



**Infection prevention and control  
and antimicrobial stewardship  
Annual Report  
2019/20**

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## Executive Summary

- ICHT has robust IPC governance structures and systems to ensure that the Trust remains compliant with the Health and Social Care act and other regulatory requirements from the Department of Health and Care Quality Commission.
- During 2019/20, the COVID-19 pandemic began, resulting in fundamental changes to the healthcare services provided by ICHT, the NHS, and all healthcare providers globally. The IPC team have played a central role in the Trust's response to the COVID-19 pandemic.
- In 2019/20, of 6354 *C. difficile* tests done, there were 101 cases of Trust-attributed *C. difficile*, against a ceiling of 77. There have been two lapses in care during 2019/20 (in October 2019 and March 2020), compared with eight lapses in care during 2018/19. A review did not identify any key drivers of the observed increase in *C. difficile* cases.
- ICHT has reduced the number of Trust-attributed MRSA bloodstream infections (BSI) significantly since 2014; of the 33,786 blood cultures processed in 2019/20 three Trust-attributed MRSA BSI were identified.
- ICHT has developed ambitious Gram-negative BSI reduction plans and achieved a 10% reduction in Trust-attributed *E. coli* BSIs.
- Central line-associated BSI (CLABSI) rates are an important preventable cause of HCAI and are an indicator of patient safety. In 2019/20 the CLABSI rates in ICHT intensive care, renal and haematology units were below benchmark levels.
- ICHT's leading antimicrobial stewardship programme continues to drive improvement. In 2019/20 approximately 45% of all our antimicrobial use within ICHT was from the WHO narrow spectrum "ACCESS" group – this has increased year on year for the last 6 years. ICHT continued to have an average compliance for all antimicrobial quality indicators of >90%.
- ICHT is committed to reducing surgical site infections (SSIs) and participates in national surveillance programmes for orthopaedic and cardiothoracic surgical procedures. SSI for the two orthopaedic procedures monitored were below the national average but were higher for cardiothoracic surgery. This was reviewed and no gaps were identified. A new SSI identification and prevention team has been launched.
- Compliance with the mandatory Aseptic Non-Touch Technique (ANTT) competency assessment improved from 2018/19. However, the figure remains below the target threshold and plans are currently being developed to improve compliance.
- The strategic work to improve hand hygiene practice has been extended to include practice related to the use of Personal Protective Equipment (PPE).
- The number of patients referred to the specialist vascular access service for assessment and line insertion has increased by 10% since 2018/19.
- Longstanding priority risks relating to the Trust's estate, cleaning standards and water quality issues and new risks related to COVID-19 continue to be identified in the IPC risk register.
- IPC has provided decontamination expertise to support refurbishments including the PICU, FGW, A7 and A8 wards and the radiology suite at HH; A&E Department, Riverside theatres and the angiography suite at Charing Cross Hospital. Expert input has also been provided on, hygienic water, specialist ventilation and the decontamination of high risk medical devices and reprocessing units.
- Several outbreaks have been identified and managed.
- As NHS leads within Imperial College's NIHR funded Health Protection Research Unit (HPRU) in HCAI and AMR, and the Centre for Antimicrobial Optimisation (CAMO) research programme, the IPC department are contributing to broad multi-disciplinary research programmes.

## 1 Introduction

Preventing the spread of organisms that cause healthcare-associated infections (HCAI) and ensuring optimal antimicrobial use is fundamentally important for all healthcare facilities. At Imperial College Healthcare NHS Trust (ICHT), the prevention and control of infection remains a top priority and is central to all areas of the organisation. The Infection Prevention and Control (IPC) service is responsible for ensuring that policies and procedures for appropriate antimicrobial use and reducing the risk of HCAI are in place, and that expert advice is available continuously.

Healthcare and hospital patients are increasingly complex with ageing populations and increasing co-morbidities. This means that patients are increasingly at risk of HCAI. Nonetheless, strides have been taken on a local and national level in reducing the rate of MRSA and *C. difficile* infection (CDI). However, there are still improvements to be made. Furthermore, new challenges continue to emerge nationally and locally. During 2019/20, the COVID-19 pandemic began, resulting in fundamental changes to the healthcare services provided by ICHT, the NHS, and all healthcare providers globally. The IPC team have played a central role in the Trust's response to the COVID-19 pandemic.

One of the key drivers for antimicrobial resistance in HCAI and *C. difficile* infection is antimicrobial exposure and suboptimal antimicrobial therapy. ICHT continues to introduce new strategies to monitor antibiotic use and ensure that antibiotics are used appropriately. Another key risk is the use of indwelling devices and intravenous lines, which can become infected if not managed appropriately. Intravenous lines are therefore another important area of focus, led by a dedicated vascular access team, with a Trust-wide aseptic non-touch technique (ANTT) training and assessment programme in place. The correct management and decontamination of high-risk medical devices (such as endoscopes) is a crucial function of the service. IPC is closely involved in decisions around the hospital estate, ensuring that it is fit for purpose in order to minimise the risk of transmission.

## 2 Responding to COVID-19

The IPC team have played a central role in the Trust's response to the COVID-19 pandemic, including:

- The processes for IPC-supported decision making changed during COVID-19, with new assurance structures implemented.
- IPC were integral in the provision of advice, guidelines, and clinical pathway development.
- A patient and staff testing strategy was developed and iterated in the context of changing national guidelines and with reference to local laboratory capacity.
- A focus on antimicrobial stewardship (AMS) and treatment of both COVID-19 and other infections was maintained during the pandemic.
- Systems were developed and implemented for the identification and management of hospital-onset COVID-19 infections.
- A daily COVID-19 "sitrep" and forecasting to support decision making about surge capacity and related staffing was developed and implemented.
- Several existing and some new models were used to provide training and education to staff.
- IPC led improvement work around Personal Protective Equipment (PPE) and hand hygiene use, including the design, implementation, development, and evaluation of a PPE Helper programme to promote best practice in the use of PPE.
- IPC worked closely with estates & facilities, providing advice around changes to the use of clinical and non-clinical areas, developed mitigating plans for water hygiene management, and provided advice and support for specialist ventilation / modification.

IPC also issued recommendations around enhanced environmental cleaning in clinical areas used to manage patients with COVID-19 in line with national guidelines.

- IPC also worked closely with the Trust communications team to develop a series of “IPC/AMS messages of the day”, participate in various staff briefings, and supported the development and accuracy of the Trust Intranet COVID-19 pages and other communications materials (e.g. infographics / posters).
- Experts from IPC joined a range of expert advisory groups and undertook applied research to support decision making in the Trust.

### **3 Governance and Organisation**

A number of IPC-related workstreams were modified or put on hold during the peak of the COVID-19 pandemic but will be restarted during recovery, including the bi-annual hand hygiene auditing and improvement programme, strategic plans to reduce Gram-negative bloodstream infections (BSIs), changes to the way that water hygiene management is conducted, surveillance for central line-associated BSIs, and plans to improve the identification and management of surgical site infection. These changes were reflected on the IPC risk register.

During 2019/20, the Trust maintained compliance with the criteria set out in the Hygiene Code of Practice (2008). The annual plan for infection prevention and control for 2019/20 set out the proposed activities for IPC at the Trust. This plan ensures that the Trust continued to meet the requirements of the Hygiene Code, Department of Health and the Care Quality Commission. The plan also accounted for locally agreed actions as well as internal programmes of work that IPC would deliver throughout the financial year. The Trust has on-going action plans focussing on preventing and managing HCAs across our hospitals, and these ‘live’ documents underpin the programmes of work referenced in this plan. The plan is reviewed annually, with progress and evidence of completing actions documented. Actions are examined at the Trust Infection Prevention and Control Committee (TIPCC). Progress on actions is also followed up by weekly operational meetings. While the Trust has many examples of excellent work and high-quality care, it recognises that there is more to do to achieve its goals and ambitions. The IPC annual plan and associated action plans support the Trust to deliver its strategic objectives.

#### **3.1.1 Trust Infection Prevention Committee (TIPCC)**

The role of the TIPCC is to oversee the delivery of IPC across the organisation. TIPCC reports to the Executive Quality Committee, Trust board, and Chief Executive Office through quarterly reports (Figure 1). Meetings are held quarterly, and attended by external stakeholders representing Public Health England and the CCG. The committee receives reports from the clinical divisions and subsidiary committees and groups including:

- Divisional IPC / quality committees
- Decontamination steering group
- Line safety management group
- Surgical infection group
- Water hygiene group
- Ventilation group
- Antimicrobial review group
- Occupational health
- Health & safety
- Hand hygiene improvement group
- Estates and facilities

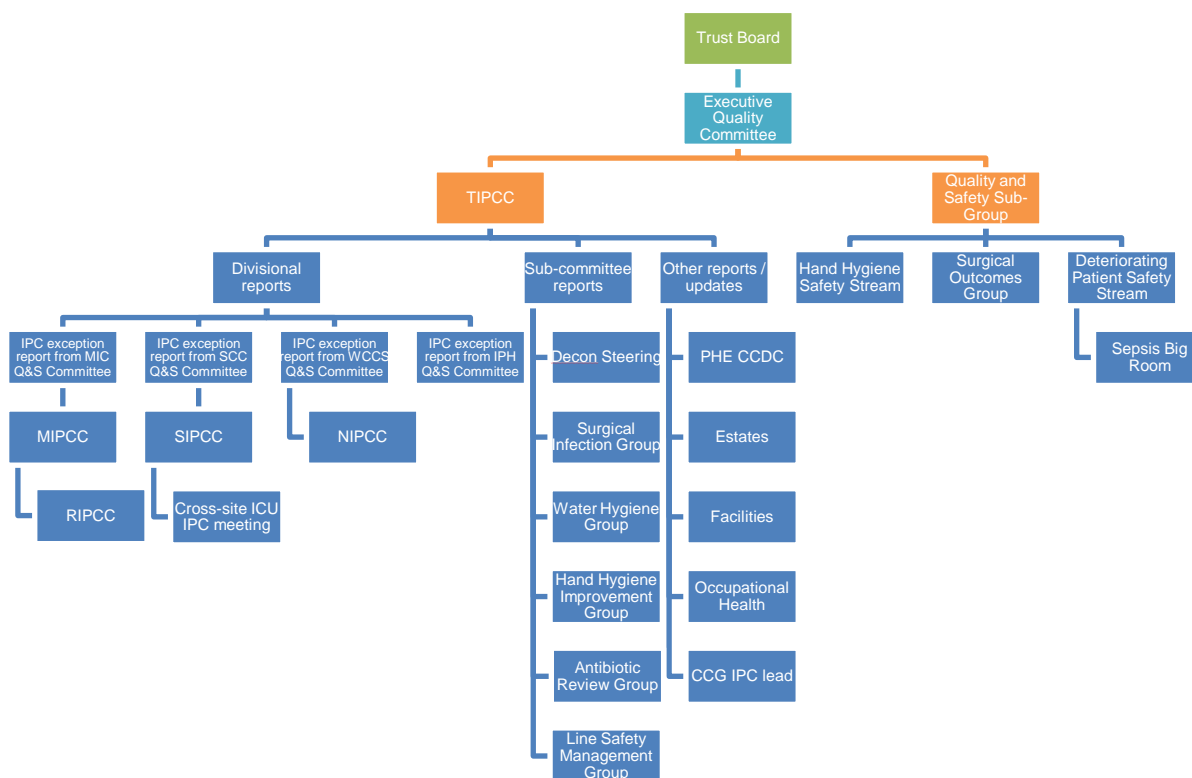


Figure 1: IPC Organisational chart

### 3.1.2 Organisation of the service

The IPC service is a corporate directorate situated in the office of the Medical Director. The multidisciplinary service is led by the Director of IPC, who is responsible for overseeing all IPC and antimicrobial stewardship activity in the Trust. The service includes doctors, nurses, pharmacists, data scientists and other technical and operational experts who create structures working collaboratively across the organisations with the Divisions to ensure patient safety through effective infection control practices and optimal use of antimicrobials. The service also works closely with key external regulatory and public health agencies and experts and provides clinical and operational expertise throughout the Trust.

### 3.1.3 HCAI Sitrep

A weekly meeting is held to support the operational delivery of IPC throughout the organisation. The Taskforce ensures weekly engagement with senior leaders in the Trust, including a lead from each of the clinical divisions. Live clinical front line issues, real time surveillance information, and actions from investigations are reviewed across all sites. This meeting has a critical function in the management of patient flow and inpatient capacity related to IPC.

### 3.1.4 Risk Register

The IPC service maintains a risk register, to record, identify and manage all risks that affect patient safety and clinical services. There are 9 risks on the risk register including three longstanding priority risks (estates, water quality and poor cleaning standards). Each risk has been updated to reflect the challenges related to COVID-19.

- Patients exposed to microbiologically unsafe water.
- Poor cleaning standards
- Low level of hand hygiene and inappropriate use of PPE (Divisional Risk).
- Risk of spread of CPE (Corporate Risk).
- Fragile supply chain of anti-infectives.
- Limited surveillance of HCAI (especially SSI).
- Inflexible IT infrastructure.
- Limited negative pressure single rooms
- Estates work affecting Infection Prevention & Control practices.

These risks are reviewed and updated regularly, and a summary of new and updated risks is included in the IPC quarterly report to ensure risks are identified and addressed.

## 4 HCAI for the Trust

Table 1 shows the number of Trust cases reported to PHE as part of their mandatory reporting scheme.

	Apr-19		May-19		Jun-19		Jul-19		Aug-19		Sep-19		Oct-19		Nov-19		Dec-19		Jan-20		Feb-20		Mar-20		YTD			
	No. cases	Ceiling	No. cases	Ceiling	No. cases	Ceiling	No. cases	Ceiling	No. cases	Ceiling	No. cases	Ceiling	No. cases	Ceiling	No. cases	Ceiling	No. cases	Ceiling	No. cases	Ceiling	No. cases	Ceiling	No. cases	Ceiling	No. cases	Ceiling	No. cases	YTD (ceiling)
Trust MRSA BSI	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
Hospital onset- Hospital associated (HOHA)	3	-	7	-	10	-	6	-	6	-	5	-	9	-	6	-	7	-	8	-	1	-	4	-	4	-	72	-
Community onset-Hospital associated (COHA)	2	-	2	-	1	-	6	-	4	-	1	-	1	-	1	-	3	-	4	-	2	-	2	-	2	-	29	-
Total Hospital associated C.difficile cases (HOHA + COHA)	5	8	9	7	11	6	12	6	10	5	6	5	10	5	7	6	10	7	12	7	3	7	6	8	8	101	77	
Trust <i>Escherichia coli</i> BSI	8	-	6	-	5	-	8	-	3	-	5	-	10	-	9	-	7	-	6	-	3	-	3	-	3	-	73	-
Trust MSSA BSI	2	-	1	-	1	-	5	-	2	-	1	-	3	-	3	-	5	-	2	-	3	-	4	-	4	-	32	-
Trust CPE BSI	0	-	0	-	2	-	1	-	3	-	0	-	0	-	0	-	0	-	1	-	1	-	1	-	1	-	9	-
Trust <i>Pseudomonas aeruginosa</i> BSI	2	-	4	-	2	-	5	-	4	-	2	-	5	-	3	-	5	-	1	-	1	-	1	-	1	-	35	-
Trust <i>Klebsiella</i> BSI	2	-	3	-	6	-	3	-	10	-	5	-	5	-	5	-	3	-	5	-	5	-	2	-	5	-	54	-

**Table 1:** Summary of the number of cases reported to PHE in their mandatory reporting scheme. For MRSA, MSSA, and *E. coli* BSI Trust cases are those that are identified after 2 days of hospitalisation; for *C. difficile*, Trust cases are those that are identified after 3 days of hospitalisation. ‘Trust’ refers to cases defined epidemiologically as having most likely been acquired in hospital.

### 4.1.1 *Clostridium difficile* infection

*Clostridium difficile* infections are a major cause of antibiotic-associated diarrhoea; significant increases were noted in the 1990s and in response extended mandatory reporting was implemented in 2007. More recently NHS England implemented organisational *C. difficile* infection objectives and financial penalties, where lapses in care were identified.

In 2019/20, there were 101 cases of Trust-attributed *C. difficile*, against a ceiling of 77. Part of the apparent increase in cases is the inclusion, for the first time, of patients who develop *C. difficile* infection after their discharge as Trust-attributed.

There have been two lapses in care during 2019/20 (October 2019 and March 2020), compared with eight lapses in care during 2018/19.



We adhere to a comprehensive set of measures to prevent cross-transmission and optimise antibiotic usage thereby minimising the risk of *C. difficile* infections. This includes a multidisciplinary clinical review of all cases, rapid feedback of lapses in care to prompt ward-level learning, and *C. difficile* prevention ward rounds.

In response to an increase in the number of hospital-associated *C. difficile* cases in 2019/20, we have investigated possible factors driving this. This has included a comparison of hospital-associated *C. difficile* cases during 2019/20 with cases from the same period in the previous year when rates were comparable to the national average (April to November 2018). We also reviewed available comparable data from peer Trusts. At this point, neither changes in patient demographics, associated risk factors, nor an increase in lapses in care related to transmission or antibiotic choices explain the increase. Transmission was not prominent, and antimicrobial use was in accordance with Trust policy. Overall, antimicrobial use at Imperial is lower than it has been historically, with the antimicrobial point prevalence studies indicating a high degree of compliance with a suite of prescribing indicators. Therefore, it is not clear what is driving the observed increase in *C. difficile* cases. Further work around understanding if changes in speciality-level prescribing and community prescribing explain *C. difficile* trends.

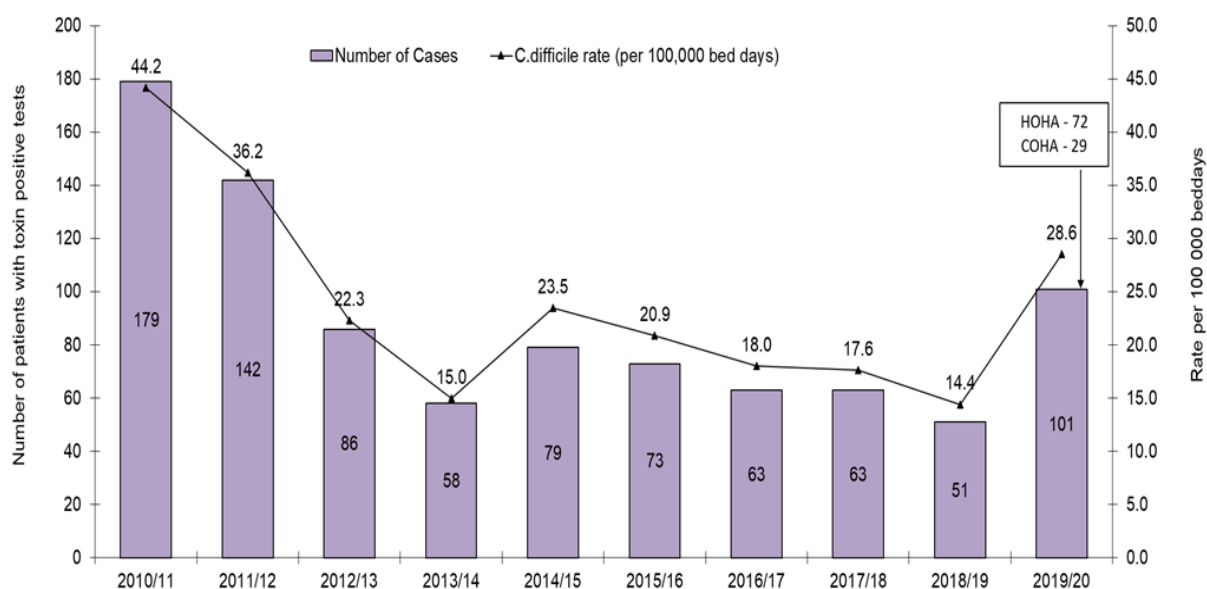
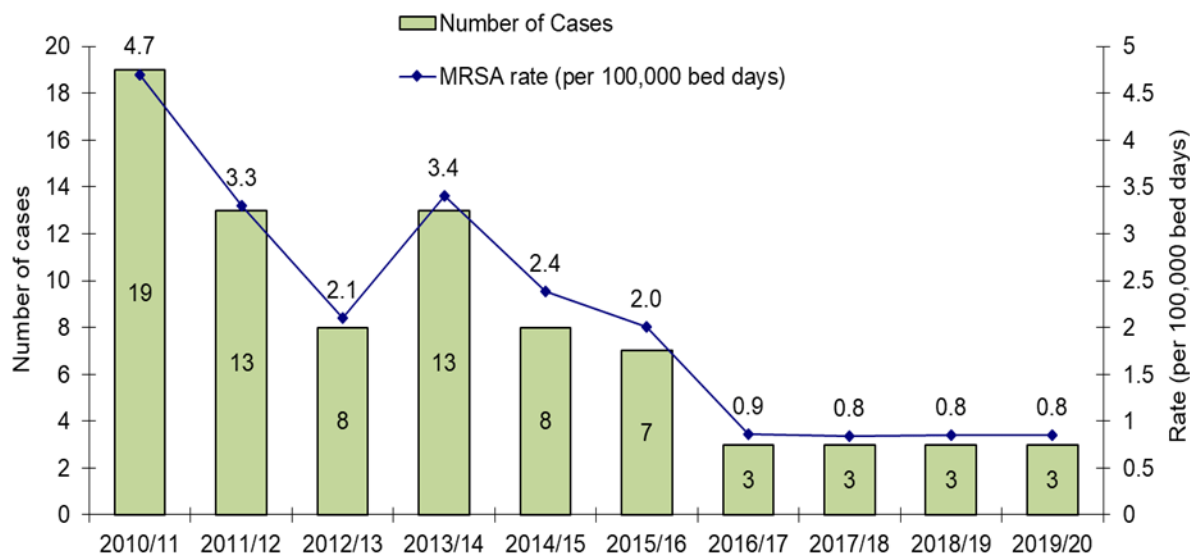


Figure 2: ICHT *C. difficile* infection rates from 2010/11

#### 4.1.2 MRSA bloodstream infection

ICHT has reduced the number of Trust assigned MRSA BSI significantly since 2014 (Figure 3). There have been three Trust-attributed MRSA BSIs during 2019/20, which was also the case in the previous three financial years. Post-infection reviews are routinely performed for all MRSA BSI cases to ensure patient care is improved and lessons learnt are captured. Limited learning was identified through a review of these cases, although poor documentation of vascular access devices was identified in two of the three cases; this has been highlighted to the teams involved and shared more widely via the *Line Safety Management Group*.



**Figure 3: MRSA BSI cases rate since 2010/11**

#### 4.1.2.1 MRSA admission screening

On average, 2294 admissions were screened for MRSA each month in 2019/2020, with an average compliance of 90%.

#### 4.1.2.2 MSSA BSI

There were 32 Trust attributable MSSA BSI in 2019/20, compared to 37 cases in 2018/19. Whilst there is no national threshold for MSSA BSI, each case is reviewed by a multidisciplinary group, and those related to a vascular access device are reviewed by vascular access specialists, in order to identify and implement learning from these cases. This has prompted additional teaching on the wards in relevant areas around vascular access device care, record keeping and promoting contacting the vascular access team for support. There has been no evidence of patient-to-patient transmission.

#### 4.1.3 Gram-negative BSIs (*E. coli*, *Pseudomonas aeruginosa*, and *Klebsiella pneumoniae*)

ICHT has developed a reduction plan and implemented an annual 10% reduction target for *E. coli* BSIs to address national rises in Gram-negative BSI rates and support Government objectives aiming to halve Gram-negative BSI by 2020/21. The Trust has met its 10% year-on-year reduction in Trust-attributed *E. coli* BSIs (an internal performance metric), with 73 cases during 2019/20, compared with 83 cases during 2018/19. Imperial's *E. coli* BSI rate ranks lowest in the Shelford group.

A multidisciplinary group has been established to reduce Gram-negative BSI with a focus on minimising *E. coli* BSIs, particularly those originating from urinary and surgical sources. ICHT, in collaboration with the CCG, have developed a Gram-negative BSI reduction plan which includes:

- Enhanced reporting of Gram-negative BSI cases to PHE, including *E. coli*, *Klebsiella pneumoniae* and *Pseudomonas aeruginosa* to identify, monitor and track local Gram-negative BSI.
- Amending GNBSI case review procedures, with a focus on improving the identification and designation of infection sources.

- Supporting and facilitating CCGs investigating non-Trust attributable Gram-negative BSIs by identifying cases and sharing the tools used to review cases.
- Performing regular reviews of antimicrobial susceptibility rates for Gram-negative organisms to ensure antimicrobial prescribing for non-susceptible isolates is appropriate.
- Implemented bi-annual point prevalence surveys of antibiotic prescribing to monitor prescribing patterns.
- Supporting the identification and management of sepsis to improve clinical outcomes.
- Key stakeholders (including the Medical Director, IPC, Deputy Chief Nurse, Procurement Nurse, and quality improvement experts) have formed a group to review the current infrastructure and resourcing for the management of urinary catheters and patient hydration. Workstreams include:
  - An audit on urinary catheter management, conducted by the audit team.
  - Developing improved surveillance systems for the identification of urinary catheter-associated BSI.
  - Analysis of antimicrobial point prevalence survey data to understand the frequency of urinary tract infection (UTI) indications over the last 2 years.
  - Participate in the AMR CQUIN around UTI management in patients aged over 65.
- Interpreting the findings of a national audit of *E. coli* BSIs in patients with cancer with the *E. coli* Cancer Collaborative (a partnership of several NHS Trusts that provide cancer services).

The graph below shows the number of *E. coli* cases and rate per 100,000 bed days by year since PHE mandatory surveillance started in 2011/12.

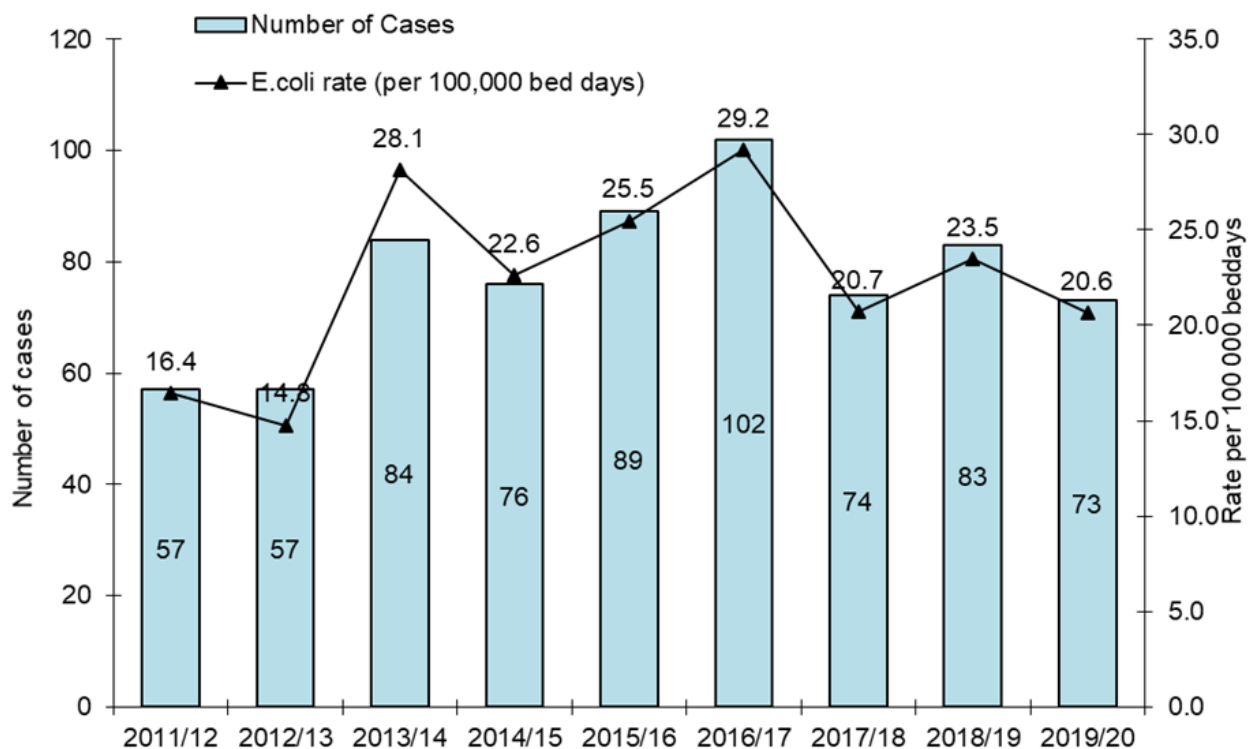


Figure 4: *E. coli* BSI cases from 2011/12 – 2019/20

#### **4.1.4 Bloodstream infections surveillance**

##### **4.1.4.1 Quality of blood culture collection**

Contaminants accounted 2.3% overall 32,903 blood cultures taken during 2019/20, which is below our benchmark of 3%. In March 2020, 3% of blood cultures were contaminated; this is associated with an increase in blood culture contaminants observed across the ICUs during the COVID-19 peak, likely related to challenges with hand hygiene and ANTT whilst wearing additional PPE. IPC and vascular access continue to support ICU in addressing these issues. This has been communicated through the weekly Trust-wide HCAI Sitrep meetings. The contaminant rate has since returned to below benchmark levels.

##### **4.1.4.2 Adult ICUs**

There is no available data on catheter line-associated BSI (CLABSI) in the adult ICUs for the Jan – Mar 2020 quarter due to operational challenges during COVID-19 not allowing for routine surveillance of BSI at detailed case reviews. For the period Apr 2019 – Dec 2019 we saw 17 catheter line-associated BSI (CLABSI) episodes, which is a rate of 2.0 per 1000 catheter line-days; this is below the benchmark rate of 3.6 per 1000 catheter-line days (ECDC benchmark). Each case is discussed in detail at weekly IPC-led MDTs including colleagues in ICU.

##### **4.1.4.3 Paediatric ICU (PICU)**

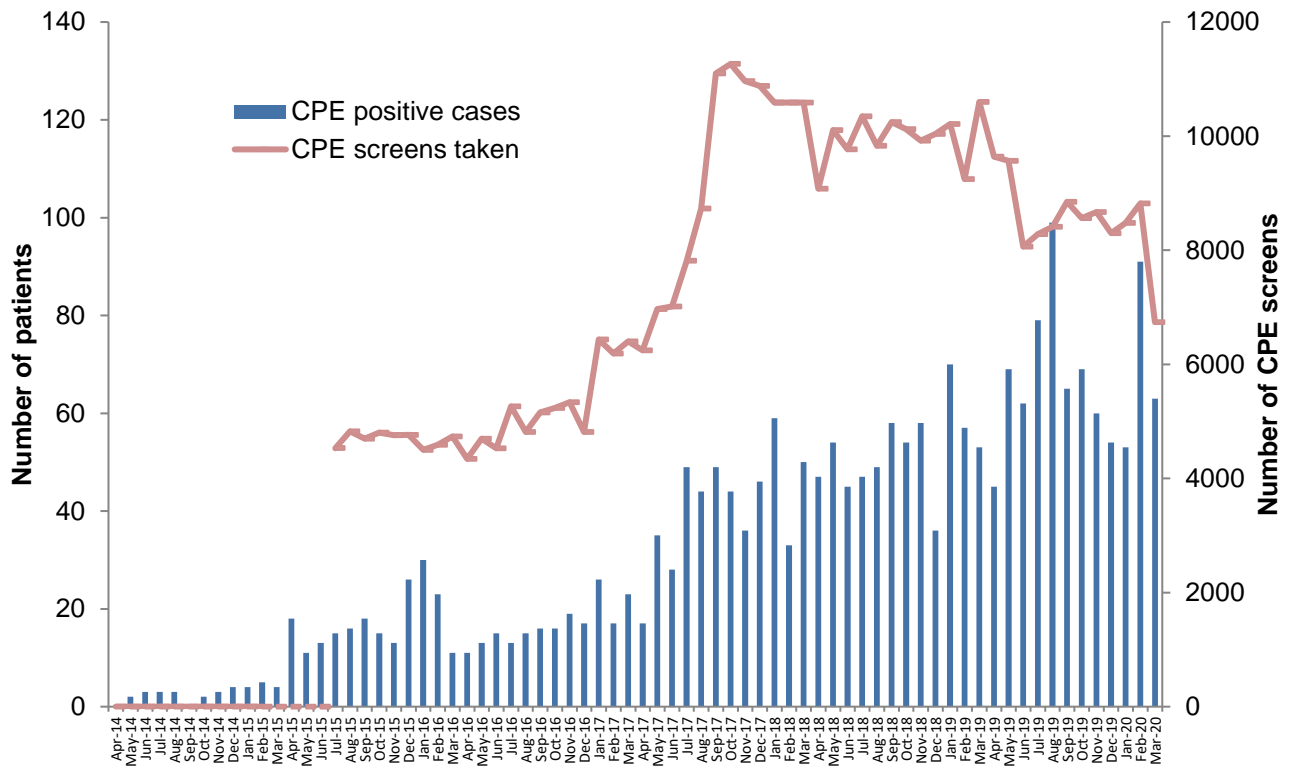
For the period Apr 2019 – Mar 2020 there have been five CLABSI cases in the PICU, a CLABSI rate of 2.9 per 1000 catheter line-days, with a benchmark of 3.0 per 1000 catheter line days.

##### **4.1.4.4 Neonatal ICU (NICU)**

For the period Apr 2019 – Mar 2020 the CLABSI rate on the neonatal ICU (NICU) at SMH and QCCH combined was 5.2 per 1000 catheter line, with nine CLABSI cases identified, against a benchmark figure of 4.45 per 1000 line days (National Neonatal Audit Programme (NNAP)). The CLABSI rate in Very Low Birth Weight (VLBW) babies was 5.9 per 1000 line days, below the NEO-KISS nosocomial infections surveillance project benchmark figure of 8.6 per 1000 catheter line days.

#### **4.1.5 Carbapenemase-producing Enterobacteriaceae (CPE) surveillance**

Enhanced CPE surveillance began in 2014 to ensure all patients colonised or infected with CPE are recorded in a comprehensive centralised database which includes information on the strain type, molecular mechanisms and culture collection details. The number of patients with CPE identified each month has plateaued at between 50 and 80 each month. More than 95% of these samples are from screening specimens rather than from clinical specimens.



**Figure 5:** CPE detected at the Trust, de-duplicated by patient since April 2014. The line represents the total number of screens taken each month.

#### 4.1.6 Surgical Site Infections

Surgical site infections are a significant cause of HCAI and are associated with poor clinical outcomes. Co-ordinated surveillance and IPC programmes where clinical feedback is provided, has been shown to significantly reduce the rate of SSI. ICHT currently performs both mandatory and voluntary surveillance for the following categories;

- Orthopaedic:
  - Knee procedures: 12-month average is 0.3% (1 SSI in 361 operations); national average is 0.6%.
  - Hip procedures: 12-month average is 0.4% (1 SSI in 283 operations); national average is 0.6%.
- Cardiothoracic:
  - CABG: 12-month average is 8.0% (24 SSI in 299 procedures); national average is 3.8%. All six were superficial incisional SSIs.
  - Non-CABG: 12-month average is 2.5% (5 SSI in 199 procedures); national average is 1.3%.

Rates of surgical site infection (SSI) remain below national benchmark rates following the selected elective orthopaedic procedures included in the mandatory national surveillance scheme. The SSI rate following CABG and non-CABG procedures remains consistently above the national average over the past 12 months. Regular task-and-finish group meetings chaired by a cardiothoracic surgeon will recommence during 2020/21.

Members of the new SSI surveillance and prevention team were reallocated to COVID-19 management during Q4. They will return to SSI surveillance and prevention during 2020/21.

## 5 Antimicrobial Stewardship

### 5.1.1 Prescribing surveillance: point prevalence survey

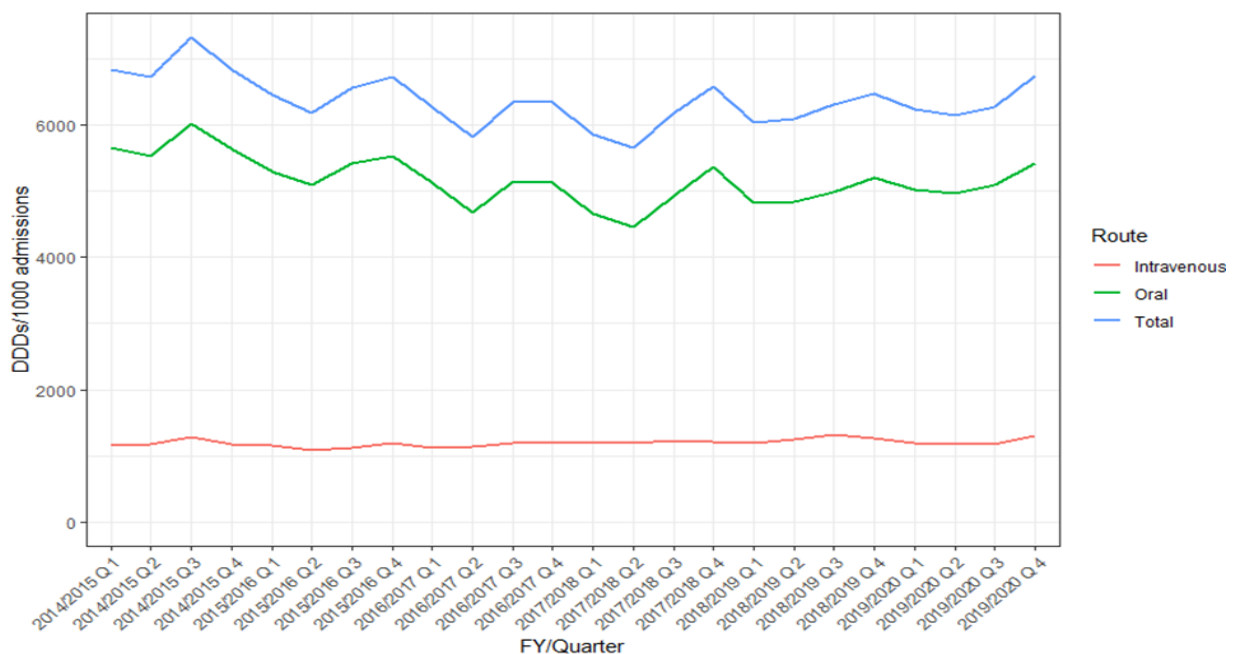
Antibiotic stewardship encompasses all activities intended to improve patient outcomes through optimised antimicrobial use while minimising negative consequences such as HCAI and limiting development of resistance.

Prescribing standards and safety and quality indicators are monitored through biannual point prevalence surveys (PPS) which are based upon standards advised by the Department of Health “Start Smart then Focus” antimicrobial stewardship guidance. The survey results were circulated via clinical and managerial structures, with detailed action plans where appropriate.

The two studies in 2019/20 that were carried out in August and February reviewed 2592 patients. On average 43% of our inpatients are on an antimicrobial at any one time. We examine if antimicrobials are in line with policy or guidance from our infection service, if antimicrobials are reviewed at 72 hours and if the duration of our antimicrobial prescriptions is appropriate. The average across both studies for each indicator was > 90% target. For the first time, duration of surgical prophylaxis was included as a 4<sup>th</sup> prescribing quality indicator. 89% of the 71 patients received appropriate antibiotic prophylaxis for patients who had surgery in the previous 24 hours at the time of the PPS.

### 5.1.2 Antimicrobial consumption and reduction

ICHT is committed to reducing total antimicrobial consumption and broad spectrum antimicrobial use in line with WHO and Department of Health initiatives. As part of this, antimicrobial consumption data continued to be analysed in 2019/20. We continued to see a reduction in quarterly use of antimicrobials during the first part of the year with an expected rise in quarter 3 and 4 which was linked to historical trends due to winter pressures (Figure 6). Antimicrobial pressures related to the initial presentations of COVID-19 augmented this pressure.



**Figure 6:** Trust-wide antimicrobial consumption (DDD / 1000 admissions) 2014/15 – present, including the split between intravenous and oral administration

### 5.1.3 AMS activity during COVID-19

Specific AMS activity related to COVID-19 includes:

- Resilience of the Trust Stewardship programme to monitor, control and implement existing and novel treatment options as the COVID-19 pandemic unfolded.
- Implementation of COVID-19 antimicrobial treatment guidelines to support prudent prescribing, reduce antimicrobial resistance and promote patient safety.
- Ensuring that key messages around identifying and treating bacterial infection using antibiotics continued to be reinforced during the pandemic.
- The Antibiotic Stewardship Cerner Dashboard has been used to target antimicrobial stewardship activities.

### 5.1.4 Sepsis reduction

Work to improve the identification and management of sepsis continues through the Sepsis Big Room.

- Work is ongoing to improve the recording of fluid balance and to introduce the sepsis alert to paediatrics and maternity.
- We are currently working on an enhanced communication approach to ensure that the key messages are received by key staff.
- Final changes have been made to the QlikView app, which went live all ward managers and other clinical staff during 2019/20. This will allow ward staff to review local sepsis-related indicators for their clinical areas.
- A paper summarising improved clinical outcomes associated with the introduction of the sepsis alert in Cerner (including a rise in the identification of sepsis, a fall in mortality and length of stay related to sepsis) has been published (Honeyford et al., J Am Med Inform Assoc in press).

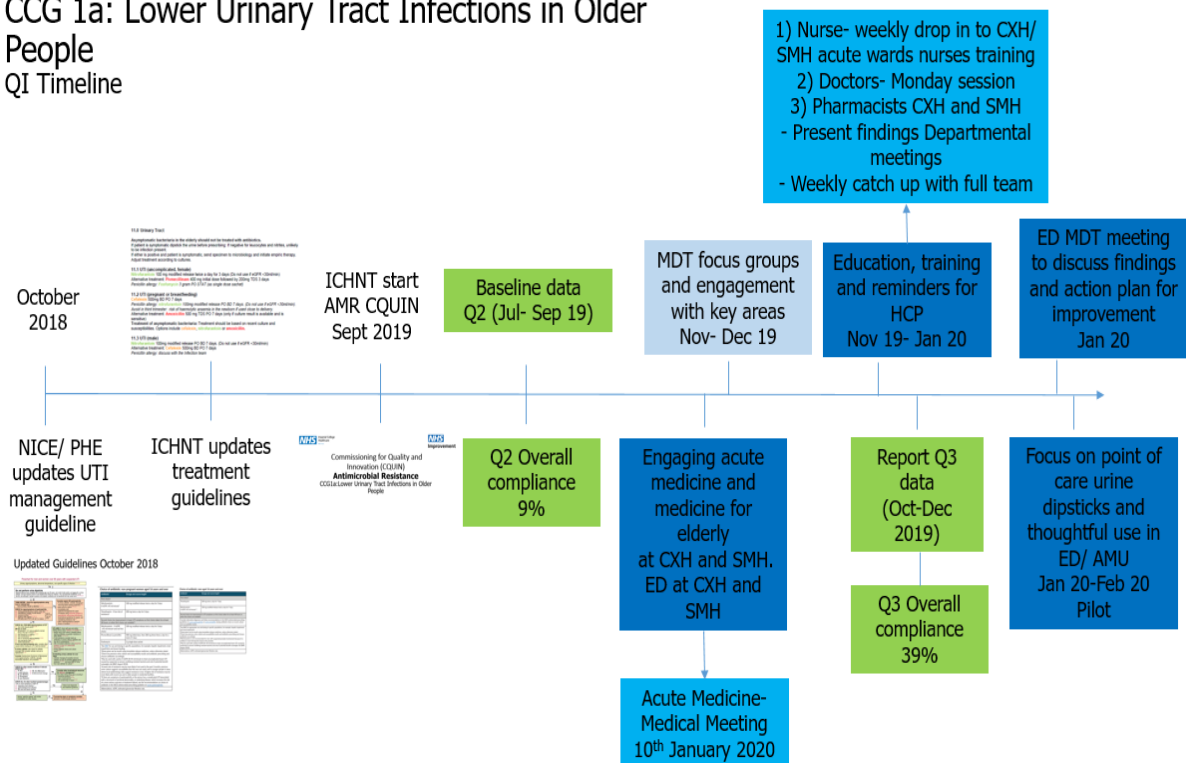
## 5.2 AMR CQUIN

The Trust participated in the *Antimicrobial Resistance 2019/20 CQUIN* where part 1 aims to improve the management of lower urinary tract infections (UTI) in the elderly and part 2 aims to improve antibiotic surgical prophylaxis in colorectal surgery with the support of a 1.0 WTE band 7 pharmacist. These CQUINs were suspended in Q4 due to COVID-19.

### 5.2.1 CCG1a: Antimicrobial Resistance- Lower Urinary Tract Infections in Older People

The Q3 data shows an overall compliance of 39% (compared with 9% in Q2) with the PHE guidance on diagnosing and treating a UTI in 65 year olds (Figure 7). October to December 2019 saw the quality improvement work commence, starting with dissemination of the Q2 results to help generate ideas for improvements. Emergency, acute and elderly medicine multidisciplinary teams have engaged. This has allowed presentations to relay on results, updates on guidance and discussion of change ideas. Education and training around this topic was the first intervention, followed closely by a focus on appropriate usage of urinalysis tools.

## CCG 1a: Lower Urinary Tract Infections in Older People QI Timeline



**Figure 7: Quality improvement timeline for CCG1a: Antimicrobial Resistance- Lower Urinary Tract Infections in Older People**

### 5.2.2 CCG1b: Antimicrobial Resistance - Antibiotic Prophylaxis in Colorectal Surgery

Q2 ICHT data showed an overall compliance of 47% with the number of doses used for prophylaxis and the choice of antibiotic. The results were communicated to the head of speciality for general surgery, senior lead pharmacist for surgery and infection consultants. Aspects of the CQUIN with low compliance were identified and email communication alerts were sent to the surgical teams. This included the purpose and aims of the CQUIN, baseline compliance, areas where improvements need to be made and how this can be achieved. Q3 results have shown an improvement to 66% overall compliance. Further data analysis is planned to compare quarters and identify whether an improvement has been seen under individual consultant teams.

#### 5.2.3 Antimicrobial review group

The Antimicrobial Review Group, in conjunction with TIPCC, is responsible for antimicrobial use to ensure their safe, appropriate and economic use in line with good antimicrobial stewardship. During 2019/20 the Group met on six occasions and reviewed over 30 guidelines with a particular focus upon the updating of adult empirical treatment guidelines in line with PHE/ WHO advice and local susceptibility patterns.

#### 5.2.4 Antimicrobial shortages

Antimicrobial shortages in a number of key agents has presented a significant clinical challenge. In response the Infection Pharmacy team and microbiology team are ensuring stock is only released where appropriate. These shortages have not resulted in patient harm.



## 6 Hand hygiene, PPE, and Aseptic Non-Touch Technique (ANTT) competency assessment

### 6.1.1 Competency assessment for PPE, Hand Hygiene, and ANTT

We have a requirement that all clinical staff perform a documented competency assessment for hand hygiene, PPE, and ANTT. Currently the compliance rate is 87.5% (7484/8558 clinical staff), below our 90% target. Of the 1074 non-compliant staff, 89.9% (966) have never had an assessment for ANTT, and 10.1% (108) have had an assessment in the past, but have gone beyond the three-year deadline for re-assessment. The competency assessment was suspended during the COVID-19 peak and replaced with an ANTT training video. During 2020/21, plans are in place to restart the ANTT competency assessment process.

### 6.1.2 PPE and Hand Hygiene Improvement

A new approach to hand hygiene compliance auditing to improve the quality of data in order to guide improvement commenced during 2018. A multidisciplinary Hand Hygiene Improvement Group meets monthly to lead the hand hygiene improvement work. This group was suspended during the COVID-19 pandemic and restarted in June 2020, with an extended remit to include improvement in PPE use.

The remit of the group is to:

- Oversee and monitor the progress of the Trust's PPE and hand hygiene programme
- Provide 'check and challenge' to programme pace and direction
- Lead on initiatives to promote effective PPE and hand hygiene practice
- Commission and review audits and intelligence gathering on PPE and hand hygiene
- Review PPE and hand hygiene audit data and intelligence
- Identify specific applied research opportunities related to PPE hand hygiene
- Celebrate success of the programme

A "Look, Listen, Learn" audit of PPE and hand hygiene practice is planned across the Trust during 2020/21. This will be a supportive approach to intelligence gathering that includes a focus on staff and patient experience. The programme will also provide and on-the-spot education to address poor practice.

## 7 Vascular Access

### 7.1.1 Intravascular device insertions

The vascular access service is provided by IPC. During 2019/20, the vascular access service had a total of 1114 referrals, an increase of 108 (10%) compared to 2018/19. Referrals included requests for the insertion of vascular access devices, and for expert advice, support, and management of existing vascular access devices. There is an increase in the use of implantable ports for patients with very difficult vascular access who require frequent intermittent intravenous therapy and repeated admissions to hospital, the team are supporting this, averaging two patients per month. Of the vascular access devices inserted, 659 were peripherally inserted central catheters (PICC), and 75 were midline catheters and 16 power injectable long peripheral cannula to assist in CT imaging. Requests for ultrasound guided cannulation are increasing, which we support as capacity allows. The median dwell of all our catheters was 34 days with a range from 1 - 266 days. We had 23 patients who had an exceptionally long dwell, averaging 149 days with no complications. We introduced a disinfecting cap to use in a specific cohort of patients, namely those patients who have a PICC, require parenteral nutrition and have a stoma to prevent infection; this has proved very

successful. Results are currently being analysed and written to present at the national forum conference, NIVAS. We continue to monitor complications in vascular access devices inserted by the service; overall these are very low and unrelated to the insertion process.

### **7.1.2 Line safety management group**

The *Line Safety Management Group (LSMG)* is the Trust-wide committee where all matters relating to the safe insertion, dwell, use, and removal of intravascular devices are scrutinised. The clinical divisions are represented on this group by senior clinicians and nurses. The multidisciplinary group reviews all MRSA and MSSA bacteraemias; trends are noted and acted upon to provide safe practice for our patients. One key challenge this past year has been the NWL procurement collaborative to standardise vascular access packs, there has been lack of agreement on the contents across the sector; we have rejected a lesser product in favour of incumbent product. The committee are now reviewing Datix's related to vascular access across the organisation to further scrutinise our clinical practice. One serious incident was reviewed related to a removal of a central venous catheter causing a less than optimal outcome, with multiple actions taken by the clinical area in consultation with the committee to prevent this occurrence in the future. All guidelines related to intravascular devices are reviewed within LSMG to ensure they adhere to recognised national and international guidance and best practice.

## **8 Decontamination and Estates**

### **8.1.1 Sterile services**

Sterile services are outsourced to a third party provider, IHSS Ltd. IPC advise on the development, monitoring, and audit of Key Performance Indicators (KPIs), which are managed by Trust Facilities.

### **8.1.2 Reprocessing units**

Including external work has remained static. Internal and external audits continue as part of the quality system. Imperial continues to retain external accreditation.

### **8.1.3 Medical Devices**

We continue to monitor medical devices being brought in to the Trust including new, loaned, consignment, and research items.

### **8.1.4 Other decontamination**

All other local areas of decontamination, which includes bedpan washers and laboratory sterilisers, continue to be compliant with the relevant regulations.

### **8.1.5 CJD and NICE 666 risk management**

No patients at increased risk for CJD were identified for surgery during this financial year. NICE 196 has now been superseded by NICE 666 in January 2020. This now means that there doesn't need to be a separate pool of instruments for people born after 1996.

### **8.1.6 Projects and estates**

Project and estate developments in 2019/20 include: competition of final refurbishment phase of PICU and parent accommodation at SMH. The hybrid theatre project is in progress. The

refurbishment projects in the A&E and sleep centre at CXH have been completed. Riverside theatre and ward refurbishment is ongoing. At HH, the refurbishment of vascular interventional radiology suite and environment of FGW have been completed. Refurbishment of environment of A7 and A8 is ongoing. Rollout of new hand hygiene dispensers is complete across all hospital sites.

### **8.1.7 Water hygiene and ventilation**

The procedures around the delivery of a safe supply of water continue to be monitored. The ventilation group continues to meet quarterly and oversee the Trust's specialist ventilation systems.

## **9 Serious incident investigations**

There were 8 infection related incidents that required serious incident investigations, these included 6 transmission events (CPE or *Pseudomonas aeruginosa*), an MSSA BSI, and a norovirus outbreak.

## **10 Freedom of Information (FOI) requests**

During 2019/20, the IPC service received five requests for data and information under the Freedom of Information Act (2000). All were completed within the legislated timeframe.

## **11 Review of infection prevention and control policies and audit of compliance**

There is a well-established, comprehensive guideline review programme to ensure all policies are up to date and reflect the latest evidence-based practice. In 2019/20, the following policies and guidelines were reviewed/ratified:

- MRSA Policy
- Diarrhoea and/or Vomiting Policy
- Viral Haemorrhagic Fever Policy
- Ectoparasitic infection Policy
- Infection Outbreak and Incident Management Policy
- Infection Control - Building construction and refurbishment Policy
- Influenza and highly pathogenic respiratory organisms IPC Policy
- Personal Protective Equipment Policy
- Isolation of Patients to Prevent the Transmission of Infection Policy
- IPC Management of Candida Auris Policy
- IPC Management of Antibiotic Resistant Organisms Policy
- Tuberculosis (respiratory) IPC Policy
- Venepuncture guidelines
- Surgical Site Infection Guidelines
- Guidelines for the treatment and management of adult patients with *Clostridium difficile* associated disease
- ANTT Guidelines
- Urinary Catheterisation Guidelines
- Guidelines for the treatment and management of adult patients with *Clostridium difficile* associated disease
- Skin tunnelled catheter Guidelines

## 12 Responding to external issues and directives

In 2019/20 the Trust responded to an NHS Improvement alert highlighting a possible risk of healthcare acquired infection transmission through the use of portable cooling fans. In response all staff were provided with guidance on the appropriate use of cooling fans in clinical areas and the use, monitoring and decontamination on portable fans was reviewed by Estates and IPC.

## 13 Responding to local issues and events

### 13.1.1 *Pseudomonas aeruginosa* and *Klebsiella pneumoniae* on the neonatal unit

Three babies were identified with *Pseudomonas aeruginosa* on the neonatal. Two babies were colonised only, but one was treated for a respiratory infection; however it is not clear that *Pseudomonas* caused this infection as another organism was also isolated. Water testing on the unit continues and is improving, with a reduction in the number of water outlets contaminated with *Pseudomonas*. Also, five babies were found to have the same type of antibiotic-resistant *Klebsiella pneumoniae* between March and June 2019 suggesting that cross-transmission had occurred.

### 13.1.2 CPE outbreaks

Five CPE colonised patients were identified on a medical ward (8S) in March and April 2019 at CXH. These were indistinguishable by typing and transmission was therefore suspected. A full investigation into IPC practice, cleaning, and the environment was undertaken. The outbreak was declared over in June 2019. This was reported as a serious incident (2019/9977).

Six patients were identified with CPE on a paediatric haematology ward at SMH in August 2019. All were identified by screening and represent colonisation. In addition one child subsequently developed a bacteraemia with the organism, possibly associated with a femoral central venous catheter (CVC). The device was removed and the patient was treated but remains an in-patient due to their underlying condition. These isolates were indistinguishable by typing and transmission was therefore suspected. A full investigation into IPC practice, cleaning, and the environment was undertaken. Cleaning concerns were highlighted and rectified and the outbreak was declared over in September 2019. This was reported as a serious incident (2019/1924).

Two separate clusters of CPE were identified on a renal ward in August 2019 at HH, each affecting four patients. One patient had an infection and was treated, the remaining cases were colonisations. These were indistinguishable by typing and transmission was therefore suspected. A full investigation into IPC practice, cleaning, and the environment was undertaken. This was reported as a serious incident (2019/20276).

Three patients were identified with CPE (*Klebsiella pneumoniae* NDM) on a medical ward at HH in September 2019. All were identified by screening and represent colonisation. These isolates were indistinguishable by typing and transmission was therefore suspected. A full investigation into IPC practice, cleaning and the environment was undertaken and no concerns were highlighted.

Three patients were identified with CPE (*Klebsiella pneumoniae* VIM) on a private patients ward at HH in October 2019. All were identified by screening and represent colonisation. These isolates were indistinguishable by typing and transmission was therefore suspected. A

full investigation into IPC practice, cleaning and the environment was undertaken. This was reported as a serious incident (2019/25650), which is under investigation.

Nine patients were identified with CPE (*Klebsiella pneumoniae* OXA-48) on a vascular surgical ward at SMH in December 2019. All were identified by screening and represent colonisation. Isolates from 7/9 of these patients were indistinguishable and two were unique, suggesting cross-transmission between the seven patients. The ward was closed to admissions for 16 days before reopening in mid-January. A full investigation into IPC practice, cleaning and the environment was undertaken.

Two clusters of CPE were identified and managed in January. These clusters included three patients colonised with *Citrobacter freundii* OXA-48 on a haematology ward and two patients colonised with *Citrobacter freundii* OXA-48 on a surgical ward.

### 13.1.3 Norovirus outbreaks

In April and May 2019 there were five outbreaks of norovirus affecting three medical wards at SMH, involving 26 patients and four staff. The management of these incidents, in line with the Outbreak Policy, resulted in five ward closures on three wards. Two of these outbreaks were declared as serious incidents (2019/10210 & 2019/10527 – see table 5).

In January 2020 two patients developed symptoms of norovirus whilst inpatients on a medical ward. Both patients were isolated and recovered quickly. A bay was closed for 4 days and no further cases were identified.

### 13.1.4 ESBL (*E. coli*) on a neonatal unit

Nine babies were identified with an ESBL *E. coli* on the neonatal unit in September 2019. These all represent colonisation and include several sets of multiple births and three singletons. An investigation is being undertaken and focuses on hand hygiene, IPC practice, and decontamination of the environment and equipment.

### 13.1.5 Carbapenemase-producing *Pseudomonas aeruginosa* on a medical ward

Four patients were identified with carbapenemase (VIM)-producing *Pseudomonas aeruginosa* on a medical ward at HH in September 2019. All were identified by screening and represent colonisation. These isolates were indistinguishable by typing and transmission was therefore suspected. A full investigation into IPC practice, cleaning and the environment was undertaken. Cleaning and hand hygiene concerns were highlighted and rectified. This was reported as a serious incident (2019/24098).

### 13.1.6 Influenza A outbreak

In January 2020 four patients and two staff members developed symptoms of influenza on a medical ward. All patients recovered and there have been no further cases.

### 13.1.7 MSSA BSI on a renal dialysis satellite unit

Three MSSA bloodstream infections were identified in three patients attending a satellite dialysis unit in October and November 2019. One patient has died with MSSA bacteraemia featuring on the death certificate. A full investigation into IPC practice, cleaning and the environment has been undertaken and actions are now in place focusing on vascular access device management. Typing indicates that there was no person-to-person transmission. This was reported as a serious incident (2019/27807).

### 13.1.8 COVID-19 on a surgical ward

Six patients who had been admitted to the same surgical ward for more than 14 days developed symptoms and subsequently tested positive for COVID-19 in March 2020. This occurred during the acute phase of the pandemic when visiting restrictions were not in place. A review of the Albert ward patients has been completed by IPC and no further investigation is required. This informed the development of a formal PIR process for HOCl investigations currently being formalised with Divisional colleagues. One patient died and this is being investigated separately via SJR process, in line with other HOCl related deaths.

### 13.1.9 COVID-19 on a medical ward

Five patients who had been admitted to the same medical ward for more than 14 days developed symptoms and subsequently tested positive for COVID-19 in March 2020. This occurred during the acute phase of the pandemic when visiting restrictions were not in place. A review of the Peters ward patients has been completed by IPC and no further investigation is required. Two patients died and these cases were investigated separately via SJR process, in line with any other HOCl related deaths.

## 14 Applied Research

In 2019/2020, IPC have continued to lead and support applied research and develop national guidelines, to improve patient care and service delivery locally and nationally:

- HPRU: For the second time, Professor Holmes was awarded £4M for an NIHR Health Protection Research Unit in Healthcare Associated Infections and Antimicrobial Resistance. The HPRU is a partnership between Imperial College London, Public Health England, Cambridge University, Warwick University and Imperial College Health Partners. It brings together researchers from a range of disciplines and professions—including doctors, engineers, epidemiologists, microbiologists, pharmacists, behavioural scientists, economists and nurses – to address HCAs and AMR via four themes: (1) Priority pathogens; (2) Precision prescribing; (3) Practice, design and engineering; and (4) Population health and policy.
- CAMO: Professor Holmes and colleagues from across Imperial College have successfully been awarded £4M to set up a Centre for Antimicrobial Optimisation (CAMO) from the DHSC/NIHR. This centre brings together multidisciplinary expertise to support and deliver innovative research on antimicrobial optimisation and precision prescribing to improve infection management.
- Colebrook Lab: The NIHR awarded Imperial BRC funds to support capital investment in AMR research. The BRC funded Colebrook Laboratory has been built at Charing Cross Hospital to support applied research in AMR, has been developed as a dedicated Research Laboratory in the key priority area of AMR.
- IPC are working with Imperial College and PHE to address the local and national challenges associated with carbapenemase-producing organisms. Through this research programme IPC have supported the development of a novel diagnostic test for emerging mcr genes (Sci Reports. 2020), and have recently published a local evaluation of enhanced CPE screening programmes to better understand the local epidemiology of CPE and inform IPC interventions (JAC 2020).
- As a board member of the international Surveillance and Epidemiology of Drug Resistant Infections Consortium (SEDRIC), Professor Holmes has contributed to their recent evaluation and recommendations on methodological approaches to estimate the global burden of AMR (Lancet Infect Dis. 2019, Nov;19: S1473-3099).
- IPC General Manager, Dr Jon Otter, co-authored an Institute for Molecular Science and Engineering commissioned briefing paper on 'Smart surfaces to tackle infection and

antimicrobial resistance' which explores the development of novel surfaces to tackle antimicrobial resistance in clinical settings

- Experts in the IPC team have shaped national and international COVID-19 guidelines through WHO COVID related panels and groups, UK Scientific Advisory Group for Emergencies (SAGE) Coronavirus Response; and COVID-19 Genomics (COG)-UK Hospital Onset COVID-19 Infection Study Group. Since the start of the COVID-19 pandemic, IPC have led and supported applied COVID-19 research.

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