performance in ED for screening = 91.7%
- Average England performance in Inpatients for screening = 84.1%

Part B: Timely treatment of sepsis in emergency departments (ED) and acute inpatient settings.

Patients diagnosed as having red flag sepsis from part A must have treatment given promptly. National target for antibiotics to be administered within 60mins of sepsis diagnosis as documented in NICE guidelines. Quarterly target milestones: 0-49% = No payment, 50-89% = 40% of payment, ≥ 90% = 100% of payment.

Table 3. Queen Elizabeth Hospital Performance for Part B of the serious infection CQUIN.

Percentage of patients diagnosed with sepsis given antibiotics within 60mins	Inpatients	Emergency department	Trust Total	Achieved Target
Quarter 1	76%	74%	**74%**	**Partial**
Quarter 2	78%	62%	**66%**	**Partial**
Quarter 3	91%	72%	**82%**	**Partial**
Quarter 4	72%	66%	**69%**	**Partial**

National Performance (quarter 3)

- Average England performance in ED for administering abx in 1 hour = 76.2%
- Average England performance in Inpatients for administering abx in 1 hour = 79.3%

Part C: Antibiotic review.

Patients diagnosed with sepsis must have their antibiotic treatment reviewed at 24-72hrs. This is to ensure that microbiology results from blood cultures are reviewed and patients are not left on broad spectrum antibiotics unnecessarily. Evidence of

review documented in the medical notes / PICS system must be seen. Milestone targets: Q1 ≥ 25%, Q2 ≥ 50%, Q3 ≥ 75%, Q4 ≥ 90%.

Table 4. Queen Elizabeth Hospital Performance for Part C of the serious infection CQUIN.

Evidence of review with 24-72 hours	Q1	Q2	Q3	Q4
UHB target	≥ 25%	≥ 50%	≥ 75%	≥ 100%
UHB results	**80%**	**100%**	**100%**	**100%**

Part D: Reduction in antibiotic consumption per 1000 admissions.
High antibiotic usage associated with increased resistance rates. This results in difficult to treat infections and infection control challenges. End of year target reduction is sub-divided into three sections (Table 5).

Table 5. End of year reduction in antibiotic consumption per 1000 admissions targets.

Target	End of year result
2% reduction target in total Trust antibiotic consumption	**+3.7% Above target**
2% reduction target in piperacillin / tazobactam consumption	**On target – 3.5% reduction**
2% Reduction in carbapenem consumption	**On target – 12.8% reduction**

- Baseline target based on Trust usage between January and December 2016.
- Antibiotic usage was measured as Defined daily dosing (DDD). Where one DDD = 1 days' treatment of antibiotics based on an adult dose.

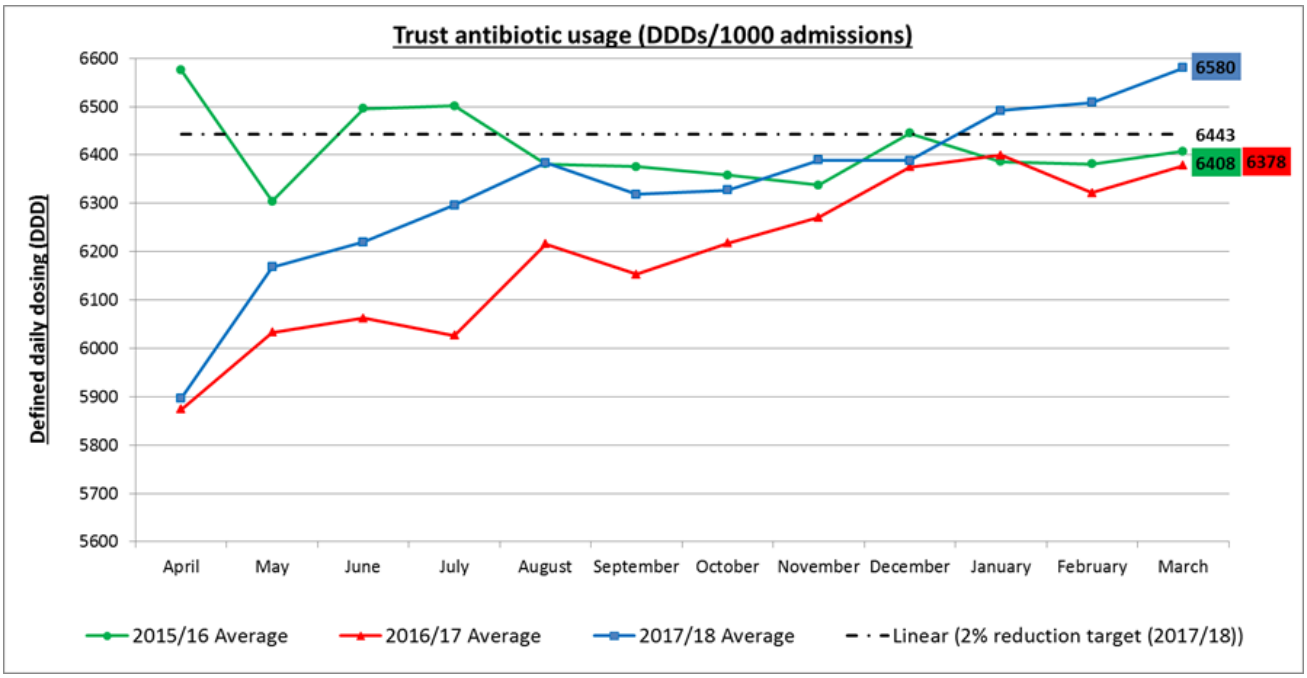
Queen Elizabeth Hospital Performance (Part D)

Trust total usage was above target because of the increase in antibiotic usage related to influenza season over winter. Prior to January 2018 the Trust was on track to achieve its 2% reduction target (Figure 18). After this time, January – March antibiotic usage greatly increased:

Number of flu patients over previous flu seasons:

- 2015/16 = 71 cases
- 2016/17 = 51 cases
- 2017/18 = 666 cases

Figure 18. Trust antibiotic usage (DDDs/1000 admissions).



Increases in usages seen related to antibiotics used for respiratory tract infections.

Performance achieved for reduction in piperacillin/tazobactam and carbapenem targets due to targeted antimicrobial stewardship (AMS) ward rounds. Areas of high usage targeted and review of broad spectrum agents undertaken over past year. Wards reviewed by microbiology, antimicrobial pharmacist and ward pharmacy teams include: Clinical decision unit (CDU), Critical care units, renal wards, vascular, Haematology.

Serious infection CQUIN 2018/19

The following changes have been made to the serious infection CQUIN for 2018/19.

- (Part A) Screening for sepsis must now be undertaken using national early warning score – 2 (NEWS2). The Trust currently uses the standard early warning score (SEWS). Payment for the CQUIN in Q3 and Q4 will be made only if the Trust has adopted this screening method.
- (Part C) Review of antibiotics
    - Must now be shown to be undertaken by senior clinician
    - Outcome of review must be documented in line with start smart then focus
    - Reason for continuing intravenous antibiotics beyond 72 hours must be clearly explained and justified
- (Part D) Reduction in antibiotic usage:
    - Reduction in piperacillin/tazobactam target removed and new target increasing proportion of narrow spectrum antibiotics used to reduce amount of broad spectrum antibiotics usage (e.g. co-amoxiclav, quinolones).

8.0 Training and Education

In 2017/18, the Infection Prevention and Control Team have continued to deliver a wide variety of education, both within the Trust and externally. It is mandatory for every member of staff to receive an annual infection prevention and control update.

In 2017/18, 8,383 staff were trained, resulting in a compliance rate of 91%. This is a slight decrease compared with previous years where the Trust achieved compliance rates of 92.71% (2016/17), 94.2% (2015/16) and 93% (2014/15). The high training figures have been achieved through Trust Induction and both Trust, local mandatory training sessions and an eLearning package. These sessions are constantly reviewed and updated to ensure they remain relevant with up to date content. During 2017/18, the Infection Prevention and Control Team have worked in collaboration with Learning and Development to ensure appropriate role specific training, in addition to rolling out an eLearning package.

The Infection Prevention and Control Team have delivered informal and formal sessions on a variety of subjects and continue to support registered practitioner and doctor induction programmes. The team have tailored infection prevention and control presentations for international fellows and the new consultants' induction training. On top of this, the Infection Prevention and Control Team have delivered infection control training sessions/updates to numerous specialities and staff groups throughout the Trust, for example teaching and education sessions to: facilities staff, preventing harm meetings, divisional quality meetings, divisional governance meetings, care quality management group, antimicrobial stewardship and sepsis group, doctors grand round, divisional monthly update meetings, volunteer sessions, matron meetings, patient/ carers sessions and the executive team. Nursing assistants receive two training sessions, one on induction and one on the nursing assistant development programme. Both of these are simulated sessions providing training on/ competence assessment on hand hygiene, MSRA screening, principles of cleaning, microbiological sampling, PPE and invasive device care. The Infection prevention and Control Team also deliver training to new preceptors and student nurses. One of the key strategic aims for the next financial year is engagement with medical staff and to align education and training nationally.

During 2016/17, there has been a big drive towards recognition and management of sepsis due to the national CQUIN. As a result, an educational package on sepsis was been rolled out across the Trust, being delivered to all clinical staff (tier 1) and all newly qualified registered nurses on their preceptorship course. In 2017/18, this has now been rolled out to include all medical staff (tier 2). In addition, sepsis education is given at various forums such as: mandatory or divisional training, during basic/advanced life support training, simulation and during recognising an acutely sick patient training.

The Infection Prevention and Control Team have also given education sessions externally, teaching on the University of Birmingham's undergraduate nursing programme. The Infection Prevention and Control Team have delivered lectures on infection prevention and control, communicable diseases such as *Mycobacterium*

tuberculosis (TB) and leadership roles within nursing. The Infection Prevention and Control Team have also given lectures on the undergraduate and postgraduate Medical Microbiology courses delivered by the University of Birmingham on various nosocomial pathogens. The team have also delivered lectures at International conferences (Figure 19) both within the UK and in Europe promoting best practice within infection prevention and control.

Figure 19. Lectures given by members of the Infection Prevention and Control team at international conferences.

Education and training will remain a key priority in the new financial year, promoting best practice within infection prevention and control.

9.0 Facilities

Collaborative work between Infection Control and Facilities continues to improve the monitoring and reporting on cleaning standards and maintenance and monitoring of the site. UV decontamination (following cleaning) is already being utilised instead of HPV in some instances. This could lead to efficiencies in bed utilisation and will continue to be introduced through the remainder of 2018-19. The Patient-Led Assessment of the Care Environment (PLACE) audit was completed in June 2018, with patient and staff assessors giving an overall score of 99.74% for the hospital environment. This is a slight increase from the 2017 PLACE score of 99.3%.

10. Occupational health

As part of the Health and Social Care Act 2015, providers are required to have a system in place to manage the occupational health needs and obligations of staff in relation to infection. Briefly, during 2017/18, the Occupational Health team has dealt with several issues including skin integrity of staff and respiratory related incidents around Tuberculosis, measles and chicken pox, been actively involved in achieving the national CQUIN on staff health and wellbeing specifically focusing on healthcare providers achieving a 75% uptake of the Influenza vaccination in front line staff, as well as dealt with inoculation injuries and immunisation/ blood tests for staff.

All new starters attending Occupational Health for their first appointment have their skin assessed and are given relevant advice. During 2017/18, 177 individuals have either self-referred or been referred to Occupational Health for advice about their hands, 21 were referred to a specialist. The rise in numbers of individuals seen is most likely due to the introduction of manager skin assessments as part of the Health and Safety checklist. Several cases of occupational dermatitis have been referred to the Health and Safety Executive; their inspectors have visited the Trust and have asked for information about glove choice and the training of staff in hand care. In relation to dermatitis problems, both the Occupational Health Team and Infection Prevention and Control Team are working on implementing hand care advice to the hand hygiene training. In addition, Occupational Health will be reporting on acceptability and tolerability of hand hygiene products in relation to contact dermatitis.

During 2017/18, the Occupational Health team have had a number of respiratory related queries. The majority of cases seen by the Occupational Health team are due to overseas honorary contract doctors coming from high Tuberculosis endemic areas who require testing and treatment for latent Tuberculosis. There continues to be an international shortage of BCG vaccine, therefore previously unvaccinated staff members are not able to receive this vaccine. They are given advice about using appropriate PPE from the ward manager and infection control.

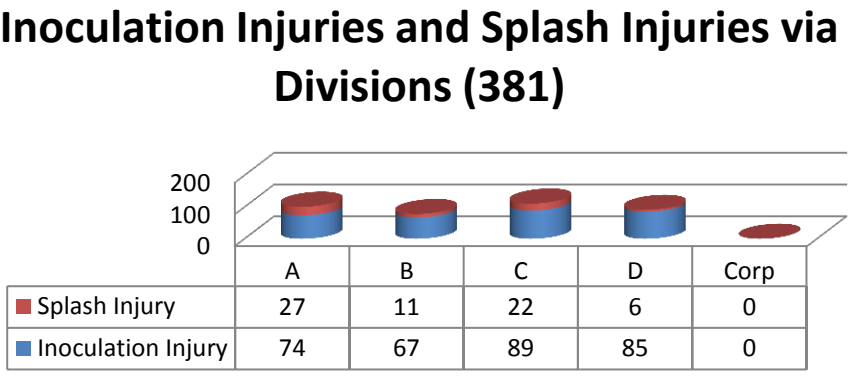
All staff exposures to infections such as Tuberculosis, measles and chicken pox are followed up and given appropriate advice. Hepatitis B vaccine has been restricted since August 2017; therefore the vaccination program has been limited to high risk areas and exposure prone procedures. Tuberculosis is among the top 10 cases of death worldwide, with the UK seeing up to 6,000 cases per year. In the Midlands, there is a high incidence of Tuberculosis so the Trust sees cases throughout the year. The Infection Prevention and Control Team have formerly established monthly Tuberculosis exposure incident (to both staff and patients) meetings. These meetings discuss all cases ensuring all exposure incidents are dealt with appropriately in a timely fashion. Membership consists of the Infection Prevention

and Control Team, the Occupational Health Department, Medical Microbiologist and the Tuberculosis lead for the Trust.

During 2017/18, the Occupational Health Team led on achieving the national CQUIN on staff health and wellbeing. Part of the CQUIN requires healthcare providers to achieve a 70% uptake of the Influenza vaccination in front line staff. To achieve the CQUIN, 4883 staff members were vaccinated, of these 3877 were frontline, which meant 71% of frontline staff were vaccinated against influenza. The Influenza programme was led by the Interim Executive Chief Nurse and DIPC, Mrs Michele Owen, and was delivered by Occupational Health supported by Peer Vaccinators. The Infection Prevention and Control Team supported the Occupational Health Team during the Influenza vaccination campaign.

In 2017/18, the number of inoculation and splash injuries reported was 381 (Figure 20). During 2016/17, there was a discrepancy between the number of reported inoculation injuries on Datix and those reported to Occupational Health. In 2017/18, reporting of incidents has improved and there is less discrepancy between the number reported on Datix and those reported to Occupational Health. The Occupational Health team now obtain consent from the individual to notify Health and Safety about the incident so that they can ensure a Datix incident is completed. All ancillary staff are counted in the Division where the injury occurred. High risk injuries: consent is sought from the individual to report to Health and Safety and onto RIDDOR.

Figure 20. Inoculation and splash injuries by Division 2017/18.



During 2017/18, the Occupational Health team undertook 8141 Occupational Health immunisations/blood tests (excluding flu), however there is a 18% did not attend rate of all appointments.

11.0 Research and development

Research and Development is a key component of an infection prevention and control programme, particularly in a high profile teaching Trust such as UHB. Research can be used to develop science and evidence based practice to further drive infection prevention and control improvement. During 2017/18, the Infection Prevention and Control Team has been actively involved in numerous research projects, highlighted by 16 peer reviewed journal articles being published and several team members giving presentations at international/national conferences and study days on its work throughout the year. At the annual international Infection Prevention Society conference in Manchester, the team gave one verbal presentation and presented 2 posters. The team also has members which are part of national infection control societies such as the Infection Prevention Society (IPS) and Healthcare Infection Society (HIS). The Lead Nurse is a director and trustee of IPS, one of the senior Infection Prevention and Control Nurses is a member of the IPS Educational Professional Development Committee, and the Associate DIPC is a councillor and chair of the education committee for HIS. Roles within these societies have enabled team members to be part of various national groups including working parties and scientific development committees to drive practice change both nationally and internationally.

The Infection Prevention and Control Team work closely with the Hospital Infection Research Laboratory (HIRL), with the Associate DIPC being the Director of HIRL. HIRL was established in 1964 at City Hospital and relocated to the Trust in 2008; providing specialised infection control advice international, nationally and locally. This financial year, HIRL have provided the following support to the Trust: validation of theatre ventilation on the upgraded theatres, research work on *P. aeruginosa* in relation to water quality within critical care, mop decontamination reducing the risks of infection, testing alternative cleaning methods with Facilities, advising the endoscopy department and endoscopy decontamination. The HIRL laboratory manager sits on the Decontamination and Water Safety Group in an advisory capacity, working closely with the decontamination services both within the Trust and externally at BBraun sterilog. HIRL actively participate in research with the Infection Prevention and Control Team as highlighted from the recent publications.

Selected research publications from the year are detailed below:

- Bradley CW, McCoy H, Raybould L, Flavell H, Dempster L, Holden E, Garvey MI. **Reducing *Escherichia coli* bacteraemias associated with**

catheter associated urinary tract infections in the secondary care setting. J Hosp Infect. 2018 98 (3): 236-237.

- Garvey MI, Bradley CW, Wilkinson MAC, Holden E. **Can a toxin gene NAAT be used to predict toxin EIA and the severity of *Clostridium difficile* infection?** Antimicrob Resist Infect Control. 2017 19 (6): 127.
- Garvey MI, Bradley CW, Holden E. **Waterborne *Pseudomonas aeruginosa* transmission in a hematology unit?** Am J Infect Control. 2017 46 (4): 383-386.
- Garvey MI, Bradley CW, Biggs MJ, Holden E, Gill MJ. **Selection of carbapenem resistant *Pseudomonas aeruginosa* in a haematology unit?** J Hosp Infect. 2018 98 (3): 238-240. Impact factor 3.126.
- Garvey MI, Bradley CW, Holden E. **Blossoming vancomycin-resistant enterococci infections.** 2017 97 (4): 421-423.
- Garvey MI, Bradley CW, Casey AL, Clewer V, Holden E. **Using a Van-A polymerase chain reaction to rapidly determine the environmental contamination following a VRE outbreak.** J Hosp Infect. 2017 97(4): 419-421.
- Garvey MI, Philips N, Bradley CW, Holden E. **Decontamination of an extracorporeal membrane oxygenator contaminated with *Mycobacterium chimaera*.** Infect Control Hosp Epidemiol. 2017 38(10): 1244-1246.
- Garvey MI, Bradley CW, Holden E, Weinbren M. **Where to do water testing for *Pseudomonas aeruginosa* in a healthcare setting?** J Hosp Infect. 2017 97 (2): 192-195.
- Garvey MI, Bradley CW, Wilkinson MA, Bradley CR, Holden E. **Engineering waterborne *Pseudomonas aeruginosa* out of a critical care unit.** Int J Hyg and Env Health, 2017 220(6): 1014-1019.
- Garvey MI, Bradley CW, Holden KL, Oppenheim BA. **Outbreak of clonal complex 22 Panton-Valentine leucocidin positive meticillin resistant *Staphylococcus aureus*.** J Infect Prev. 2017 18(5): 224-230.
- Garvey MI, Bradley CW, Walker J. **A year in the life of a contaminated heater cooler unit with *Mycobacterium chimaera*?** Infect Control Hosp Epidemiol. 2017 38(6): 705-711.
- Bradley CW, Wilkinson MA, Garvey MI. **The Effect of Universal Decolonization With Screening in Critical Care to Reduce MRSA Across an Entire Hospital.** Infect Control Hosp Epidemiol. 2017 38(4): 430-435.
- Garvey MI, Bradley CW, Casey AL. **Using a carbapenemase-producing organism polymerase chain reaction to rapidly determine the efficacy of terminal room disinfection.** J Hosp Infect. 2017 95(3): 329-330.
- Bradley CW, Holden E, Garvey MI. **Hand hygiene compliance targets: what are we actually targeting?** J Hosp Infect. 2017 95(4): 329-360.
- Garvey MI, Bradley CW, Holden KL, Hewins P, Ngui SL, Tedder R, Jumaa P, Smit E. **Use of genome sequencing to identify hepatitis C virus transmission in a renal healthcare setting.** J Hosp Infect. 2017 96 (2): 157-162.
- Walker J, Moore G, Collins S, Parks S, Garvey MI, Lamagni T, Smith S, Dawkin L, Goldenberg S, Kappeler R, Chand M. **Microbiological problems and biofilms associated with *Mycobacteria chimaera* in**

heater cooler units used for cardiopulmonary bypass. J Hosp Infect. 2017 96(3): 209-220.

Other studies are being planned with both external academic partners and internal clinical parties. Research and development within the Infection Prevention and Control Team at the Trust will continue to flourish in the next financial year. Already in the new financial year, the following research articles have been accepted for publication:

- Bradley CW, Holden KL, Pollard C, Smith G, Holden E, Glynn P, Garvey MI. **Unmasking a patient leading to a health care worker *Mycobacterium tuberculosis* transmission.** J Hosp Infect. 2018 *doi.org/10.1016/j.jhin.2018.05.033*.
- Halstead FD, Niebel MO, Quick J, Garvey MI, Cumley N, Smith R, Neal T, Roberts P, Hawkey P, Hardy K, Shabir S, Walker J, Loman L, Oppenheim B. ***Pseudomonas aeruginosa* infection in augmented care: detecting transmission from water using whole genome sequencing in an observational study.** J Hosp Infect. 2018 in press.
- Garvey MI, Holden K, Bradley CW, Wilkinson MAC, Holden E. **Wiping out MRSA: effect of introducing a universal disinfection wipe in a large UK teaching hospital.** Infect Control Hosp Epidemiol. 2018 in press.
- Garvey MI, Wilkinson MAC, Holden K, Martin T, Parkes J, Holden E. **Tap out: reducing waterborne transmission of *Pseudomonas aeruginosa* in an intensive care unit.** J Hosp Infect 2018 in press.

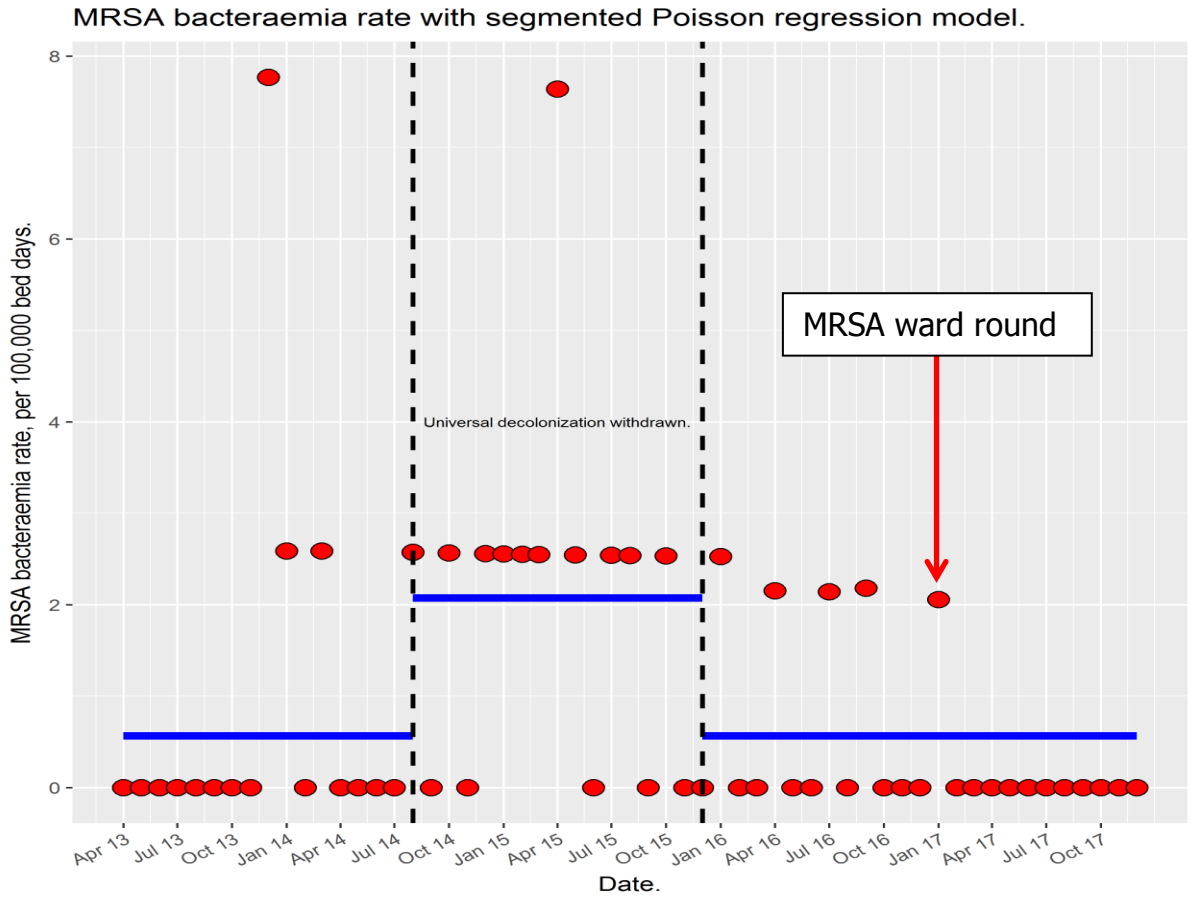
12.0 Infection Prevention and Control Initiatives

Continuing the work from last year, MRSA bacteraemias and acquisitions within the Trust for this financial year have been lower compared to previous years. For this financial year, the Infection Prevention and Control Team has focused primarily on the MRSA acquisition nurse-led ward rounds, cleaning strategies and investigations such as Post Infection Reviews and root cause analysis reviews being fed back throughout the Divisions within the hospital.

The Trust has utilised MRSA screening and clinical isolate data to further clarify MRSA acquisitions within the Trust. This has enabled the team to identify potential transmission links within the Trust, understand the epidemiology of this pathogen and use acquisitions as a predictor for MRSA bacteraemia. MRSA acquisition data has also been used as an indirect quality measure for adherence to infection prevention and control practice. Areas where MRSA acquisitions are seen are reviewed by the Infection Prevention and Control Team, observing practice and formulating action plans if needed. Data is also shared with Divisions and presented at specialty meetings. During this financial year, all MRSA acquisitions are reviewed by the Infection Prevention and Control Team on nurse-led MRSA acquisition ward rounds. Patients who acquire MRSA are at high risk of developing an MRSA bacteraemia; nurse-led ward rounds of these patients have been invaluable for the care and management of these high risk patients. Infection Control Nurses are uniquely placed to lead MRSA ward rounds due to their experience and expertise in the management of the infection. The ward rounds provide an opportunity for a holistic nursing assessment, including review of decolonisation therapy, antimicrobial treatment if the patient requires any, invasive devices and skin integrity of patients. In addition, patients have rapid access to specialist advice from Microbiology Consultants via the ward round team if they become unwell. Improvement in the outcome of patients has been observed since implementation, including an overall reduction in the number of MRSA bacteraemias observed within the Trust (Figure 21).

In addition, other initiatives undertaken this year to tackle MRSA acquisitions and bacteraemias included: updating the MRSA patient information leaflet, providing patients with details of what to do if colonised with MRSA; Schulke the company who manufacturer the decolonisation wash Octenisan came into the Trust and visited all the wards, providing education to the staff on how to use the wash effectively and appropriately.

Figure 21. MRSA bacteraemia rate with segmented Poisson regression model.



Key: Since the introduction of the MRSA nurse led ward rounds, highlighted in the Figure, no MRSA bacteraemias were seen in the proceeding 15 months.

C. difficile infection continues to be a major burden to patients that can also cause increased morbidity and mortality. For this financial year, the number of Trust Apportioned *C. difficile* infection cases decreased. At the Trust we have strengthened the national Post Infection Review process by adding more criteria into the review, allowing more detail about the individual cases to be gathered, specifically around antimicrobial stewardship. The ward pharmacists are now involved in the Post Infection review process, completing the antimicrobial section of these forms. This has enabled robust action plans to be developed if any lapses in care have been identified around antimicrobial stewardship.

During the last financial year, we have continued and improved the nurse-led *C. difficile* ward rounds. Infection Control Nurses are uniquely placed to lead *C. difficile* ward rounds due to their experience and expertise in the management of this infection. Supported by Gastroenterology and Microbiology; ward rounds include patient assessment and treatment review to optimise the management of *C. difficile* infection for patients. The ward rounds provide an opportunity for a holistic nursing assessment including nutrition and hydration, skin integrity, bowel management, and medicines review and optimisation. Patients have rapid access to specialist advice from gastroenterology and microbiology consultants via the ward round team. Improvement in the outcome of patients has been observed since implementation, including an overall reduction in the level of severity, reduced mortality and reduction

in recurrence rates. Since the introduction of the *C. difficile* nurse-led ward rounds, the average length of stay for patients with *C. difficile* has reduced from 33.8 days to 23.5 days. In addition, the number of patient deaths with CDI reported on the death certificate has fallen by 50%. The main aim in the next financial year is to facilitate access to faecal microbiota transplant for patients who have failed treatment. During the last financial year, there was no access to an FMT service locally; however the University has now set up a service licensed with the MHRA.

From the Post Infection Reviews, there were very few lapses in care. Areas of learning included the documentation of patients with loose stool, however this has become less frequent across the Trust due to the implementation of a diarrhoea isolation sticker which is put into patients' notes. During the Post Infection Reviews, we have seen better documentation of patients with diarrhoea as a result of this initiative and timelier isolation of patients with diarrhoea. The main area for concern is around antimicrobial stewardship, with all lapses in care being attributed to inappropriate prescribing of broad spectrum antibiotics including duration of therapy. In the new financial year, there will be a focus on antimicrobial stewardship with nurse-led antimicrobial stewardship ward rounds.

Contamination of hospital surfaces can contribute to the transmission of healthcare-associated infections. The best way of reducing healthcare-associated infections after hand hygiene is environmental control. The Infection Prevention and Control Team are working closely with Facilities, further improving cleaning techniques by looking at new technologies, such as a UV decontamination machine. Research undertaken by the Hospital Infection Research Laboratory has shown these devices to be extremely effective at killing nosocomial alert organisms; as a result the Trust has purchased a machine which will be used in outbreak situations and on high risk wards such as the Burns unit. Other initiatives have included changing of the wipes used within the Trust; the Trust has now moved over to using Clinell universal wipes. As a result, the rate of MRSA acquisitions per 100,000 bed days reduced from 20.4 to 9.4 per 100,000 bed days (Figure 4A).

Cleaning hands is one of the most important actions anyone can carry out to prevent infection. Patient safety organisations in the UK and the World Health Organisation have focused on making hand hygiene routine behaviour in healthcare settings. Hand hygiene forms a major part of the Infection Prevention and Control Team's key priorities and every year, initiatives are undertaken to further raise awareness of hand hygiene, prompting this through education and teaching to all staff within the Trust (Figure 22). Examples of promoting hand hygiene have included partaking in World hand hygiene awareness day, with stands in the atrium for the public as well as road shows in clinical areas (Figure 23). Working with the Communications Department, hand hygiene is constantly being promoting to staff and public, via electronic bulletins and in QEHB news. The Infection Prevention and Control Team have also undertaken hand hygiene education sessions in the community at local schools (Figure 24).

Figure 22. Photographs of the Infection Prevention and Control Team and Nursing Students promoting hand hygiene.

Figure 23. Photographs of the Infection Prevention and Control Team giving educational sessions on how staff should undertake hand hygiene training using the glow box; showing areas most missed on the hands.

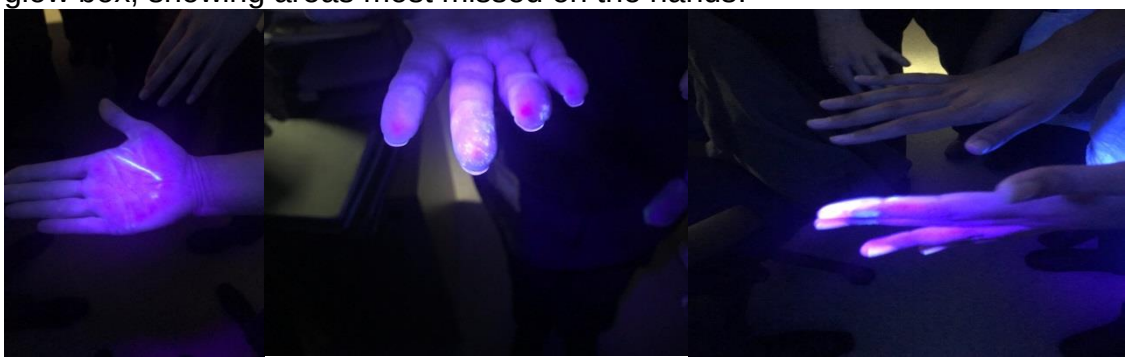


Figure 24. The Infection Prevention and Control Team promoting Hand Hygiene to local communities.

The Infection Prevention and Control Team are actively involved in the management of water safety within the Trust. Representatives of the team sit on the Water Safety Group and are actively involved in the control of *Legionella pneumophilia*, *P. aeruginosa* and other waterborne pathogens. The Water Safety Group are actively involved in numerous research projects to improve the water quality and management within the Trust. The financial year 2017/18 has been challenging in terms of *P. aeruginosa,* and the Trust has taken steps to reduce the risk of transmission by examining intrinsic, holistic and engineering factors. Planned initiatives, including the installation of new tap outlets onto Critical care A and the installation of PALL end filters on selected tap outlets throughout the entire Critical Care Unit has resulted in the reduction of *P. aeruginosa* infections by over 50% (Figure 16A). Work has influenced recently published national guidance on managing *P. aeruginosa* in augmented care units. The work was also recognised by the Trust and the Water Safety Group received a Best in Care award for its work on *P. aeruginosa* (Figure 25). *L. pneumophilia* continues to be controlled by the PFI and results monitored by the Water Safety Group. During 2017/18, there were no issues with *L. pneumophilia* and all results were managed in accordance with national and local policy. Water microbiology is unpredictable and unknown problems can arise at any time. The Water Safety Group meets monthly, managing all issues relating to water microbiology and feeding into the Infection Prevention and Control Group.

Figure 25. Photograph of the Water Safety Group receiving the Trust's Best in Care Team of the Year Award for its work in relation to *P. aeruginosa*.

Mycobacterium tuberculosis (TB) infects one-third of the world's population and is the most frequent infectious cause of death worldwide, accounting for 3 million deaths per year. Infection is acquired by inhalation of infectious droplets. Almost all TB in the UK is acquired through the respiratory route. The Infection Prevention and Control Team have undertaken educational work on TB within the Trust, focusing on early recognition, diagnosis and infection prevention and control precautions. The team has also participated in World TB day, focusing on education and made strong links with regional TB nurses (Figure 26). In addition, the Infection Prevention and Control Team are involved in a monthly TB incident review panel to discuss any new case within the Trust, to identify whether staff or patients have been exposed to TB; with action plans being developed if such an occurrence has been identified.

Figure 26. Photograph of the Infection Prevention and Control Team with TB nurses educating Trust staff members on TB on World TB day.

Sepsis is a life-threatening condition that affects an estimated 150,000 people in the UK every year. It occurs when the body's natural response to infection damages its own tissues and organs. If not recognised early and treated quickly, sepsis can lead to septic shock, organ failure and even death. Approximately 44,000 people die each year in the UK as a result of sepsis – more than bowel, breast and prostate cancer combined. It's estimated that a quarter of deaths could be avoided by early detection and timely treatment. In 2017/18, the Trust agreed to complete the national sepsis CQUIN. The Infection Prevention and Control Team were heavily involved in the promotion of sepsis, sepsis education as well as launching a new screening and action toolkit to improve awareness of sepsis within the Trust. The sepsis screening and action toolkit is part of the Trust's '*think sepsis*' campaign to educate staff on the early-warning signs of sepsis and is just one of a number of ways the sepsis team are improving the sepsis care pathway. To launch the initiative, the Trust held a sepsis awareness week (Figure 27) which was opened by Dr Ron Daniels, chief executive of the UK Sepsis Trust, who has greatly influenced the national and international sepsis agenda and is a clinical adviser on sepsis to NHS England. More than 160 clinical staff attended Dr Daniels' thought-provoking lecture on the real-life impact of the condition, highlighting the importance of early intervention and treatment. Throughout the week, staff across the Trust got involved in a range of education activities, held information stands and took part in a taste-bud-tantalising charity cake sale, raising £142.00 for the UK Sepsis Trust and QEHB charities, whilst promoting the '*think sepsis*' 'recognise, screen and treat' message (Figure 28).

Figure 27. Photograph of the launch of the sepsis awareness week at the Trust.

Figure 28. Photographs of the Infection Prevention and Control Team promoting sepsis awareness week.

E. coli is the leading cause of bacteraemia in England, with sustained increases. Thirty day all-cause mortality in England for *E. coli* bacteraemias was recently estimated as 18.2%, equating to 5,220 deaths over a 12-month period. It has been suggested that appropriately targeted interventions are required to reduce morbidity and mortality associated with *E. coli* bacteraemia. A sentinel surveillance scheme initiated by the UK government's Advisory Committee on Antimicrobial Resistance and healthcare associated infection looked at risk factors for patients with *E. coli* bacteraemias in the community and within hospitals. The results revealed urogenital tract was the most commonly reported source of infection (51%); key risk factors for these patients included prior hospitalisation, antimicrobial therapy and urinary catheterisation. Various interventions have been put in place at UHB to reduce the number of *E. coli* bacteraemias associated with CAUTIs including; employment of a specialist catheter continence nurse, focusing on education and teaching around catheter care and insertion, catheter awareness road shows across the Trust (Figure 29), the implementation of the nurse-led HOUDINI urinary catheter removal protocol, discharge packs for catheter care as well as a catheter passport for the community. These interventions resulted in a 50% reduction in the number of *E. coli* bacteraemias associated with CAUTIs. This work has also been presented by the Infection Prevention and Control team at national NHS improvement events around the country.

Figure 29. Photographs of the Infection prevention and Control team undertaking a catheter awareness road show across the Trust.

Influenza is a leading cause of acute respiratory infection and places a significant burden on healthcare. To reduce hospital transmission, patients clinically suspected of having influenza are isolated and offered empirical antiviral treatment. This year has been a challenging year with the increase in Influenza seen within the Trust. As a result, this year we implemented the use of a point of care test (POCT) for influenza in the emergency department at QEHB. Following introduction of the POCT, there was an increase in appropriately targeted oseltamivir prescribing, shorter time to isolation of patients with Influenza, proportionally less post-48 hour influenza cases and a reduction in length of stay of patients presenting with Influenza-like illness. The POCT on the front door improved the quality and efficiency of management of patients presenting with Influenza-like illness. Although difficult to quantify, there was a likely additional benefit of admission avoidance. As a result of this work, CDU staff are presenting this at their main national conference.

Hospital acquired pneumonia (HAP) is a respiratory infection that develops 48 hours or more after hospital admission. Pneumonia that presents sooner is regarded as community acquired pneumonia (CAP). Ventilator associated pneumonia (VAP) is defined as pneumonia that presents more than 48 hours after endotracheal intubation. Pneumonia is one of the leading hospital acquired infections worldwide. It is the most common healthcare associated infection (HCAI), contributing to patient mortality and is estimated to increase a patients hospital stay by 7-9 days. Patients who acquire HAP are also more likely to require intensive care and mechanical ventilation. During the 2011 European point prevalence survey (PPS) of HCAI, the most frequently reported were respiratory tract infections (pneumonia 19.4% and respiratory tract 4.1%) According to the PPS, the average number of acute beds occupied overnight each day in 2010/11 was 117,360. This translates to potentially 1,760 patients per day in NHS hospitals in England with HAP. 1,670 of which were

not ventilated, therefore non ventilated HAP (NV-HAP) has a significantly greater prevalence and burden of disease compared to VAP. Therefore, the implementation of preventative measures directed to individuals who have not received mechanical ventilation are of great importance to the safety of our patients. There are several therapeutic interventions associated with the prevention of HAP, most of which are components of hospital care patients should receive normally during their stay. Two of these interventions include mouth care and patient mobility. With significant harm being caused to patients acquiring NV-HAP, a Trust HAP prevention group with key stake holders from Infection Prevention and Control, Therapy Services, quality and standards, Education, Dental and ENT services, patient activities, moving and handling and senior nursing has been assembled. The purpose of the HAP prevention group is to support the implementation of the multimodal HAP prevention programme across two medical wards as part of an initial pilot, with the view to the programme being disseminated across the rest of the Trust. The focus of the group is to implement two streams of interventions as part of the HAP prevention programme: improve the delivery of basic mouth care to patients; this will be identified as Mouth Care Matters and increase our patient's mobility throughout their admission, this will be identified as Get Up, Get Dressed, Keep Moving. The pilot HAP prevention programme was launched on W516 and W518 (Figure 30).

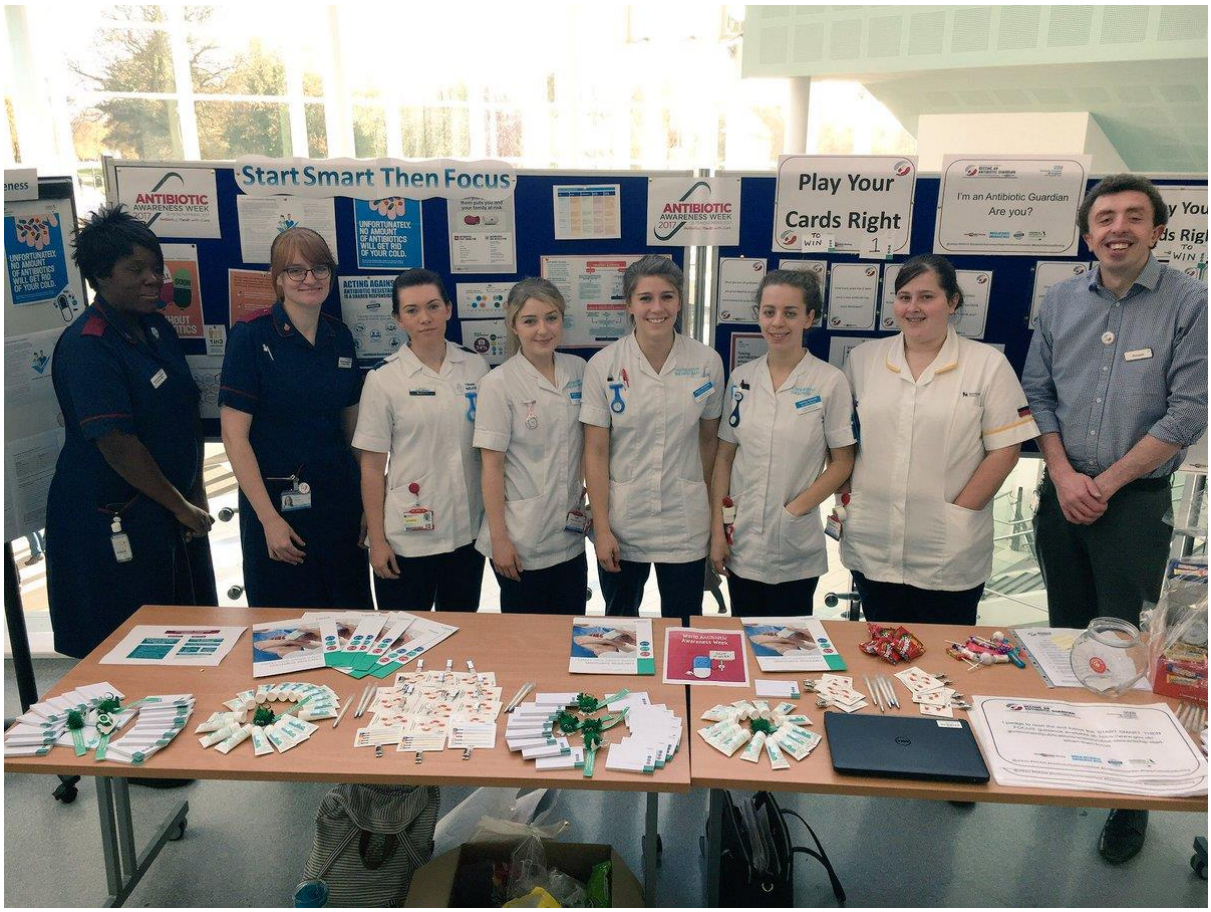
Figure 30. Photograph of the Infection Prevention and Control Teams launch of the HAP prevention programme.

The Infection Prevention and Control Team at QEHB have also taken part in a new initiative to get more patients up and out of bed whilst they are in hospital, called 'end PJ paralysis'. End PJ paralysis is a 70-day challenge that aims to achieve one million patient days of patients being up, dressed and mobilising. Several areas across QEHB are engaging in initiatives to get patients up, dressed and moving, which have already proven very successful. The key to the initiative is capturing the following patient data points every day throughout the challenge: number of patients in clothes at midday and the number of patients who are mobile. This data is inputted to a mobile application. The application will also contain a message of the day, which is about encouraging staff discussions on valuing patient time, deconditioning and relevant research. The live dashboard will be accessible to the public and will feature all the data collected from wards and hospitals taking part in the challenge. The data collected will be available in real time to check progress towards the one million patient day challenge goal. Professor Jane Cummings, Chief Nursing Officer for

England, said: “End PJ paralysis is a means of valuing patients’ time so they return sooner to loved ones we’ll never meet, to homes we’ll never visit, to spend more of their last 1,000 days in a place that is not a hospital. This 70 day End PJ paralysis challenge is about embedding that into normal practice.” The results will directly impact on the number of HAP infections seen within the Trust.

Antibiotic resistance is rising to dangerously high levels in all parts of the world and threatening our ability to treat common infectious diseases. Infections affecting people – including pneumonia, tuberculosis, blood poisoning and gonorrhoea – and animals alike are becoming harder, and sometimes impossible, to treat as antibiotics become less effective. Antibiotics are often overprescribed by physicians and veterinarians and overused by the public. Where they can be bought for human or animal use without a prescription, the emergence and spread of resistance is made worse. Examples of misuse include taking antibiotics for viral infections like colds and flu, and using them as animal growth promoters on farms or in aquaculture. To tackle these problems, the World Health Organisation are using their expertise in a ‘One Health’ approach to promote best practices to reduce the emergence and spread of antibiotic-resistant microbes in both humans and animals. One initiative WHO launched was the world antibiotic awareness week which the Infection prevention and Control team took part in, promoting antimicrobial stewardship (Figure 31).

Figure 31. Photograph of the Infection Prevention and Control Team participating in antibiotic awareness week promoting antimicrobial stewardship throughout the Trust.



The Infection Prevention and Control Team have supported other departments within the Trust, for example:

- Working with the Tissue Viability Team by undertaking the annual foam mattress audit
- Reviewing the external renal dialysis clinics from an infection prevention and control perspective
- Having nursing students shadowing the Infection Prevention and Control Team during their nursing course
- The team now undertakes a student nurse Infection prevention and Control education pathway experience
- Having military staff shadow the team during their infection prevention and control courses
- Giving Infection Control updates at the patient and carers council
- Team members sit on the Product Evaluation Group being involved in decision making of products
- Having regular medical students undertake projects within the team

This has enabled the team to broaden relationships across the Trust, further embedding infection prevention and control practice within the Trust. The team are working closely with counterparts at HGS in line with the close working relationship between the two Trusts. The Infection Prevention and Control Team at the Trust plan to work closely with the Infection Prevention and Control Team at HGS in the next financial year on various projects and learn from one another's practices, embedding the learning into our Infection Control practices moving forward.

13.0 Innovation and the future

Infection Prevention and Control is a top priority for the Trust. Keeping our patients safe from avoidable harm is everyone's responsibility. The Infection Prevention and Control Team has set out an ambitious but flexible and achievable programme of work over 2018/19, with the aim to keep our patients, staff and public informed of planned activity.

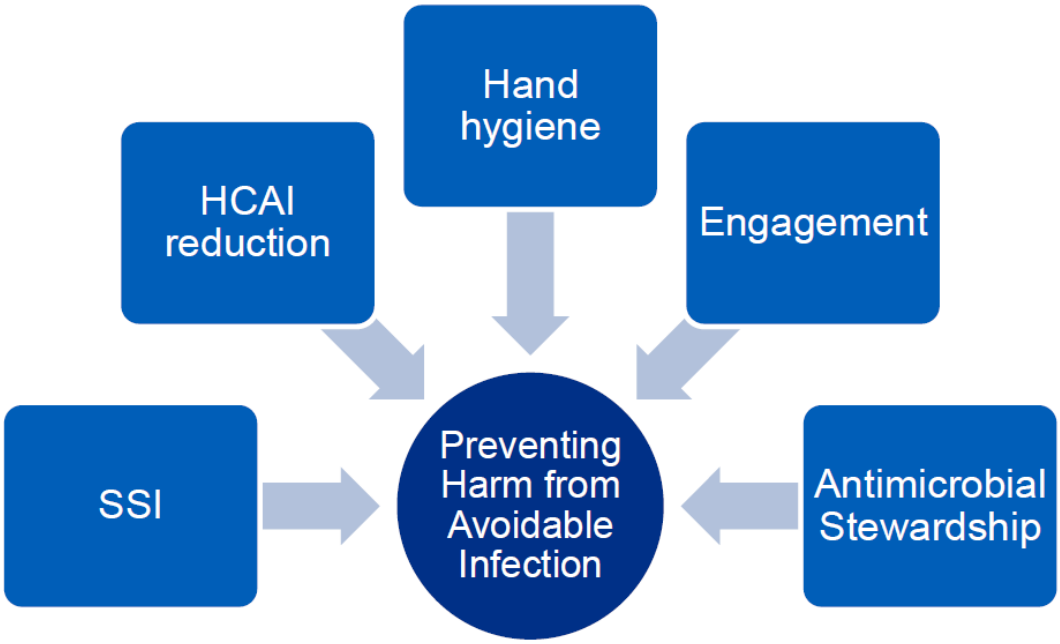
Each year, the Infection Prevention and Control Team undertake a review of the Trust's compliance with the Health and Social Care Act 2008 code of practice on the prevention and control of infections (2015). The teams aim is to provide an infection prevention and control service that supports our clinical teams to deliver the best in care. This year's annual plan covers 5 strategic themes (Figure 32). An update on the actions and work plan is provided as part of the regular Board of Directors updates around infection prevention and control.

The plan for the Infection Prevention Control Team in 2018/19 provides an operational framework for achieving progress with our strategic themes. The executive Director responsible is Michele Owen, interim Executive Chief Nurse and Director of Infection prevention and Control. The Infection Prevention and Control Teams plan will ensure:

- The Trust complies with relevant national guidance and policies specifically the Health and Social Care Act.
- Incorporates the learning from Post Infection Reviews, complaints and incidents.
- Ensure audits/reviews are undertaken, providing robust assurance around the Trusts quality indicators for infection prevention and control.
- Antibiotic stewardship is improved through the new reduction in serious infections CQUIN.
- Engagement, education and training in infection prevention and control is at the forefront in all what we do.

To deliver the priorities and plans for 2018/19, the key actions will be (Figure 32):

Figure 32. The Infection Prevention and Control Teams strategic themes in 2018/19



- Produce and implement a multimodal hand hygiene improvement strategy across the Trust with new metric standards to measure compliance; thereby reducing the transmission of nosocomial pathogens amongst our patients.
- Healthcare associated infection reduction plan focusing on the following pathogens:
    - To improve the management of *S. aureus* bacteraemias.
    - Improve the treatment of patients with *C. difficile* infection and implement a multidisciplinary management approach to the management of *C. difficile* infection.
    - Implement a Gram negative bacteraemia reduction plan focusing on: hospital acquired pneumonia, water acquired *P. aeruginosa* infections, *E. coli* and *Klebsiella pneumonia*e bacteraemias and timely identification of patients colonised with CPEs. This work will be related to the quality premium guidance to reduce Gram negative bacteraemias across the whole health economy.
    - Validate the current Trust wide cleaning programme and engage key stakeholders within Facilities and the wards. Improving cleaning within the Trust will reduce the bioburden of microorganisms and subsequent transmission.
- Antibiotic stewardship to be improved through the national CQUIN on reducing the impact of serious infections, ensuring timely review of antimicrobial treatment through '*start smart*' then '*focus*'.
- To establish an electronic monitoring system for surgical site infections and undertake snapshots audits on specialities of concern.
- Key to all these strategic aims is engagement with staff, patients and visitors within the Trust. We aim to improve engagement via:
    - Engaging with continence action group (CAG) to reduce CAUTI and UTI rates.
    - Working across the health economy to strengthen reduction in Gram negatives.

    - Engaging the medical workforce in the infection prevention and control agenda.
    - Ensuring patients in the infection prevention and control agenda
- In addition to the key strategic aims we will aim to:
    - Continue to fully participate within the Trust's Infection Prevention and Control Group.
    - Strive for the best in patient care and innovation in infection prevention and control practice.

14.0 Assure Dialysis Infection Control statement of compliance.

Purpose

This annual statement will be generated each year in April in accordance with the requirements of The Health and Social Care Act 2008 *Code of Practice on the prevention and control of infections and related guidance*. It summarises:

- Any infection transmission incidents and any action taken (these will have been reported in accordance with our Significant Event procedure / Notifiable diseases)
- Details of any infection control audits undertaken and actions undertaken
- Details of any risk assessments undertaken for prevention and control of infection
- Details of staff training
- Any review and update of policies, procedures and guidelines

Infection Prevention and Control (IPC) Lead

For Assure Dialysis Limited the Clinical Director Mrs Michele Owen also acts as the Infection Control Lead who is supported by the Trusts Infection Prevention and Control Team.

Infection transmission incidents (Significant events)

Significant events (which may involve examples of good practice as well as challenging events) are investigated in detail to see what can be learnt and to indicate changes that might lead to future improvements. All significant events are reviewed with learning cascaded to all relevant staff.

Infection Prevention Audit and Actions

The Trusts Infection Prevention and Control Team have visited the Assure Dialysis clinics throughout the last financial year.

Risk Assessments

Risk assessments are carried out so that best practice can be established and then followed. In the last year several risk assessments have been carried out. Risk assessments including the following would have been completed for example Legionella (Water) Risk Assessment, Immunization, cleaning specifications, frequencies and cleanliness.

Training

All staff receive annual training in infection prevention and control.

Policies

Assure Dialysis share the Trusts Infection Prevention and Control related policies.

Policies relating to Infection Prevention and Control are available to all staff and are reviewed and updated annually, and all are amended on an on-going basis as current advice, guidance and legislation changes. Infection Control policies are circulated amongst staff for reading and discussed at meetings on an annual basis.

Responsibility

It is the responsibility of each individual to be familiar with this Statement and their roles and responsibilities under this.

Review date

April 2019

Responsibility for Review

The Infection Prevention and Control Lead is responsible for reviewing and producing the Annual Statement.

Michele Owen
Clinical Director for and on behalf of Assure Dialysis Limited

Appendix 1. List of Infection Prevention and Control policies and procedures.

Doc. No.	Document title	Version	Document Lead	Approval Date	Date Placed on intranet	Status	Review date
67	Infection Prevention and Control Policy	6	Director of Infection Prevention and Control	23/07/2015	28/10/2015	In Date	23/07/2018
387	Management of Spillages	5	Director of Infection Prevention and Control	01/01/2015		Overdue	01/01/2018
388	Hand Hygiene	5	Director of Infection Prevention and Control	27/05/2016	31/05/2016	In Date	30/04/2019
390	Outbreaks of Infectious Disease	3	Director of Infection Prevention and Control	30/03/2017		In Date	29/03/2020
392	Procedure for the management of outbreaks of diarrhoea with or without vomiting	6	Director of Infection Prevention and Control	09/09/2013	30/03/2017	In date	29/03/2020
393	Isolation	3	Director of Infection Prevention and Control	16/06/2014	16/06/2014	Due for review	16/06/2017
394	Control of Varicella Zoster Virus	3	Director of Infection Prevention and Control	31/12/2014		Overdue	31/12/2017
395	Viral Haemorrhagic Fever	3.2	Director of Infection Prevention and Control	01/01/2015		Overdue	01/01/2018
403	Infectious disease notification	4	Director of Infection Prevention and Control	27/05/2016	31/05/2016	In Date	30/04/2019
410	Screening and managing staff with respiratory tuberculosis.	2	Director of Infection Prevention and Control	01/11/2014		Overdue	01/10/2017
417	Protective Clothing Procedure	2	Director of Infection Prevention and Control	27/02/2014		In Date	6/11/2020
418	Death of a Patient with an Infectious Condition	5	Director of Infection Prevention and Control	01/01/2015		Overdue	01/01/2018
507	Procedure for the use of fans	5	Lead Nurse Infection Control	27/05/2016	31/05/2016	In Date	30/04/2019
649	Procedure to Minimise Transmission of Seasonal Influenza Virus	3	Director of Infection Prevention and Control	08/02/2017		In Date	07/02/2020
682	Procedure for Diphtheria	3	Director of Infection Prevention and Control	27/05/2016	31/05/2016	In Date	30/04/2019
686	Procedure for Scabies	3	Director of Infection Prevention and Control	30/03/2017	05.04.2017	In Date	29/03/2020
687	Assistance Dog Procedure	3	Director of Infection Prevention and Control	27/05/2016	31/05/2016	In Date	01/08/2020
688	Procedure for Body and Pubic Lice	2	Director of Infection Prevention and Control	31/12/2014		Overdue	31/12/2017
689	Procedure for lice (head)	3	Director of Infection Prevention and Control	31/12/2014		Overdue	31/12/2017
773	Blood Culture Collection	2	Director of Infection Prevention and Control	01/01/2015		Overdue	01/01/2018
819	Procedure *for Clostridium difficile* Infection	3	Director of Infection Prevention and Control	11/10/2016	23/09/2016	In Date	01/09/2019
900	Procedure for the management of patients with blood borne viruses	4	Director of Infection Prevention and Control	01/01/2015		Overdue	01/01/2018
902	Management of Patients with CPE	1	Director of Infection Prevention and Control	01/01/2015		Overdue	01/01/2018
911	Water Safety Plan	2	Director of Infection Prevention and Control	01/01/2015		In Date	01/01/2018
928	MRSA Procedures for the control of methicillin-resistant staphylococcus aureus (MRSA).	4	Director of Infection Prevention and Control	13/10/2015	20/10/2015	Overdue	20/10/2017
1003	Management of Patients with Tuberculosis	3	Director of Infection Prevention and Control	11/10/16	01/07/2014	In date	11/09/2019