IDWeek 2018 Conference Highlights

IDWeek 2018, the annual meeting of the Infectious Diseases Society of America (IDSA), the Society for Healthcare Epidemiology of America (SHEA), the HIV Medicine Association (HIVMA), and the Pediatric Infectious Diseases Society (PIDS) was held Oct 3 through Oct 7, 2018, in San Francisco. With the theme “Advancing Science, Improving Care,” IDWeek 2018 brought together more than 7,000 physicians, researchers, clinicians, and epidemiologists to present, discuss, and listen to the latest in prevention, diagnosis, treatment, and epidemiology of infectious diseases.

The meeting began with a special plenary session titled “Reaching for the Stars, Improving Science on Earth: Microbiome Research in Space,” by Kathleen Rubins, PhD. Rubins holds a BS in molecular biology and PhD in cancer biology. She was selected by the National Aeronautics and Space Administration (NASA) in 2009. She has spent 115 days in space, where she became the first person to sequence DNA in space, and she also conducted two space walks. During this session, she described the challenges of conducting routine experimentation in space and the importance of understanding infection control and physiological changes to the human body while in space that predisposes astronauts to infection or re-activation of latent viruses. Her work will grow in importance as NASA plans for longer space travel to the moon or Mars.

A significant portion of the scientific program was devoted to antibiotic resistance and antimicrobial stewardship. There were 11 sessions devoted to antimicrobial stewardship. Topics pertaining to antimicrobial stewardship included sociobehavioral approaches, appropriate measurable outcomes, diagnostics, communication strategies, challenging populations, role of the infectious diseases physician, bacterial infections, dialysis patients, development and implementation of programs, and global perspectives.

Other sessions focused on new advancements in diagnostics, including metagenomic-based infectious diseases diagnostics. This session explained how next-generation sequencing (NGS) can be used to predict phenotypic bacterial resistance to antimicrobials, as well as the detection of infectious pathogens, including during outbreaks.

Review the CIDRAP-ASP selected abstracts on the ensuing pages for more specific information from the meeting. IDWeek 2019 will be held Oct 2 through 6 in Washington, DC.

-Marnie L. Peterson, PharmD, PhD
Some ECCMID Abstract Highlights

from Chris Dall, CIDRAP News reporter

De-colonization of therapy dogs lessens risk of MRSA spread, study finds
A pilot study conducted by researchers at Johns Hopkins found that using a special antiseptic shampoo and wipes to decolonize therapy dogs before and between visits with young cancer patients can reduce the transmission of methicillin-resistant *Staphylococcus aureus* (MRSA).

In the study, the investigators sampled 45 cancer patients and four therapy dogs at Johns Hopkins Bloomberg Children's Hospital for the presence of MRSA before and after 13 therapy dog visits. Seven of those visits were control visits, in which the dogs were not decolonized; in the six intervention visits, the dogs were bathed with a chlorhexidine-based shampoo prior to visiting patients and were cleaned with chlorhexidine wipes between patient visits.

The hypothesis was that the dogs could be a vector for transmitting MRSA between patients. MRSA carriage in cancer patients is a concern because their weakened immune systems put them at greater risk of infection.

The investigators found that 4 of the 45 patients became MRSA carriers after the control visits, as did three of the dogs. Patients who interacted more closely with the dogs were six times more likely to be colonized with MRSA than those who didn't interact closely.

But during the six interventions visits, only one of the patients and two of the dogs became colonized, and the risk for MRSA transmission among patients who interacted closely with the dogs was significantly reduced. Overall, regardless of the level of interaction, the intervention reduced the risk of MRSA colonization in patients by 90%.

"While there was still a risk of children for children being involved in these therapy visits, because of their direct contact with other patients or other environments, it essentially removed the dog from the equation, which overall increased the safety of the visit," lead study author Kathryn Dalton, VDM, MPH, of Johns Hopkins Bloomberg School of Public Health, said at a press conference.

Dalton said they also observed many patient benefits from therapy-dog visits, including decreased stress levels and fewer reports of anxiety and pain. Because of the positive results, Dalton and her colleagues have received additional funding for a larger study involving multiple hospitals.

IDWeek 2018 abstract #160

Study links reduced antibiotic use in infants, decreased asthma incidence
A population-based ecological study by a team of Canadian researchers found a correlation between reduced antibiotic use in infants and a decrease in asthma incidence.
In the study, researchers from the University of British Columbia (BC) and the British Columbia Centre for Disease Control used data from BC PharmaNet, a population-based database on outpatient prescribing, to calculate the annual prescription rate in infants under the age of 1. Then, using BC's universal physician billing, hospital, and drugs database, they calculated age-stratified asthma incidence in children ages 1 to 4. Correlation between the antibiotic prescribing rate and asthma incidence in the following year was estimated using a Spearman test.

The researchers found that, from 1999 to 2013, the antibiotic prescribing rate in infants under 1 fell by 58%, from 1,014 to 427 prescriptions per 1,000 population per year. From 2000 to 2014, asthma incidence in children ages 1 to 4 fell 26%, from 27.3 to 20.2 cases per 1,000 population/year. The Spearman correlation coefficient was 0.81 (\( P = 0.0002 \)), which indicates strong correlation between the two trends.

The findings are noteworthy because antibiotic use in infants has been associated with an increased relative risk of asthma in cohort studies, possibly due to the removal from the infant microbiome of bacteria that protect against asthma.

The researchers say that since this was a population-based ecological study, it's possible other factors may have been involved in reduced asthma incidence. They suggest the trends should be further investigated in a large cohort study.

**IDWeek 2018 abstract #920**

**Study finds reduced fluoroquinolone use prior to FDA warnings**

Researchers from the Duke Center for Antimicrobial Stewardship and Infection Prevention reported that fluoroquinolone use declined at 29 southeastern US hospitals before the US Food and Drug Administration (FDA) issued a black box warning on fluoroquinolone use in 2016.

The researchers performed the retrospective cohort study of antimicrobial use at the hospitals, which are part of the Duke University Health System and an associated outreach network, from 2013 to 2017. They used an interrupted time series approach to estimate the longitudinal trend and the effect of the FDA safety announcement on antimicrobial use trends. The FDA issued the black box warning in 2016 in response to reports of side effects involving tendons, joints, and nerves that were associated with fluoroquinolone use. The warning recommended avoiding fluoroquinolones for certain conditions if other options were available.

The data showed that over the 60-month period, fluoroquinolone use declined at a consistent rate of 1 day of therapy per 1,000 patient-days per month, with a 10% overall decrease before the FDA warning. While a significant drop in fluoroquinolone use occurred at the time of the announcement (\( P = 0.002 \)), there was no significant change in trend (rate ratio [RR], 0.89; 95% confidence interval [CI], 0.79 to 1.01). However, alternative antibiotic use significantly increased after the warning, with increases observed in use of community-onset agents (RR, 1.24; 95% CI, 1.11 to 1.38), atypical agents (RR, 1.40; 95% CI, 1.19 to 1.66), and third-generation cephalosporins (RR, 1.54; 95% CI, 1.19 to 1.65).

The authors of the study say the observed decline in fluoroquinolone use prior to the FDA warning is likely due to stewardship activities at the Duke University Health System that focused on quinolone-
With new CRE definition, CDC study detects higher incidence

A multistate surveillance study conducted by the US Centers for Disease Control and Prevention (CDC) and state health departments found a large increase in carbapenem-resistant Enterobacteriaceae (CRE) incidence, and a rise in community-associated (CA) cases, after a change in the case definition.

The population-based surveillance study for CRE incidence was conducted by the CDC and eight state health departments participating in the agency's Emerging Infections Program to compare CRE epidemiology before and after the change, which was made to improve sensitivity for detecting CRE. Prior to 2016, a CRE case was defined as an isolate of *Escherichia coli*, *Klebsiella*, or *Enterobacter* that was intermediate or resistant to carbapenems (imipenem, meropenem, and doripenem) and resistant to cephalosporins (ceftazidime, ceftriaxone, and cefotaxime). The definition was widened in 2016 to *E coli*, *Klebsiella*, and *Enterobacter* isolates with resistance to imipenem, meropenem, doripenem, and ertapenem.

For the study, the researchers collected reports of CRE isolates identified under these two definition by clinical labs in the surveillance areas, along with data from medical records. They defined cases as CA CRE if no healthcare risk factors were documented. They also tested a convenience sample of isolates for carbapenemase genes.

The results showed a total of 443 incident CRE cases in 2015, compared with 1,149 cases in 2016. The crude overall pooled mean incidence was 2.9 (range by site, 0.45 to 7.19 cases) per 100,000 population in 2015 and 7.48 (range by site, 3.13 to 15.95) in 2016. The most common CRE genus in 2015 was *Klebsiella* (51%) and in 2016 was *Enterobacter* (41%). In 2015, 12% of cases (52/442) were CA CRE, compared with 23% (267/1,149) in 2016. Among the subset of tested isolates, 48% (109/227) were carbapenemase-producing (CP) CRE in 2015, and 20% (109/551) were CP CRE in 2016.

The researchers say the CDC is undertaking efforts to further investigate the observed increase in CA CRE cases.

ASP reduces antimicrobial use, costs in Brazilian hospital

Brazilian researchers reported significant reductions in antimicrobial use and cost in the intensive care unit (ICU) of a public hospital in Sao Paulo following implementation of a multimodal antimicrobial stewardship program (ASP).

The analysis conducted at Sapopemba Hospital looked at antimicrobial consumption in the ICU before and after implementation of the ASP. In the pre-intervention period—January 2014 to December 2015—rational antimicrobial use was based only on post-prescription authorization by the infectious diseases (ID) physician. After the ASP was implemented in January 2016, rational antimicrobial use was based on authorization by an ID physician and implementation of an empirical antibiotic protocol according to institutional microbiological profile. Other elements of the ASP included measurement of adherence to
the protocol and feedback to hospital leadership, pharmaceutical intervention, leadership engagement, and educational measures for medical staff.

The analysis found that overall antimicrobial consumption declined from 1,032 defined daily doses (DDD) per 1,000 patient-days (PD) in the pre-intervention period to 785 DDD/1,000 PD post-intervention. An analysis of the most commonly used antibiotics in the ICU showed a 51% reduction in meropenem use, a 41% reduction in colistin use, and a 41% reduction in vancomycin use. Antibiotic costs fell from a monthly median of US $71,176 to $43,772. No difference in mean mortality or mean Apache score was observed.

"The implementation of the antimicrobial stewardship program can lead to a safe reduction in antibiotic use in the ICU, with significant reduction of costs that can be reapplied in the patient care," the authors of the study wrote, adding that further analysis is needed to assess the impact on patient outcomes.

IDWeek abstract # 1780

Investigators identify Candida auris risk factors in acute care facility
Investigators from the New Jersey Department of Health and the CDC reported that patients colonized with multidrug-resistant organisms (MDROs) at a long-term acute care hospital were at higher risk of also being colonized with the multidrug-resistant fungus Candida auris.

From February 2017 to June 2017, the investigators conducted point prevalence surveys every 2 weeks among admitted patients at a 30-bed long-term acute care hospital, testing swabs collected from patients' armpits and groins for the presence of C auris and analyzed patient medical records for clinical characteristics. They then evaluated the differences between colonized and non-colonized patients to identify risk factors for colonization.

The point prevalence surveys found that 33 of 101 patients (33%) were colonized with C auris, with prevalence ranging from 8% to 38% over the study period. Among colonized patients with available medical data, 19/27 (70%) had a tracheostomy, 20/31 (65%) had gastrostomy tubes, 24/33 (73%) were on ventilators, and 12/27 (44%) had hemodialysis. In addition, 31/33 (94%) were on antibiotics and 13/33 (34%) were on antifungals. Analysis of risk factors showed that the odds of C auris colonization were higher among black patients than white patients (odds ratio [OR], 3.5; 95% CI, 1.3 to 9.8) and among patients colonized with other MDROs versus non-colonized patients (OR, 3.2; 95% CI, 1.3 to 8.0).

The authors of the study concluded that patients at long-term acute care facilities with other MDROs might be at risk for C auris and could be targeted for enhanced surveillance to facilitate earlier detection. They also suggested that measures to control MDRO transmission—including hand hygiene, contact precautions, and judicious antibiotic use—could prevent further C auris transmission.

IDWeek 2018 abstract #161

Bacteriophage treatments show promise in handful of emergency cases
An analysis of a small number of cases suggests that bacteriophage therapy appears to be a safe adjunct therapy for patients with life-threatening Staphylococcus aureus and Pseudomonas aeruginosa infections, a team of US and Australian researchers reported.
The analysis evaluated eight patients in the United States and Australia with infections that were no longer responding to antibiotics who were treated with two types of bacteriophage therapy. Five of the patients received AB-SA01, a cocktail of three phages targeting *S. aureus*, and three patients received AB-PA01, a four-phage cocktail targeting *P. aeruginosa*. In all cases, concomitant antibiotics were continued.

Median duration of bacteriophage therapy was 14 days, with treated patients collectively receiving more than 90 intravenous (IV) doses of AB-SA01 and more than 490 IV and nebulized doses of the AB-PA01. Safety was assessed clinically and using laboratory parameters with up to 90 days of follow-up, and samples were collected to assess bacterial loads, bacteriophage kinetics, and immune responses to phage therapy.

Over the course of treatment, bacteriophage therapy was found to be well-tolerated, and no treatment-related adverse events were reported. Clinical treatment success was documented in 75% of patients. Isolates collected during therapy showed ongoing susceptibility to the treatments, although changes in sensitivity to individual phage components were observed in some cases. Bacteriophage kinetics revealed bloodstream clearance within a few hours of IV infusion.

Based on these findings, the researchers concluded that AB-SA01 and AB-PA01 are promising candidates for controlled clinical trials.

**IDWeek abstract #1642**

**Microbiome disruption observed in healthy volunteers on antibiotics**

A study conducted by researchers at Washington University School of Medicine found that antibiotics commonly used to treat community-acquired bacterial pneumonia reduced microbiome species diversity and richness and increased the abundance of antibiotic-resistance genes (ARGs) in a group of healthy volunteers.

For the prospective cohort study, 20 healthy volunteers were randomized to receive 5 days of levofloxacin, azithromycin, cefpodoxime, or azithromycin plus cefpodoxime. To measure fecal microbiome and resistome disruption in the volunteers, the researchers collected stool samples before, during, and after antibiotic treatment, created microbiological cultures, and extracted and sequenced bacterial DNA. The volunteers included 10 men and 10 women, with a mean age of 37.

The researchers found that bacterial species diversity and richness were significantly lower in all the volunteers 3 days after antibiotic treatment (*P < 0.01* for all volunteers), and that post-antibiotic intra-patient dissimilarity varied by antibiotic. The azithromycin group exhibited chronic alterations in taxa dissimilarity, and the cefpodoxime group had increases in dissimilarity directly after antibiotic treatment, while the azithromycin plus cefpodoxime group displayed acute and persistent microbiome perturbations.

Although there was no significant change in ARG richness after antibiotic treatment, there was a significant increase in ARG abundance across all samples (*P < 0.003*). Unique changes in ARG abundance were observed within each antibiotic treatment group, with samples from volunteers treated with cefpodoxime showing significant increases in ARG abundance.
The researchers say the findings indicate that measures to prevent inappropriate antibiotic use could help avoid microbiome disruption.

IDWeek 2018 abstract #1773