Methods. Here, we present the first evidence that ambient temperatures may modulate the rate of increase of antibiotic resistance across Europe. Using a comprehensive dataset containing information across 28 countries, for 17 years (2000–2016), 3 common bacterial pathogens, and 4 antibiotic classes collectively representing over 4 million tested isolates, we show that antibiotic resistance has increased more rapidly in warmer regions over a period of nearly 2 decades.

Results. Specifically, we show that European countries with 10°C warmer ambient temperatures have experienced more rapid increases in antibiotic resistance to *E. coli* and *K. pneumoniae* over the 17-year period, ranging between 0.33%/year (95% CI 0.2, 0.5) and 1.2%/year (0.4, 1.9), even after accounting for recognized drivers of resistance including antibiotic consumption and population density. We found a decreasing relationship for *S. aureus* and methicillin of -0.4%/year (95% CI −0.7, 0.0), reflecting widespread declines in MRSA across Europe over the study period.

Conclusion. Our findings suggest that rising temperatures globally may hasten the spread of resistance and complicate efforts to mitigate it.

Disclosures. All authors: No reported disclosures.

1606. Legionellosis Cluster Associated with Direct and Indirect Hot Tub Exposure—West Virginia, 2018

Jared R. Rispens, MD, REHS/RS[1]; Chris Edens, PhD[1];
Albert Barskey, MPH[1]; Jeffrey Mercante, PhD[1]; Troy Ritter, PhD[2];
Stephen B. Martin, PhD[2]; Marisa Hast, PhD[1]; Miriam Siegel, DrPH, MPH[3];
Erica Thomasson, PhD[4]; Jackie L. Huff, BS[5];
Carolyne A. Baker, BS, REHS/RS[6]; Chelsea Everly, Bachelor of Science in Public Health[5]; [1]Centers for Disease Control and Prevention, Atlanta, Georgia; [2]United States Public Health Service, Atlanta, Georgia; [3]National Institute for Occupational Safety and Health, CDC, Cincinnati, Ohio; [4]West Virginia Bureau for Public Health, Charleston, West Virginia; [5]Hancock County Health Department, Chester, West Virginia; [6]WV Bureau of Public Health Sanitation, Weirton, West Virginia

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Background. In October 2018, the West Virginia Bureau for Public Health (BPH) notified CDC of one *Legionella* urinary antigen test (UAT)-positive case of Legionnaires' disease (LD) in a worker at a racetrack facility. Following investigation by BPH and the county health department, five additional LD cases were identified among facility workers within a one-month period. Our objective was to determine the extent of the outbreak and identify potential sources of exposure.

Methods. We interviewed the previously identified patients and conducted case-finding among racetrack workers. Our case definitions included confirmed LD (pneumonia with a positive UAT), suspected LD (pneumonia without a UAT completed), and Pontiac fever (PF) (self-limited, nonspecific flu-like symptoms) among employees with exposure to the facility within 14 days prior to symptom onset. We conducted an environmental assessment of the facility and the surrounding area for sources of potential *Legionella* exposure.

Results. We identified 17 cases (71% in men, 35% in current smokers, median age 55 years): six confirmed LD, four suspected LD, and seven suspected PF cases. Our environmental assessment revealed a poorly maintained hot tub in the first floor jockey area. All samples collected from the hot tub (which was chlorinated before our arrival) tested negative for *Legionella*. Two employees with confirmed LD (33%), three with suspected LD (75%), and six with suspected PF (86%) had direct exposure to the hot tub or adjacent hallway; the remaining six were exposed only to a second floor office suite. Further investigation identified deficiencies in the facility's ventilation systems and a crack in the floor between the hot tub and office areas. These factors created a pathway for *Legionella*-containing aerosols from the hot tub to pass into the second floor office space and air-handling unit for recirculation to occupied areas.

Conclusion. Our investigation suggests that both direct and indirect exposure to a *Legionella* reservoir can cause illness. This finding supports analysis of ventilation systems and airflow dynamics in future LD outbreak investigations. Clinicians should consider LD in pneumonia patients with direct or indirect exposure to suspected *Legionella* sources to ensure appropriate testing and treatment.

Disclosures. All authors: No reported disclosures.

1607. Temporal Patterns and Spatial Synchrony in Pertussis Incidence—the United States, 2000–2017

Heather Reese, PhD, MPH; Nong Shang, PhD; Susan Hariri, PhD; Tami Skoff, MS; Centers for Disease Control and Prevention, Atlanta, Georgia

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Background. Pertussis is a highly contagious, vaccine-preventable respiratory disease. Historically, pertussis incidence was cyclic with peaks in disease every 3–5 years. In the United States, reported pertussis has increased over the past few decades despite high vaccination coverage; however, there is currently no clear national spatiotemporal pattern. We aimed to assess whether geographically distinct areas in the United States: (1) share similar temporal patterns (trend and periodicity), and (2) were synchronous in peaks in pertussis incidence.

Methods. We used pertussis cases reported through the National Notifiable Diseases Surveillance System, and CDC Wonder bridged-race county population estimates, for 2000–2017. County-level pertussis case counts were aggregated by month, and counties were aggregated into population areas of ≥300,000 persons. For each

population area, trend and dominant periods across the study period were extracted using wavelet analysis. Common temporal patterns were identified using hierarchical cluster analysis of trend and periodicity. Synchrony between population area pairs, and between each area and the country as a whole, were assessed using wavelet coherence and phase difference.

Results. There was substantial variability in temporal patterns, though geographically distinct population areas clustered by trend and similar dominant periods of 8 to <19 months, 19 to <38 months, and 38 to 71 months, with three main patterns accounting for 79% (400/506) of all population areas (Figures 1 and 2). The majority of areas had a background period of at least 38 months, and 87% (439/506) of population areas experienced a positive trend. However, only 37% (185/506) of areas were synchronous with the national time series at any time during 2000–2017.

Conclusion. Spatiotemporal patterns in pertussis incidence are complex, and are heterogeneous across the United States. Although a background period of at least 38 months was identified in the majority of areas, similar to the historic perception of a 3–5-year cycle, higher frequency components were also identified. A better understanding of the current spatiotemporal patterns of pertussis will allow us to better characterize current epidemiology and improve prediction of future outbreaks.

Figure 1. Temporal patterns in pertussis incidence in the United States, from 2000 to 2017. Population areas clustered by positive/negative trend, and by dominant periods of 8- < 19mo, 19- < 38mo, and 38-71mo.
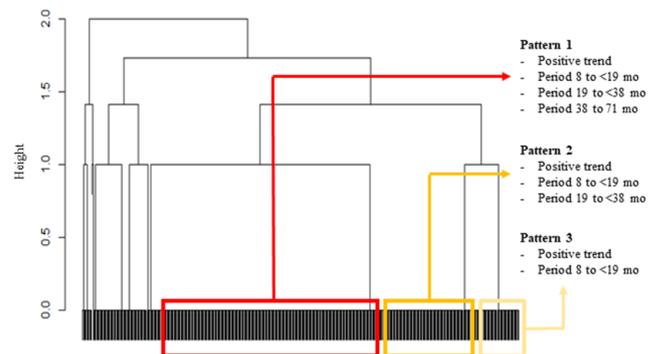
Figure 2. Spatial distribution of the three main identified temporal patterns in pertussis incidence in the United States, from 2000 to 2017.
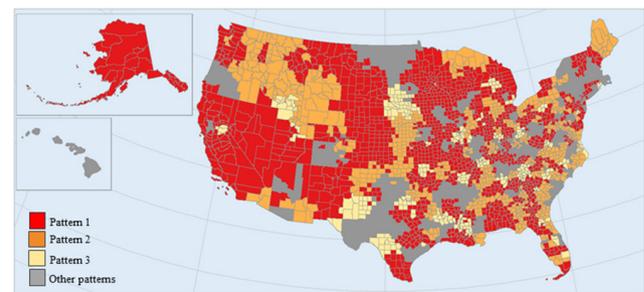
Disclosures. All authors: No reported disclosures.

1608. Use of Selective Reporting of Antimicrobial Susceptibilities and Its Impact on Antimicrobial Resistance Surveillance—National Healthcare Safety Network, 2017–2018

Hsiu Wu, MD; Liang Zhou, MStat;
MINN M. SOE, MBBS, MPH, MCTM; Jonathan R. Edwards, MStat;
Daniel Pollock, MD; Centers for Disease Control and Prevention, Atlanta, Georgia

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Background. Selective reporting (SR), recommended by the 2016 IDSA/SHEA antimicrobial stewardship guidelines, is a strategy to guide prescribing decisions by limiting the antimicrobial susceptibility testing (AST) results available to prescribers. Yet, SR carries risks that cumulative antibiograms reflect only partial AST results. The Clinical Laboratory Standards Institute (CLSI) M100 performance standards stipulate that AST results should be routinely reported for some antimicrobials (Group A agents) while SR is appropriate for other antimicrobials (Group B agents). We assessed the extent of SR use and its impact on national antimicrobial resistance (AR) surveillance.

Methods. We used Enterobacteriaceae (EB) and *Staphylococcus aureus* (SA) blood culture AST results that hospitals reported for group A and B agents to the CDC's National Healthcare Safety Network's AR option from 2017 through 2018. Routine reporting for an organism-agent combination was defined as results reported for ≥ 90% isolates for the hospital's most frequently reported agents. SR was defined as a shortfall of > 20% in results reported for an agent compared with a routinely reported agent in a hospital that reported ≥ 30 isolates. We compared hospital antibiograms

between SR and non-SR hospitals. We also identified isolate characteristics associated with AST reporting in SR hospitals.

Results. Among 242 and 185 hospitals reported ≥ 30 isolates, many showed patterns of SR (Figure 1). Of 437 and 425 hospitals reported ≥ 1 isolate, only 112 (26%) and 152 (36%) routinely reported AST results for all group A agents for EB and SA, respectively. For EB, 345 (79%) hospitals routinely reported AST results for ciprofloxacin or levofloxacin, although both are group B agents. For SA, 324 (76%) routinely reported vancomycin (Figure 2). Antibiograms for many agents differed between SR and non-SR hospitals (Figure 3, 4). In SR hospitals, non-susceptibility to narrower-spectrum drugs, patient location, age, and some species among EB were associated with AST reporting.

Conclusion. AST results reporting vary across hospitals and agents, and CLSI's SR standards are used inconsistently. For AR surveillance, complete reporting calls for solutions that bypass SR. In the meantime, SR should be taken into account in national AR benchmarking.

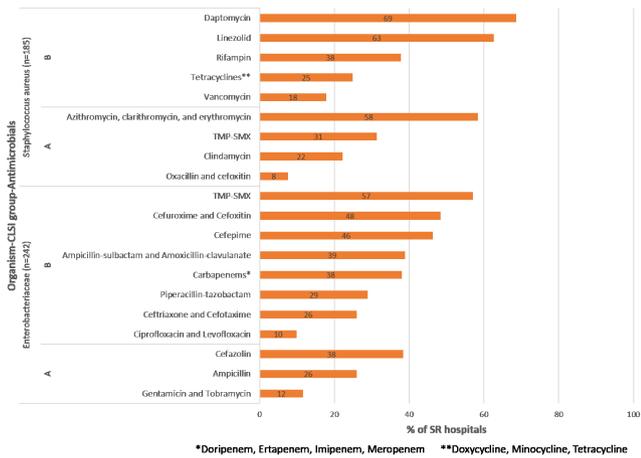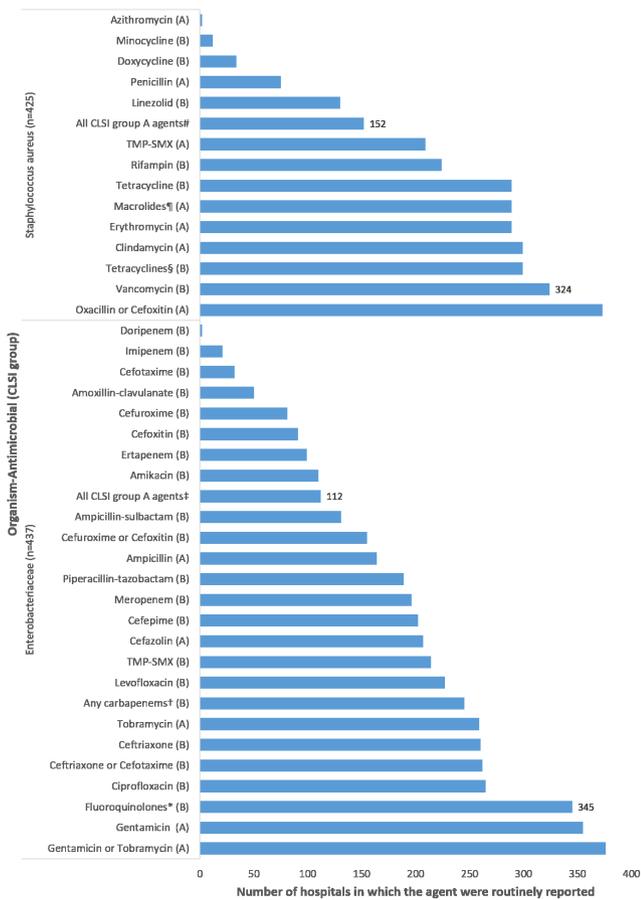Figure 1. Percentage of hospitals with patterns of selective reporting (SR) by antimicrobials

*Doripenem, Ertapenem, Imipenem, Meropenem **Doxycycline, Minocycline, Tetracycline

Figure 2. Number of hospitals in which the susceptibility of the agent was considered routinely reported

*Ciprofloxacin or Levofloxacin
†Doripenem, Ertapenem, Imipenem, or Meropenem
‡Ampicillin, Cefazolin, Gentamicin, and Tobramycin
§Doxycycline, Minocycline, or Tetracycline
¶Azithromycin, Clarithromycin, or Erythromycin
#Oxacillin/Cefoxitin (or Penicillin with susceptible results), TMP-SMX, Clindamycin, and Macrolides¶

Figure 3. Distribution of antibiograms (%S, median, quartiles, and range) of Enterobacteriaceae among SR and non-SR hospitals
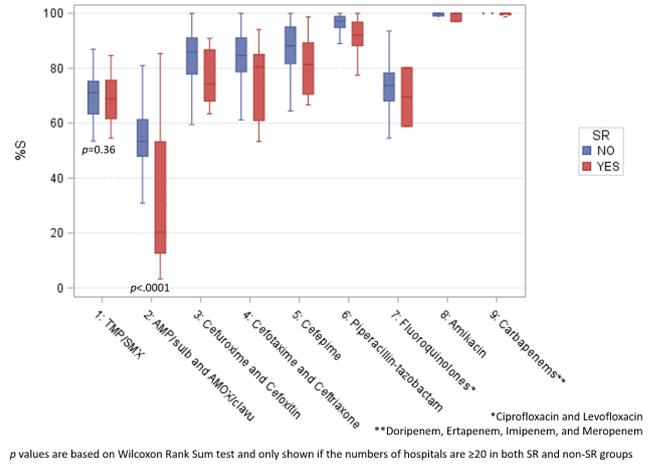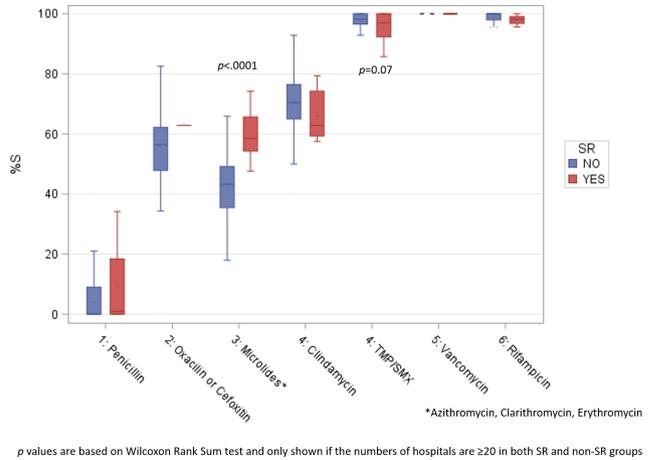

*Ciprofloxacin and Levofloxacin
**Doripenem, Ertapenem, Imipenem, and Meropenem

p values are based on Wilcoxon Rank Sum test and only shown if the numbers of hospitals are ≥20 in both SR and non-SR groups

Figure 4. Distribution of antibiograms (%S, median, quartiles, and range) of *Staphylococcus aureus* among SR and non-SR hospitals

*Azithromycin, Clarithromycin, Erythromycin

p values are based on Wilcoxon Rank Sum test and only shown if the numbers of hospitals are ≥20 in both SR and non-SR groups

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1609. Using a Novel Rapid Test to Investigate a Multistate Outbreak of Coccidioidomycosis Among US Residents Returning From Mission Trips in Baja California, Mexico, June–July, 2018
Mitsuru Toda, MS, PhD[1]; Diego H. Caceres[1]; Francisco J. Gonzalez, MD[2]; Mary Pomeroy, MSN, RN[1]; Genevieve Bergeron, MD, MPH[3]; Eliza Wilson, BSMT[4]; Patrick Franklin, BS[5]; Laura Kresl, MPH-HP[6]; Kristy Lunquest, ScM[7]; Chelsea Raybern, MPH[8]; Adam J. Ratner, MD, MPH[9]; Tom M. Chiller, MD, MPHTM[1]; Brendan R. Jackson, MD, MPH[1]; Mark Lindsley, ScD[3]; Orion McCotter, MPH[1]; [1]Centers for Disease Control and Prevention (CDC), Atlanta, Georgia; [2]New York University School of Medicine, New York, New York; [3]Centers for Disease Control, Long Island City, New York; [4]Department of Health and Mental Hygiene * Public Health Laboratory, New York, New York; [5]Missouri Department of Health and Senior Services, Jefferson City, Missouri; [6]City of Kansas City, Missouri Health Department, Kansas City, Missouri; [7]Maryland Department of Health, Baltimore, Maryland; [8]Kansas Department of Health and Environment, Topeka, Kansas, [9]New York University School of Medicine, New York, New York

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Background. In August 2018, New York City health authorities notified CDC of two students with pneumonia and rash following mission trips to Mexico. Send-out *Coccidioides* serology tests took 7 days for results to return. Both students and five additional travelers from four states were diagnosed with coccidioidomycosis. A seroepidemiologic survey implicated soil-disturbing activities at a single site as a likely source. Given the time to diagnosis observed, we examined the use of a novel one-hour lateral flow assay (LFA).

Methods. We interviewed and collected sera from people who traveled with seven case-patients during June–July 2018 and performed LFA, enzyme immunoassay (EIA), and immunodiffusion (ID). We asked travelers about exposures and symptoms and compared test results with reports of ≥1 coccidioidomycosis symptom(s) within 6 weeks of travel.

Results. Of 133 travelers, we interviewed 108 (81%) and collected sera from 75 (56%). Majority were male teenagers. One-third (34%, 37/108) reported symptoms,