

Research on the Transmission of Disease in Airports and on Aircraft

Summary of a Symposium

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On September 17–18, 2009, a diverse group from academia, government, industry, and nonprofit organizations convened at the National Academies' Keck Center in Washington, D.C., to share insights into the transmission of disease in airports and on aircraft. The Transportation Research Board (TRB) has published a summary of the symposium, including speaker-written highlights of the presentations, as Conference Proceedings 47, *Research on the Transmission of Disease in Airports and on Aircraft*.

The goals of the symposium were to examine (a) the status of research on or related to the transmission of disease on aircraft and in airports, (b) the potential application of research results to the development of protocols and standards for managing communicable disease incidents in an aviation setting, and (c) areas for additional research. The symposium program was designed to provide an opportunity for the aviation community to share data, models, and methods; discuss findings and preliminary conclusions of ongoing research; and identify gaps to inform future research projects.

Funded by TRB's Airport Cooperative Research Program (ACRP), the symposium was the product of

Symposium presentations triggered audience questions and discussions, which identified topics for future research, and attracted media attention and coverage.



Ben S. Cooper, U.K. Health Protection Agency, speaks on Human Movement Patterns and the Spread of Infectious Disease during the opening session of the TRB symposium in Washington, D.C., September 2009; his presentation examined the role of travel in the dissemination of pandemics and the impact of air travel restrictions.



almost eight months of planning and discussion by a committee chaired by Katherine B. Andrus, then with Air Transport Association of America, Inc. Appointed by the National Research Council, the committee consisted of experts from the public sector—federal, state, and local agencies, including public airports; the private sector, including an airline official and consultants with expertise in airport emergency response; and research institutions (see box, page 35).

Timely Program

When planning began on the program, the committee knew the importance of the topic but had no expectation of the timeliness of the symposium. In April 2009, the outbreak and rapid spread of the novel H1N1 influenza virus renewed attention on communicable diseases.



PHOTO COURTESY OF BYRON JONES, KSU

Aircraft cabin mock-up in the Aircraft Cabin Environment Research Laboratory, Kansas State University (KSU), is equipped with coach seats from a Boeing 767. In this experiment to measure contaminant dispersion, each seat is occupied by a thermal mannequin, and carbon dioxide tracer gas mixed with helium is released through the vertical tube in the center of the aisle.

Although the H1N1 pandemic underscored the role that travel often plays in the spread of disease, affecting the pattern and rate at which the spread occurs, the planning committee decided to focus on the actual transmission of disease during air travel. The committee decided that interest in—and uncertainty about—the spread of disease within an aircraft and airport environment was sufficient to justify this focus.

The introductory session helped participants develop a common understanding of how infectious disease spreads, how aircraft are ventilated, and the role of travel in spreading disease. After that session, three panels of researchers presented the science that underlies current understanding of the transmission of pathogens in the special environment of an aircraft cabin and in airport facilities. Each of the panels presented a distinct approach to research: case study investigations, theoretical modeling, and “bench science” experimental methods.



PHOTO COURTESY OF BYRON JONES, KSU

In a KSU experiment with bacteria dispersion in the aircraft cabin, a researcher releases aerosolized surrogate bacteria with a handheld mister at the head height of the seated mannequins; bacteria are then collected from plates on top of the seat backs.

On the second day, the program shifted to examine practices and policies that can be informed by science, but too often are not. Several speakers noted that more scientific evidence, subjected to more rigorous analysis, is needed to determine the effectiveness of current practices such as applying pesticides to aircraft to control vector-borne diseases, developing airline and airport sanitation measures, or imposing travel restrictions to stem the spread of a pandemic. In the concluding session, members of the audience joined the session moderators in identifying areas for more research to improve understanding and to mitigate the transmission of disease through air travel.

Diverse Perspectives, New Research

The symposium presented many opportunities for the exchange of ideas, and the discussions illustrated the benefits of bringing together researchers from different disciplines, along with the potential users of the research findings. The diverse perspectives and expertise applied to these issues identified many topics for researchers to explore in the transmission of disease.

ACRP subsequently funded two research projects stemming from the dialogue at the symposium:

- ◆ The Role of Air Travel in the Transmission and Spread of Insect-Borne Diseases (ACRP Project 02-20), which will develop a user-friendly geographic information system-based tool on CD-ROM to define the roles of airports and airlines in the transmission and spread of insect-borne human diseases; and
- ◆ Evaluating the Risk of Disease at Airports and on Aircraft (ACRP Project 02-20A), which will explore the best available epidemiological data and most current modeling techniques to assess and quantify the exposure risk of air travelers to infectious disease.



Conference Proceedings 47, *Research on the Transmission of Disease in Airports and on Aircraft: Summary of a Symposium*, is available from the TRB Bookstore at www.trb.org/Finance/Public/Bookstore.aspx; to view the book online, go to <http://onlinepubs.trb.org/onlinepubs/conf/CP47.pdf>.

Committee on Research on the Transmission of Disease in Airports and on Aircraft: A Symposium

- Katherine B. Andrus**, Air Transport Association, *Chair*
- Alan Black**, Dallas–Ft. Worth International Airport
- Anthony D. B. Evans**, International Civil Aviation Organization
- Mark Gendreau**, Lahey Clinic Medical Center and Tufts University School of Medicine
- Marc Lipsitch**, Harvard School of Public Health, Department of Epidemiology
- John C. Neatherlin**, Centers for Disease Control and Prevention
- Chris Seher**, Department of Homeland Security
- John (Jack) Spengler**, Harvard School of Public Health
- Jennifer Topmiller**, National Institute for Occupational Safety and Health
- Jeanne C. Yu**, Boeing Commercial Airplanes
- Jean Watson**, Federal Aviation Administration, *Liaison*