

IPS Ten Years on – Jubilee Conference with Multifaceted Programme

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The British Infection Prevention Society held its jubilee conference in Manchester. The delegates were able to choose from a varied block of topics in accordance with their professional background and level of knowledge. For example, there were special sessions on domiciliary care and for dentistry personnel, and as always also talks aimed at those who were “New to Infection Prevention”.

I Health education and behaviour change

“Why is it so difficult for me to get people to follow basic infection control practices?!” That question was posed by Prof. Michael A. Borg from Malta who spoke about the difficulty of effecting behaviour change. Despite the plethora of evidence-based guidelines and literature, implementation of correct infection prevention and control (IPC) procedures continued to be a challenge in healthcare settings.

That meant that attempts to implement IPC measures were often suboptimal or even failed. It was difficult to change, in particular, long-established behavioural practices. There were positive examples from industry showing how behaviour changes could be achieved. These could serve as models for effective infection control/hygiene strategies.

Health education was the focus of a talk by Charlotte Eley. The e-bug programme

pioneered by Public Health England was a community education course on antibiotics, infections and hygiene (primarily aimed at children). She explained that 80% of all antibiotics were prescribed in the community, of which some 50% were unnecessary. These insights on hygiene and self-care (hand and food hygiene, an introduction to microbes, etc.) were incorporated into a six-week course and its effectiveness verified by completing before and after knowledge questionnaires. The pilot course participants were young mothers and adults with learning difficulties. The results demonstrated an improvement in participant knowledge, in particular of microorganisms and antibiotics. Likewise, behaviour changes were reported (e.g. more frequent hand washing and tooth brushing). The speaker pointed out that the course, which could be downloaded free of charge at www.e-Bug.eu/beat-the-bugs, was suitable for promoting awareness and knowledge of hygiene among the public.

I Clostridium difficile – current challenges

Professor Thomas V. Riley, Australia, spoke about Clostridium difficile. A significant number of infections in the western healthcare sector were attributable to *C. difficile*. Since the early 2000s there had

been major outbreaks in North America and Europe. Conversely, little was known about the *C. difficile* infection rates in other parts of the world – nor about important aspects of the natural and evolutionary history of *C. difficile*.

Riley elaborated on the One Health Concept, a worldwide strategy for interdisciplinary cooperation and communication on all aspects of healthcare for humans, animals and the environment. 70% of emerging infections in recent years were vector-borne diseases or zoonoses – animal diseases transmissible to humans. Riley explained that *C. difficile* infections were also zoonotic diseases, in either a direct or indirect sense. *C. difficile* was apparently found to colonize the gastrointestinal tract of all animals during the neonatal period. While this bacterium was unable to compete with other bacterial species, it was able to undergo rapid growth once the human intestinal flora had been eliminated through antibiotic treatment.

The use of cephalosporins had exacerbated problems with *C. difficile*, and their use for animal production had in the meantime given rise to a massive repository of this bacterium also outside the hospital. Riley finished by drawing attention to the need for awareness and good surveillance to monitor the infection rates and prevent the emergence of antibiotic-resistant strains. Dr Michael Weinbren, Consultant Microbiologist at Chesterfield Royal Hospital, spoke in a Meet the Expert session also about *Clostridium difficile*. He described its basic characteristics and transmission routes, and also gave an overview of the clinical manifestations of pseudomembranous colitis.

C. difficile spores were spread to all environments and did not need moisture,



hence cleaning was of paramount importance. There continued to be periods of increased incidence of *C. difficile* infections or outbreaks which could be brought under control through cleaning. The problem was that often accessories and items in the patient's surroundings were not properly cleaned e.g. blood pressure cuffs.

In situations where patients used their own personal appliances, e.g. wheelchairs, CPAP (continuous positive airway pressure) machines, these were often not included in the cleaning operation since there was a lack of understanding of who was responsible for that. Weinbren stated that by limiting such patient items in his own institution it had been possible to reduce the spore burden. He also stressed that effective terminal cleaning e.g. with UVC and H₂O₂, should be preceded by thorough precleaning, but that standardization and monitoring were often a problem.

However, *C. difficile* was often newly introduced from the hospital via the admission wards. Here, the standard of cleaning was frequently inadequate and items such as beds from these wards were used to transfer patients to other wards and examination rooms. That served as a vehicle

to spread the spores throughout the hospital. Evidence of that came to light at times, as demonstrated by Weinbren on the basis of one example. Five patients with *C. difficile* infections which manifested at different time points and on different wards were found to have one thing in common: they had been admitted on the same day via the same admission ward.

! The role of the microbiome

Dr Nicola Fawcett from Oxford described the human microbiome as the “microbial armour” and reported on its role in infection prevention. There was growing evidence that the microorganisms colonizing the human body played a key role in resistance to colonization and infection by pathogenic organisms. They could do so through direct competition and interaction, or indirectly through their effects on the immune system, which was reliant on commensal microorganisms, e.g. in the intestines, to function properly.

Accordingly, interventions such as the use of antibiotics or other measures that positively or negatively impacted the human microbiome had implications for infection resistance. Dr Fawcett mentioned the prospects for future interventions – research

was underway to ascertain how manipulation of the microbiome could be used to improve health and infection prevention. Bloodstream infections and sepsis Professor Jacqui Reilly, Scotland, reported on the topic of bloodstream infection (BSI), its current epidemiology and on the symptoms on which diagnosis was based (positive blood cultures plus fever and hypotension). Hence, its definition was not unlike that of sepsis.

Reilly presented data from Scotland; *Escherichia coli* was by far the most commonly implicated pathogen. 12% of all health-care-associated (nosocomial infections) related to BSI or sepsis. 10% of all antibiotics of which 15% were broad spectrum antibiotics, were prescribed to combat these infections.

She continued her lecture by addressing prevention strategies. Early detection through screening was important, as was early treatment of primary infections. There was also a need to create public awareness of the symptoms, for example temperature drop as a sign of deterioration, since 50% of BSIs occurred in the community. More rigorous measures were needed to promote personal hygiene and hand hygiene. And finally antibiotic stew-

ardship played an important role. In the context of the one health concept, attention had to be also paid to animals since they served as reservoirs.

I Isolation as a means of prevention – prospects and limits

In parallel sessions other topics were addressed in the afternoon.

Brett Mitchell et al. from Australia evaluated the potential benefits of installing temporary isolation facilities to supplement the limited number of single rooms and isolation facilities available in hospitals. The portable isolation room (Redi-Room™) could be installed on existing wards. By direct observation, video recording and questionnaires, procedures within the isolation room were compared and evaluated versus those in a standard (control) room after 13 nurses were randomly assigned to one or the other room where they had to perform various clinical (nursing) activities over three days. A technical assessment was also undertaken by infection control professionals.

The movements as well as the time needed for the activities were largely identical in both room types. The various tools used for evaluation proved to be adequate and could serve as a valuable basis for evaluation of new technologies in hospitals.

Elaine Ross and colleagues investigated whether a PCR (polymerase chain reaction) point of care testing (POCT) platform for influenza and respiratory syncytial virus (RSV) on admission could be useful to ensure that patients received correct treatment sooner and to facilitate management in periods of extreme winter bed pressures (e.g. during flu epidemics).

The PCR unit was installed in the admissions' department and was able to confirm or rule out influenza or RSV within 30 minutes. These results could be taken into account for treatment decision-making as well as for patient placement (e.g. isolation).

It was revealed that following the introduction of point of care testing no cases of healthcare-associated influenza or RSV infection occurred. POCT helped promote cohort nursing of symptomatic patients as well as optimize the use of single rooms or isolation rooms. In addition, this system contributed to standardization of influenza prophylaxis and treatment.

Lisa Ritchie from Scotland reported on the results of admission risk assessment and pre-emptive patient cohorting in the control of MRSA patients. A prospective study was carried out at two hospitals over a period of 16 months to investigate whether pre-emptive cohorting of those patients identified as at high risk for MRSA could impact the MRSA transmission rate on general wards.

Screening swabs were taken from all patients on admission and discharge in order to document MRSA baseline colonization and infection contracted in the course of the study.

The study unfolded in three phases: in phase 1 patients identified as risk patients were isolated in single rooms. In the second phase the risk patients were pre-emptively cohorted, while in phase 3 the original practice from phase 1 was reinstated. The swabbing and laboratory tests showed that 1% of the screened patients had contracted MRSA in the course of their hospital stay. The speaker pointed out that patient cohorting did not positively impact the transmission rates and on its own did not appear to be a suitable strategy for transmission prevention.

I Vascular access – what is the best approach?

Vascular access was the focus of two lectures in the afternoon.

Steve Hill from the Christie NHS Foundation Trust in Manchester used this as an example to demonstrate how clinical evidence could influence practice when introducing new devices and products.

He explained that a new catheter type had been investigated in 42 patients. The parameters investigated were e.g. successful puncture on the first attempt, flow rate, infections and other complication rates. The findings were compared with those of the literature.

The greatest challenge faced was catheter-related thrombosis; in the oncology setting, in particular, this gave rise to additional costs and detracted from the quality of life. Although the new catheter scored highly for successful puncture, the higher thrombosis rate and the ensuing higher infection and complication rates meant that the catheter was not introduced for routine use.

Hill presented similar studies, e.g. on the alternative placement of catheters in the case of chest wall metastases, where placement in the trapezius muscle was found to be associated with fewer complications. Hill stated that the evidence collected in these cases had led to a change in practices and could be implemented in small steps. Interdisciplinary cooperation was important to see a problem from different angles and collect reliable data.

Tim Jackson, Consultant Anaesthetist from Calderdale and Huddersfield, dealt with placement of vascular lines. This was undertaken in various disciplines – either in the respective department or by anaesthetists or emergency medicine physicians – using different approaches. In certain places there were “vascular access teams”, especially in oncology. That called for standardization or agreement on best practice. To cite Jackson, the overriding goal was to ensure that “the patient receives the right line and in the right time”. While an evidence-based and fundamentally standardized approach was important, that was not always the correct basis for decision-making or for all patients – in particular in oncology. At times, other approaches were more suitable for an individual patient, for whom even small changes could mean an improvement.

Central venous access devices were not as risky as commonly assumed when properly placed. These were often the best choice, especially when administering substances that caused vascular damage (e.g. vancomycin) or in patients needing frequent or numerous peripheral vascular access devices.

A framework of tools had been developed to guide decision-making for the best vascular access choices (UK Vessel Health and Preservation). Implementation of the framework into the real world remained a challenge despite its benefits being acknowledged by all concerned. Here, too, it was not easy to change established practices, in particular in times of cost pressures and staff shortages.

Jackson finished by pointing out that the data provided by the institutions already applying the framework were encouraging and he called for documentation of the framework measures as proof of their impact.

I Dentistry – special risks, special difficulties

The focus on the second congress day was on the infection control challenges in dentistry.

Prof. Andrew Smith from Glasgow reported on mechanisms of resistance development and cited metronidazole resistance as a new problem of unknown magnitude. 57% of all metronidazole prescriptions issued in the outpatient setting were in dentistry. Smith pointed out that metronidazole was not at all called for. Amoxicillin was the antibiotic of first choice for the majority of dental infections.

Carbapenemase-producing *Enterobacteriaceae* (CPE) were on the rise and presented a risk, in particular to immunocompromised patients, leading to mucosal lesions and periodontitis. In Scotland an outbreak following transmission in a dental practice was reported.

The Glasgow Dental Clinic had formulated a CPE protocol with preoperative screening. Patients who tested positive were treated at the end of the day in separate rooms which were subsequently thoroughly cleaned.

Odontogenic infections on the whole were on the rise. In Glasgow two to three patients were treated each week, in some cases needing intensive treatment.

Smith stressed the importance of having in place a screening protocol and functional surveillance system. But that was difficult given the existing personnel shortages. For example, in the whole of the United Kingdom there were only six microbiologists who were specialists for oral infections, of whom three were in Scotland.

Likewise, in the dentistry session Dr Jimmy Walker, Scientific Leader in Water Microbiology at Public Health England (PHE), reported on studies into prion transmission and on the efficacy of automated washer-disinfector processes. While there was limited evidence, there had been reports of transmission of hepatitis B and *Staphylococcus aureus* during dental procedures because of inadequate instrument decontamination. The handpieces were a particular problem since organic material, microorganisms and tissue residues could accumulate in their lumens. Endodontic files had already been declared for single-use due to the potential risks they posed. A study by PHE investi-

gated the cleaning efficacy of automated washer-disinfector processes for dental instruments.

The study was carried out in accordance with standard ISO 15883 Part 1 and 2 using the Edinburgh Test Soil and thermometric verification of the disinfection parameters.

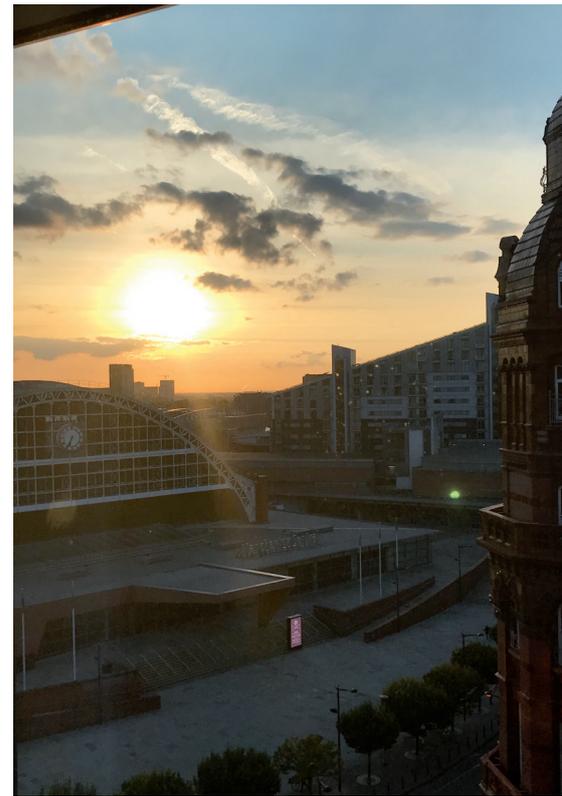
13 washer-disinfectors (WDs) were tested; three WDs were unable to demonstrate successful cleaning of dental handpieces. Brian Crook spoke about respiratory risks in dentistry. He explained the fundamentals of aerogenic transmission and the hazards associated with splashes, droplets and aerosols. The latter were extremely light and could be spread over long distances.

In dentistry the water-carrying systems presented a particular risk; pseudomonads and legionellae could grow and persist within such systems.

Crook also explained how to choose the correct respiratory protective equipment, especially orofacial masks. A good fit was important and this should ideally be checked around every two years. The protection class should be tailored to the risk. Flowcharts showing the risks posed by aerosols or droplets should be consulted. Likewise, the risk emanating from the individual patient should be taken into account.

I Risks from water and the air

The following talks focused on the water network. Susan Paton and colleagues investigated the transmission of carbapenemase-producing *Enterobacteriaceae* (CPE) via a hospital's waste water system. CPE was found in the hospital sinks, waste traps and drains. At Public Health England in Porton a laboratory model, incorporating stainless steel utility sinks, clinical handwash basins and corresponding fittings, water temperature and hardness levels, had been designed and built to simulate a clinical setting and investigate the impact of various parameters on colonization, propagation and dispersal of CPE. Waste traps contaminated with CPE-containing biofilm were removed from the hospital and the test model installed to replace them. The tests carried out included investigating the impact of handwash soap, detergents and synthetic dishwasher in combination with four times daily flushing of the system.



Handwash soap had little impact on bacterial count; however, bacterial counts declined when detergent was omitted and increased rapidly on using the synthetic dishwasher. Apparently some of the added substances served as nutrients, leading to bacterial growth. The results demonstrated, among other things, the importance of appropriate disposal of hospital waste. Aerosolization was also investigated but there was no evidence of CPE in the aerosols released during routine sink use. Sophie Baranovsky from Montpellier reported on the monoclonal colonization of the water network of an intensive care network with *Pseudomonas aeruginosa* ST299. That allowed assessment of the residual infectious risk associated with water routed through antimicrobial filters. Colonization was detected just before opening a new intensive care unit. All 65 water points-of-use were immediately fitted with antimicrobial filters. During the first 18 months water samples were taken monthly to check filter efficacy and monitor colonization. All *P. aeruginosa* strains isolated from patients were typed. 8% of the water samples were positive (2% positive for *P. aeruginosa*). Of 279

clinically isolated strains 15 were identical to strain ST299 (that applied to 6.7% of all patients colonized with *P. aeruginosa*) despite all points-of-use being fitted with filters. That demonstrated that the antimicrobial filters were not completely effective and that despite the filters patients were exposed to an infection risk if the water network was highly contaminated.

Eleonora Dyakova from London reported in her lecture on an air disinfection unit to reduce the risk of contaminated aerosol transmission from heater-cooler units. Infections with *Mycobacterium* species had been reported in a number of patients following cardiac surgery during which cardiopulmonary bypass machines (heater-cooler units) had been used. In August and September 2016 a Plasmaid air disinfection unit was installed in a cardiothoracic operating theatre; four other operating theatres served as controls. Air sampling was carried out in July (before installing the unit) as well as in November (after removal of the unit). Air samples were collected from the front and rear outlets of the heater-cooler units.

Air contamination in the test theatre with the disinfection unit was significantly lower than in the control theatres (1 vs. 13 cfu per 500 l air, $p=0.01$). There had essentially been no difference in contamination levels prior to installation of the unit. These findings suggested that disinfection units could help to reduce the risk of contaminated aerosols from heater-cooler units.

I Hand hygiene – keep it simple?

The topic of hand hygiene was addressed in a debate. The motion: “All 5 moments of hand hygiene (based on WHO) are equally important” was debated by Prof. Didier

Pittet (for the motion) and Prof. Michael Borg (against the motion).

Pittet stated that the efficacy of the 5 moments (before touching a patient, before clean/aseptic procedures, after body fluid exposure/risk, after touching a patient and touching patient surroundings) was well documented in the literature. That concept had markedly increased hand hygiene compliance rates. Studies had already demonstrated 80% compliance for moments 1, 4 and 5 (before and after touching a patient or their surroundings). Evaluation and, in particular, feedback were important. That promoted an understanding of the concept and helped implement it. Staff should be regularly reminded about the 5 moments to increase compliance rates.

It was helpful to view the patient and their immediate surroundings (patient zone) as potentially infectious and to implement the 5 moments' concept in the interest of institutional safety. Pittet cited a number of studies and finished off by emphasizing that only for hand hygiene had a significant link to infection reduction been identified. Efforts to give more prominence to any individual component of the 5 moments' concept could cause confusion since that would mean deviating from the original training content. Pittet finished off by pointing out since the 5 moments' concept had been found to be effective and successful, it should be fully implemented and not watered down as that could jeopardize safety and put compliance rates at risk. Michael Borg expressed the view that particularly high compliance rates could be achieved by keeping things simple. He said that when added up the moments allotted during a working day to hand hygiene

measures amounted to around 270, i.e. about one hour working time had to be spent on.

Besides, having too many choices paralysed decision-making, as demonstrated by consumer studies.

The HACCP concept was originally pioneered by US space travel agencies. Borg said that analysis of critical control points, when applied to hand hygiene, showed that only one of the 5 moments was retained, i.e. hand disinfection before touching the patient.

In his institution in Malta the 5 moments' compliance rate had never risen beyond 40% despite numerous training courses, etc. Since concentrating on one moment, compliance had risen to over 60%. The advantage here was that staff knew exactly what to do and no longer had to grapple with indecision.

Keep it simple – that concept appeared to convince the audience, too, since when put to a vote Prof. Borg's argument got considerably more votes.

The above is a selection of the multifaceted topics presented and debated in Manchester. Next year the IPS conference will be held from 1 to 3 October in Glasgow, Scotland. ■