

FisherFocus

Volume 7, Issue 2 | Winter 2018

NEWS FROM THE SHERRILYN AND KEN FISHER CENTER FOR ENVIRONMENTAL INFECTIOUS DISEASES

Dedicated to the clinical research of environmental pathogens which improves the diagnosis and treatment of these infections.

Chicken May Not Be the Healthier Option

Living Near an Industrial Food Animal Production Operation

Evidence is mounting that human health may be affected in communities where industrial food animal production (IFAP) facilities are located. IFAP facilities are large animal operations where animals live in confined areas in densely populated numbers. IFAP, as expected, produces large amounts of animal waste. Mass treatment of animals with antibiotics used for both treatment and prevention appear to be factors driving bacterial drug resistance in these animals and their waste are also agents of human illness such as E. coli and Salmonella. Earlier IFAP research has assessed community health risks associated with people living near swine and dairy/veal operations. Poultry operations have not been examined to date.

Background

Poultry can carry several types of bacteria that cause diarrheal illness in people. Salmonella, Campylobacter and E. coli are among the top causes and can contaminate undercooked chicken or eggs. Thorough cooking of meat and eggs will avoid acquiring these potentially dangerous pathogens that most often sicken the very young and the very old. It is unknown whether poultry production operations affect people living nearby.



Ventilation Fans in a Poultry House
 Photo Source USDA

Environmental contamination from poultry operations has the potential to spread bacteria beyond the farm to nearby communities. These pathogens colonize animals at an early age and spread quickly through a flock. From the poultry houses, bacteria may enter the larger community environment through several pathways. Examples include aerosolized particles or dust emitted through ventilation fans, pests such as flies, and the spread of poultry waste on crop fields as a fertilizer. Bouts of heavy rainfall may facilitate the spread of these harmful bacteria into surface and ground waters.

Fisher Research Project

Drs. Poulsen and Schwartz sought to explore whether poultry IFAP may affect the health of nearby communities through these pathways. Their project took advantage of an extensive database of electronic health record (EHR) data from Geisinger, a large integrated health system that serves approximately 1.6 million patients across central and northeastern Pennsylvania, an area with many IFAP facilities. Geisinger provides primary care services to over 500,000 patients living in this region which offered an exceptional opportunity to study effects of IFAPs across 38 counties. The collaboration with Geisinger allowed study of the health outcomes of tens of thousands of people for relatively low cost.

This project evaluated whether proximity of patient residences to high-density poultry operations was associated with risk of gastrointestinal illnesses or community-acquired pneumonia. Proximity among patients with these illnesses was compared to proximity in persons without the illnesses, frequency-matched on age, sex, and year of contact with the health care system, while adjusting for sociodemographics and other variables.



Chicken, Photo Source USDA



Poultry Flock, Photo Source USDA

WHAT'S INSIDE

Director's Message

Page 02

Living the Hopkins Mission Honorees

Page 03

Chicken May Not Be the Healthier Option
 CONT'D

Page 03

Fisher Center Well Represented

Page 04 - Page 05

Donor Recognition

Page 04

Recent Presentations and Publications

Page 04

MESSAGE FROM THE DIRECTOR



Patricia "Trish" Simner Ph.D. is a treasure. Trish received her doctoral training at the University of Manitoba, studying mechanisms of antibiotic resistance. Johns Hopkins was fortunate to recruit her to Baltimore three years ago, where as an Associate Professor of Pathology, she serves as Director of Medical Bacteriology and Parasitology Laboratories. When I have a patient with a difficult to treat, resistant-infection, she is the go-to person to discuss the "bad bugs" in our clinical microbiology laboratory at Johns Hopkins Hospital.



Dr. Trish Simner

Her study leveraged existing samples taken routinely from patients in our intensive care units who are screened by rectal swabs looking for an organism called enterococcus. Dr. Simner used these to explore how frequently patients hospitalized at Johns Hopkins hospital have resistant Gram-negative infections. Organisms such as Klebsiella and E. coli have become increasingly resistant to the safest class of drugs that treat resistant Gram-negative infections, namely the penicillin derivative class called carbapenems. When patients have these resistant bacteria that do not respond to carbapenems, infectious disease doctors often have to choose toxic drugs such as colistin or gentamicin that may damage the kidneys or ears. These drugs were last used routinely in the 1960s and 1970s before the advent of safer drugs such as the carbapenems.

The study used sophisticated molecular techniques to study risk factors for patients who may harbor these carbapenem-resistant organisms as well as how these bacteria may spread from patient to the hospital environment, potentially affecting other patients. The results are already informing policy decision within Johns Hopkins as well as national guidelines on how best to anticipate if patients may harbor such organisms and how to staunch the spread of these dangerous pathogens to other patients in the hospital.

The Fisher Center is profoundly proud of her accomplishments, but others have noticed as well. The Fisher Center award was Dr. Simner's first research grant, and this provided the important pilot data for winning a prestigious R21 award from the National Institutes of Health (NIH). Moreover, data from the study have already generated 15 peer-reviewed publications benefiting 24 collaborators beyond the microbiology laboratory in the Johns Hopkins Epidemiology and Infection Control Department, Antimicrobial Stewardship Program as well as Biomedical Engineering and Computational Biology.

Such efforts bringing together expertise is highly robust. Such team science is also highly important for new faculty who are beginning their research careers to establish contacts and collaborators for future efforts. Private philanthropy dollars are more important than ever to allow innovative projects such as Dr. Simner's, as traditional research sponsors such as the NIH now rarely grant funds to projects that are only hypothetical but instead are now more conservative and require preliminary data before considering. Recent paylines at the National Institute of Allergy and Infectious Diseases/NIH for first-time applicants such as Dr. Simner fell to an all-time low of 14% this year, whereas twenty years ago the percentage funded was higher than 30%.

Internal research programs such as the Fisher Center Discovery Program are more important than ever as a catalyst for sponsoring young investigators to productive careers that can lead to improved patient care. The generosity of Sherri and Ken Fisher who provided the initial funding for these pilot grants since 2013 has had a substantial magnifying effect as well as many others who have contributed. So far, the Fisher Center Discovery Program has meant that 25 primary investigators have taken the initial awards of typically 40-50,000 dollars each, and now these funds have led to nearly 34 million dollars in new research grants and 64 publications with more to follow. On behalf of the Fisher Center and the awardees, I am so thankful for the inspired philanthropy that has allowed the Center to help spur such success.

With best wishes for a happy and healthy 2019.



Paul G. Auwaerter, MD, MBA
Director, Fisher Center for Environmental Infectious Diseases



To celebrate the 125th Anniversary of the JHU SOM, **125 Living the Hopkins Mission** honorees were selected for their outstanding dedication to our core values of **Excellence & Discovery; Leadership & Integrity; Diversity & Inclusion; and Respect & Collegiality**. Honorees affiliated with the Fisher Center include the following people.

LIVING THE HOPKINS MISSION HONOREES



Brian Garibaldi, MD
Assistant Professor of Medicine
Director, Johns Hopkins Biocontainment Unit

Dr. Garibaldi is a 2018 Fisher Center Discovery Program grant recipient for **Environmental transmission and traceability of aerosolized bio-simulants in a clinical biocontainment unit**.



Damani Piggott, MD, PhD
Assistant Professor of Medicine
Assistant Dean for Graduate Biomedical Education and Graduate Student Diversity

Dr. Piggott received Fisher Center data support for his publication, **Characteristics and Treatment Outcomes of Propionibacterium acnes Prosthetic Shoulder Infections in Adults**.



Reginald Wells
Custodian Floor Technician, Administrative Facilities Support Services

Our beloved Reggie is well known in the Fisher Center for his hard work and dedication to his job above and beyond the job description. His friendly approach and warmth is much appreciated by our staff.

When Chicken May Not Be the Healthier Option If You Live Near an Industrial Food Animal Production Operation

Continued From Page 1

Poulsen and Schwartz found that people who lived closest to larger poultry operations had increased risk of Campylobacteriosis, infectious diarrhea, and community-acquired pneumonia, contributing to growing concern regarding public health impacts of IFAP. This first study in North America to suggest such associations with poultry operations should stimulate further research to study the public health effects of IFAP operations, including methods to limit the inadvertent spread of disease to neighboring residents.

Denmark recognized such health risks in the 1990s and significantly limited the use of veterinary antibiotics for animal production, working in a collaborative style among the agriculture industry, human health researchers, veterinarians, and government agencies. The spread of drug-resistant microbes fell sharply with little negative impact on the nation's pork industry, as an example. Interestingly, animals appeared healthier over time with less antibiotic exposure. Exploring economical methods to incorporate similar practices in the United States will likely help decrease the rates of antibiotic resistance in communities. Identifying ways to limit the effects of animal waste on health will require ongoing study.

This successful study demonstrates the power of small, innovative projects that have a substantial multiplier effect. Dr. Poulsen used this Fisher Center Discovery Program grant to gain experience in new research methods and acquire data that she will use for additional studies. Her success has resulted in two first-author manuscripts and strengthened her successful

application for an Assistant Professorship, as well as serving as a basis for new grant applications. Undergraduate students assisted in data collection, giving them valuable educational experiences outside of the classroom. Lastly, researchers within Johns Hopkins University Schools of Medicine and Public Health joined with investigators at Bucknell University and Geisinger, forming an interdisciplinary research team. Such collaborations are increasingly important as leaps in science more often come when people who have different perspectives and areas of expertise work together.



Chickens in Wire Cages, Photo Source iStockPhoto

FCDP 2016 AWARD: HIGH-DENSITY POULTRY OPERATIONS AND ASSOCIATED INFECTIOUS DISEASE RISKS
BRIAN S. SCHWARTZ, MD, MS AND MELISSA N. POULSEN, PhD, MPH



FISHER CENTER WELL REPRESENTED AT ID WEEK

A number of Fisher Center affiliated faculty presented, received awards or volunteered, making for an outstanding 2018 ID Week, held October 3-7 in San Francisco, CA.

Presenters



Former Fisher Center Discovery Program (FCDP) grant recipients presented their research as an oral presentation, poster abstract, or symposium presentation. These include



Meghan Davis, PhD, DVM, MPH (FCDP 2014); **Pranita Tamma, MD, MHS** (FCDP 2014); and **Patricia Simner, PhD** (FCDP 2016).



Award Recipients



Aaron M. Milstone, MD, MHS, received the 2018 Society for Healthcare Epidemiology of America (SHEA) Mentor Scholar Award for his commitment to mentoring fellows and junior faculty. Dr. Milstone is an Associate Professor of Pediatric Infectious Diseases and Epidemiology at Johns Hopkins University. He is Associate Hospital Epidemiologist at Johns Hopkins Hospital and the Pediatric Lead for Infection

Prevention for Johns Hopkins Health System. He serves on multiple national committees and writing groups guiding practices to prevent healthcare associated infections (HAIs) and emergence of antibiotic resistance. Dr. Milstone is a Fisher Center Discovery Program grant recipient in 2013 for *Development and Clinical Evaluation of Laboratory Methods to Identify Reduced Antiseptic Susceptibility in Organisms Causing Healthcare Associated Infections* and in 2017 for *Impact of Heterogeneous Resistance Mechanisms on Hospital Transmission of Carbapenem-Resistant Enterobacteriaceae (CRE)*.

Volunteers



Michael T. Melia, MD reviewed abstracts. Dr. Melia received data support from the Fisher Center for his *Nocardia* research and is co-investigator on several Lyme disease research projects.



Fisher Center Board Members were active at ID Week. **Karen Carroll, MD** and **Paul Auwaerter, MD, MBA** served on the ID Week Program Committee. Dr. Carroll was an author on several oral and poster presentations and was a symposium moderator. Dr. Auwaerter led the symposium on New and Updated Guidelines.



Richard Moore, MD, was an author on several posters.



ISDA Leadership



At the recent ID Week, **Cynthia Sears, MD**, assumed the Presidency of the Infectious Diseases Society of America (IDSA). Having served IDSA in numerous capacities, Dr. Sears has gained a special appreciation for the Society's

contributions through federal advocacy, improving member services, and educating the public about the value of ID specialists. As president, she looks forward to continuing to further the Society's strategic priorities with a special emphasis on supporting young clinicians and researchers and recruiting the next generation of physician-scientists into the

field of infectious diseases. Dr. Sears was recently honored by the American College of Physicians, receiving the Harriet P. Dustan Award for Science as Related to Medicine, for outstanding nationally or internationally recognized work in science. Dr. Sears is a 2013 Fisher Center Discovery Program grant recipient for *Does Disruption of Host Microbiota Modify*

BreakOut

Global Health Security

At ID week, CDC Director, Robert Redfield, MD, had a conversation with Dr. Auwaerter concerning global health security. Dr. Redfield stated, "Global health security and preparedness is the overarching mission of the CDC," he said. "It is critical for the CDC to continue to prepare here and help other nations prepare for health emergencies." Adding, "We need to take time to build a strong public health foundation both here and abroad." That includes addressing the growing threat of antimicrobial resistance, which, Redfield said, "some people don't see as a security concern but really is one of the biggest."

Discussion was held on response to pandemics, including flu, as a significant health risk. Global pandemics "would cause massive disruptions on transportation, supply chains and other healthcare services, on top of the human health toll," per Dr. Daniel Jernigan, director of the CDC's influenza division



CDC Director, Robert Redfield, MD, discussing global health security with Paul Auwaerter, MD, MBA.

CONT'D on Page 5

FUNDING OUR FUTURE

Thank you to those who contributed so generously to support environmental infectious disease research and education in the past six months. Such gifts help facilitate innovative research, especially targeted to early-career investigators. In particular, we would like to acknowledge

HELEN R. BUCK FOUNDATION

MR. MICHAEL H. KAPLAN

MR. ALAN KRASNER

MR. PARK MILLER

MR. THOMAS OWSLEY

IF YOU ARE INTERESTED IN SUPPORTING OUR WORK, PLEASE CONTACT DONNA BOLIN AT 410-550-9893 OR DBOLIN1@JHMI.EDU

+ RECENT PRESENTATIONS

Fever of Unknown Origin in an Adult? Consider Periodic Fever Syndromes. Paul G. Auwaerter, MD, MBA. Medscape Infectious Diseases. <https://www.medscape.com/viewarticle/898406>. July 2, 2018

Oral Antibiotics for Infective Endocarditis: Time to Switch? Paul G. Auwaerter, MD, MBA. Medscape Infectious Diseases. <https://www.medscape.com/viewarticle/903695>. October 31, 2018

+ RECENT PUBLICATIONS

Residential proximity to high-density poultry operations associated with campylobacteriosis and infectious diarrhea. **Poulsen MN**, Pollak J, Sills DL, Casey JA, Rasmussen SG, Nachman KE, Cosgrove SE, Stewart D, **Schwartz BS**. Int J Hyg Environ Health. 2018 Mar;221(2):323-333. doi: 10.1016/j.ijheh.2017.12.005. Epub 2017 Dec 15. PMID: 29268955

Antibiotic pressure on the acquisition and loss of antibiotic resistance genes in Klebsiella pneumoniae. **Simner PJ**, Antar AAR, Hao S, Gurtowski J, **Tamma PD**, Rock C, Opene BNA, Tekle T, **Carroll KC**, Schatz MC, Timp W. J Antimicrob Chemother. 2018 Apr 10. doi: 10.1093/jac/dky121. [Epub ahead of print] PMID: 29648629

Using Patient Risk Factors to Identify Whether Carbapenem-Resistant Enterobacteriaceae Infections Are Caused by Carbapenemase-Producing Organisms. **Simner PJ**, **Goodman KE**, **Carroll KC**, Harris AD, Han JH, **Tamma PD**. Open Forum Infect Dis. 2018 May 17;5(5):ofy094. doi: 10.1093/ofid/ofy094. eCollection 2018 May. PMID: 29876368

High-density poultry operations and community acquired pneumonia in Pennsylvania. **Poulsen MN**, Pollak J, Sills DL, Casey JA, Nachman KE, Cosgrove SE, Stewart D, **Schwartz BS**. Environmental Epidemiology (2018) 2:e013. Published online 23 May 2018. DOI: 10.1097/EE9.000000000000013.

Does Malnutrition Have a Genetic Component? **Duggal P**, Petri WA Jr. Annu Rev Genomics Hum Genet. 2018 Aug 31;19:247-262. doi: 10.1146/annurev-genom-083117-021340. Epub 2018 Jun 6. PMID: 29874104

Comparison of nylon-flocked swab and cellulose sponge methods for carbapenem-resistant Enterobacteriaceae and gram-negative organism recovery from high-touch surfaces in patient rooms. Rock C, Anderson M, Lewis S, Scheeler V, Nowakowski E, Hsu YJ, **Milstone AM**, **Carroll KC**, Maragakis LL, **Simner PJ**. CDC Prevention Epicenters Program. Infect Control Hosp Epidemiol. 2018 Oct;39(10):1257-1261. doi: 10.1017/ice.2018.182. Epub 2018 Aug 28. PMID: 30152307

Genome-Wide Association Study Reveals Genetic Link between Diarrhea-Associated Entamoeba histolytica Infection and Inflammatory Bowel Disease. Wojcik GL, Marie C, Abhyankar MM, Yoshida N, Watanabe K, Mentzer AJ, Carstensen T, Mychaleckyj J, Kirkpatrick BD, Rich SS, Concannon P, Haque R, Tsokos GC, Petri WA Jr, **Duggal P**. MBio. 2018 Sep 18;9(5). pii: e01668-18. doi: 10.1128/mBio.01668-18. PMID: 30228239

Applying Rapid Whole Genome Sequencing to Predict Phenotypic Antimicrobial Susceptibility Testing Results Among Carbapenem-Resistant Klebsiella pneumoniae Clinical Isolates. **Tamma PD**, Fan Y, Bergman Y, Perlea G, Kazmi A, Lewis S, **Carroll KC**, Schatz MC, Timp W, **Simner PJ**. Antimicrob Agents Chemother. 2018 Oct 29. pii: AAC.01923-18. doi: 10.1128/AAC.01923-18. [Epub ahead of print] PMID: 30373801

Phenotypic Detection of Carbapenemase-Producing Organisms from Clinical Isolates. **Tamma PD**, **Simner PJ**. J Clin Microbiol. 2018 Oct 25;56(11). pii: e01140-18. doi: 10.1128/JCM.01140-18. Print 2018 Nov. Review. PMID: 30158194

Genome analysis of Mycobacterium avium subspecies hominissuis strain 109. **Matern WM**, Bader JS, **Karakousis PC**. Sci Data. 2018 Dec 4;5:180277. doi: 10.1038/sdata.2018.277. PMID: 30512015

FisherFocus

Johns Hopkins University, School of Medicine
Department of Medicine, Division of Infectious Diseases
The Fisher Center for Environmental Infectious Diseases
Pre-Clinical Teaching Building | 725 N. Wolfe Street, Suite 211
Baltimore, MD 21205
fishercenter@jhmi.edu | 443-287-4840

Managing Editor: Yvonne Higgins | yhiggins@jhmi.edu

Design: Stephanie Cohen | scohen58@jhmi.edu

