

Workshop Goals and Framework

Jonathan M. Samet, MD, MS
Dean and Professor
Colorado School of Public Health

***EMHI Airborne Transmission of SARS-CoV-2
Virtual Workshop***

August 26-27, 2020

Mounting evidence suggests coronavirus is airborne — but health advice has not caught up

Governments are starting to change policies amid concerns that tiny droplets can carry SARS-CoV-2. And after months of denying the importance of this, the World Health Organization is reconsidering its stance.

The New York Times

The Coronavirus Outbreak > **LIVE** Latest Updates Maps and Cases Vaccine Tracker Measures to Boost Vaccine Rates Economy

239 Experts With One Big Claim: The Coronavirus Is Airborne

The W.H.O. has resisted mounting evidence that viral particles floating indoors are infectious, some scientists say. The agency maintains the research is still inconclusive.



Patrons at the Ocean Casino in Atlantic City, N.J., on July 3. Some scientists are warning that airborne transmission of the coronavirus in indoor settings has been underappreciated. Mark Makela/Getty Images

By Apoorva Mandavilli

SLATE

News & Politics Culture Technology Business Human Interest

IT'S GOING TO BE WEIRD

FOLLOW US

MEDICAL EXAMINER

The Coronavirus Is Airborne. Keep Saying It.

It's a jarring message, and the right one.

By MICHAEL A. FISHER

JULY 31, 2020 • 12:07 PM

TB: A Paradigm Shift

Transmitted by Spitting

- The solution: don't spit and spittoons



Allene Goodenough (right) and Helyn James of the Young Women's Christian Association mop up a spot on the sidewalk where someone expectorated by an anti-spitting sign during a public health campaign in Syracuse, New York, in 1900. (George Rinhart / Corbis via Getty Images)

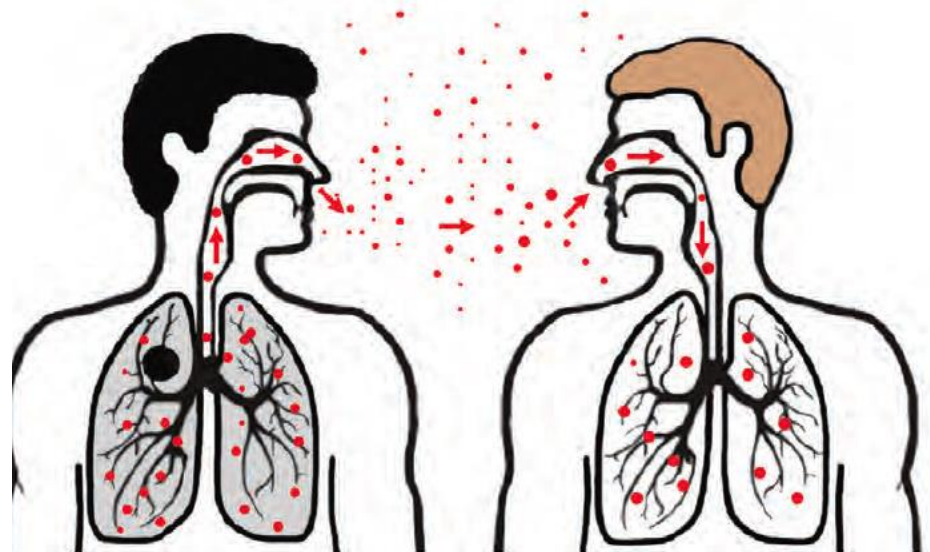
[Smithsonian Magazine](#)

Airborne Transmission

- The solutions: masks, isolation, ventilation

Transmission of TB

TB is spread from person to person through the air. The dots in the air represent droplet nuclei containing tubercle bacilli.



[CDC](#)

AIR HYGIENE IN TUBERCULOSIS: QUANTITATIVE STUDIES OF INFECTIVITY AND CONTROL IN A PILOT WARD¹

A Cooperative Study Between the Veterans Administration, The Johns Hopkins University School of Hygiene and Public Health, and the Maryland Tuberculosis Association

RICHARD L. RILEY,² WILLIAM F. WELLS, CRETYL C. MILLS, WALENTY NYKA,
AND ROSS L. McLEAN

(Received for publication November 28, 1956)



“Those of us with a speculative turn of mind wonder whether air hygiene may advance as far in the next half century as water sanitation did in the last half century.”

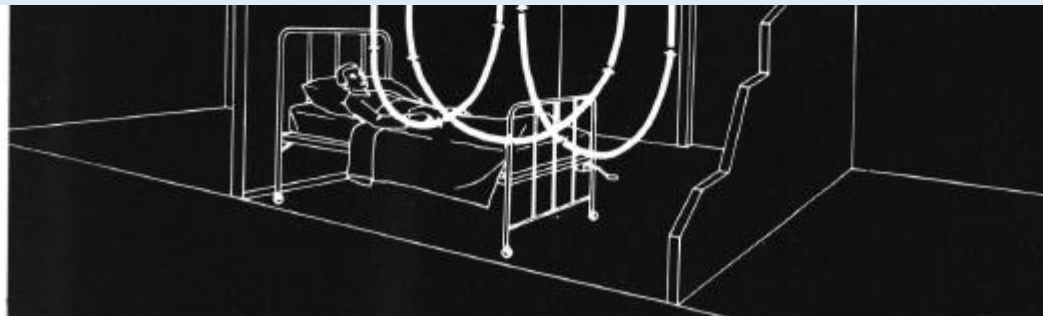
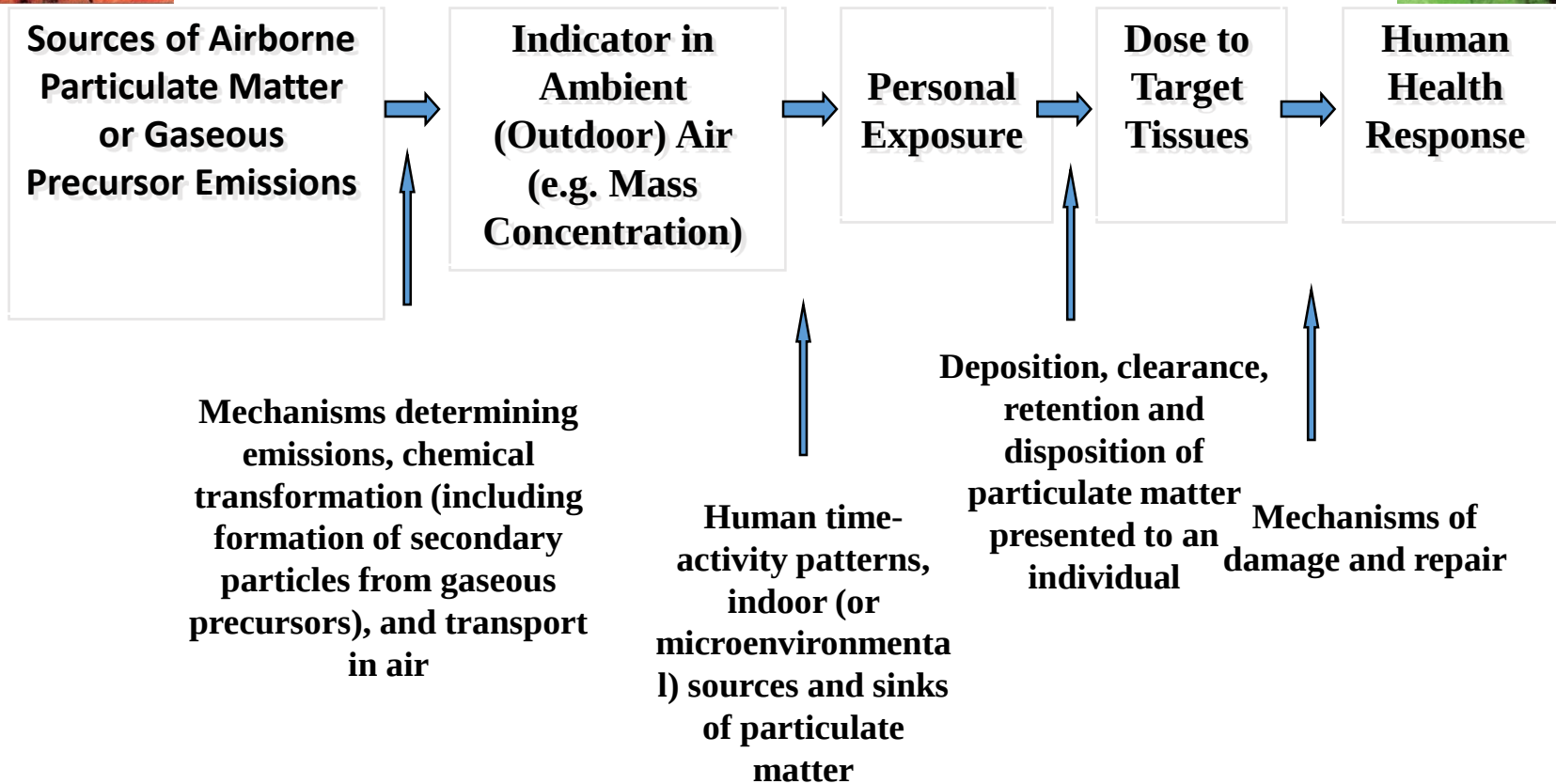
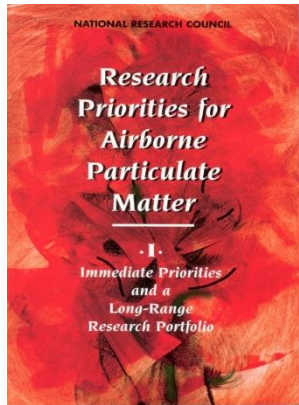


FIG. 1. Schematic diagram of pilot ward and animal exposure chamber.

Back to the Future: Source-to-Response Framework



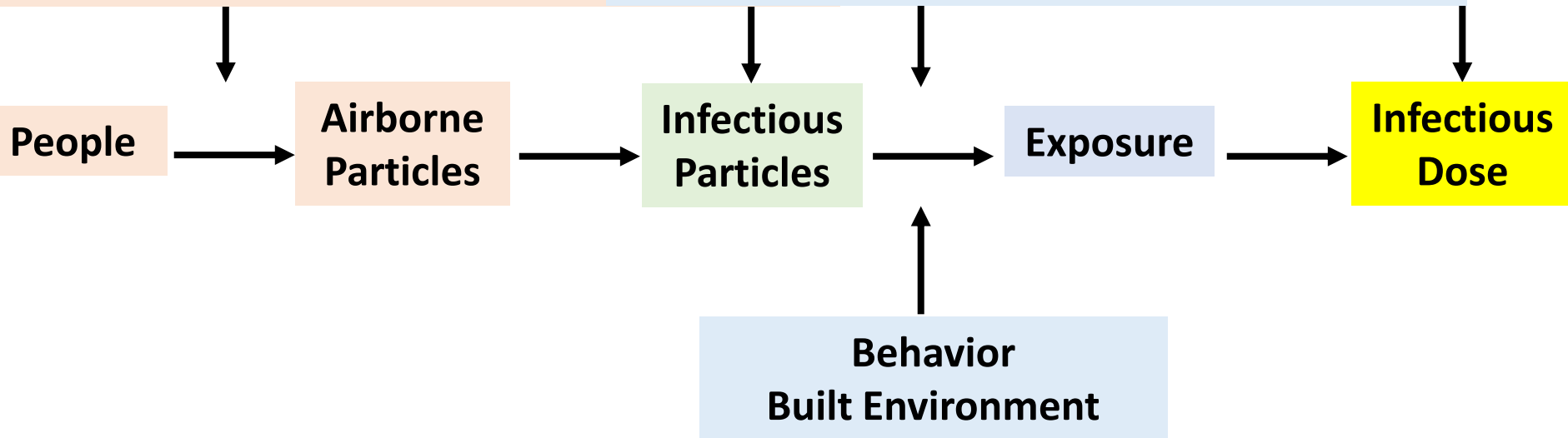
Works

CQ3: What behavioral and

CQ1: What size particles generated by do they

CQ2: What infection

CQ4: What Do We Know About the Infectious Dose and Disease Relationship for Covid-19?



Some Contextual Factors

Housing Quality

Medical Care

Occupation

Income

Race/Ethnicity

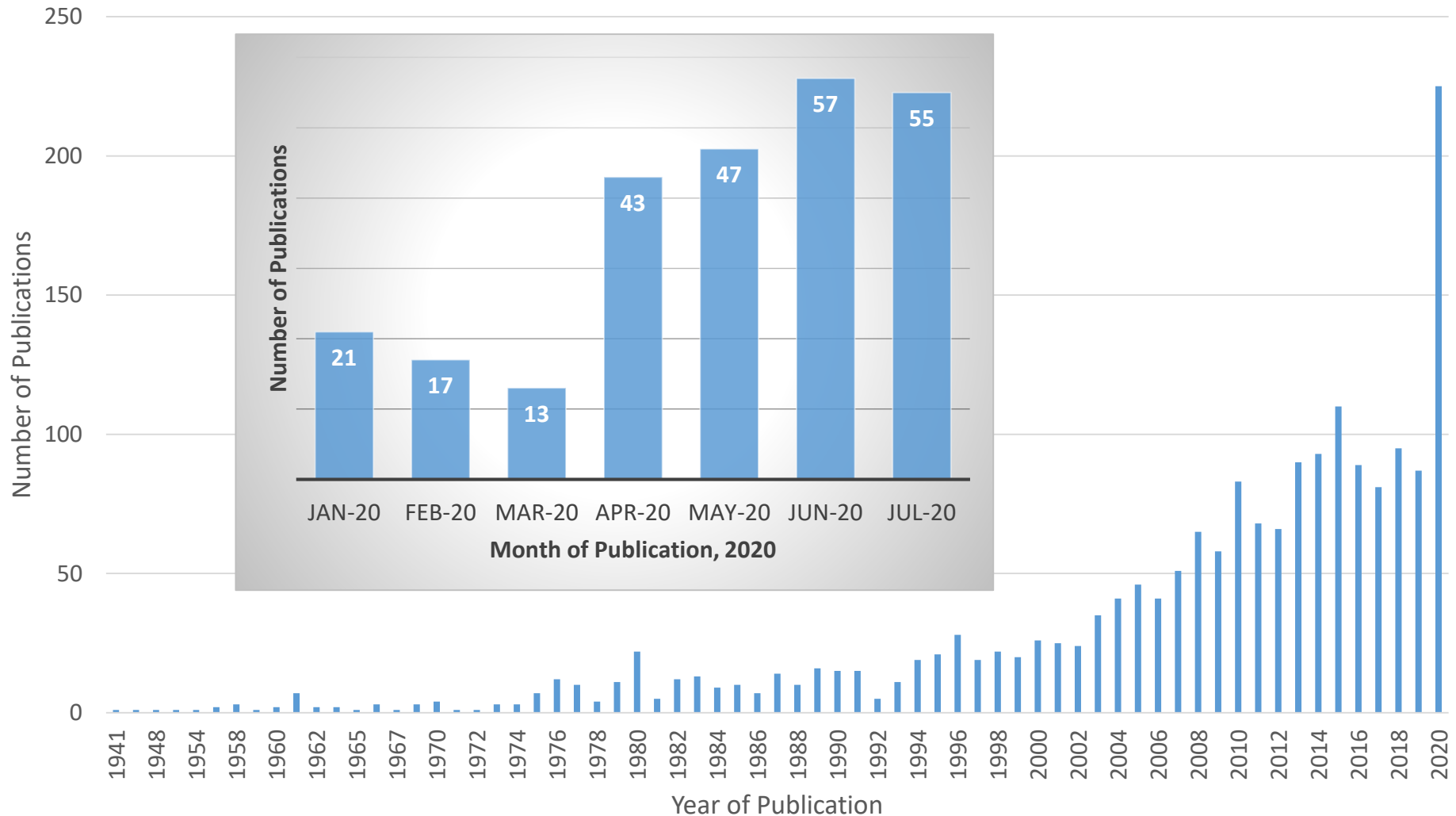
Environment

Workshop Goal

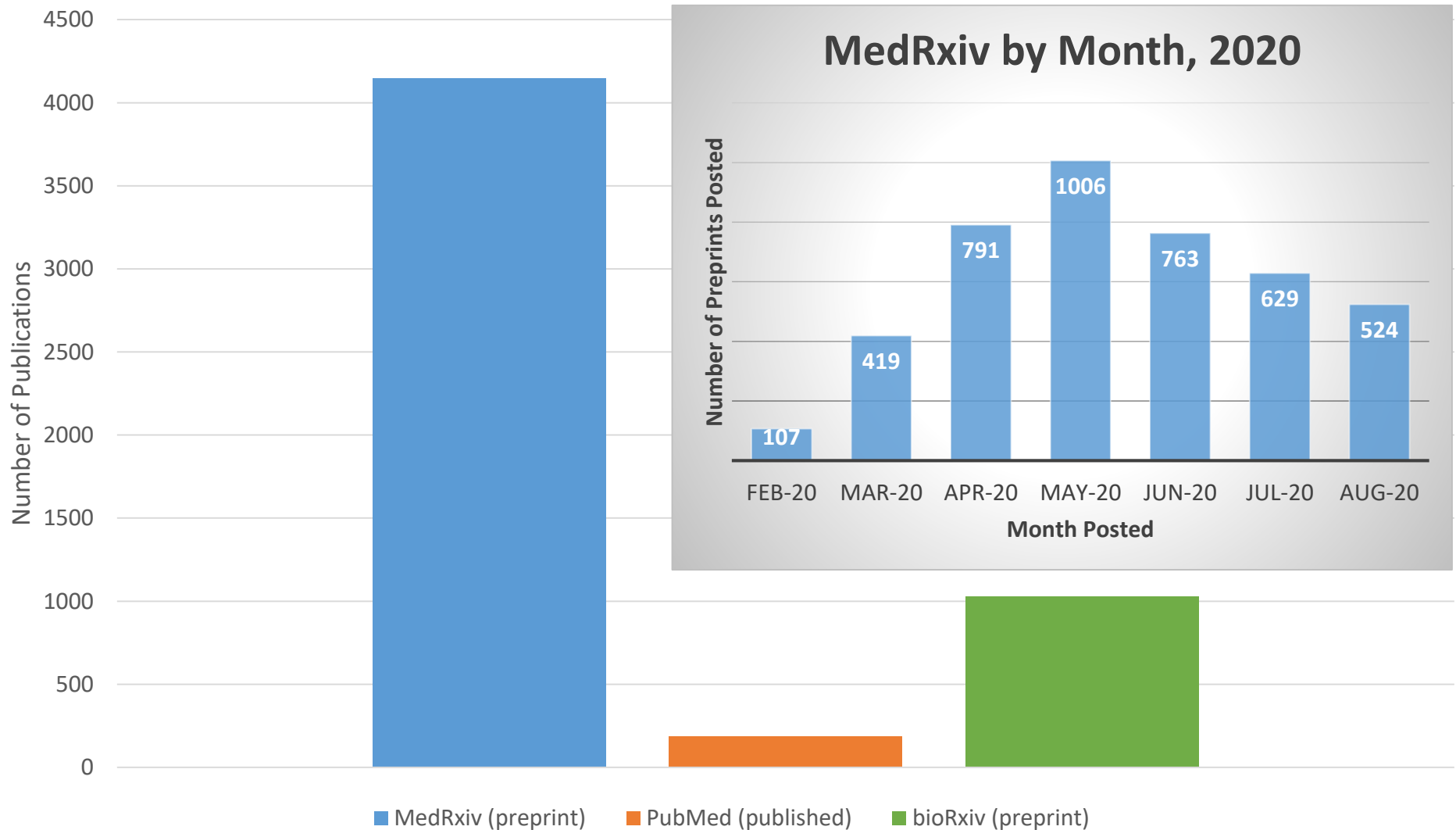
To bring together relevant sectors of research and practice to explore and assess the evidence on airborne transmission of SARS-CoV-2 in order to identify:

- **What we know**
- **What we need to know**
- **What research is needed to fill critical gaps**
- **In order to prevent and control infection with SARS-CoV-2 and COVID-19.**

The Evidence Challenge: PubMed Search “Airborne Transmission AND Infection,” 1941-



The Evidence Challenge: “Airborne Transmission and COVID-19”

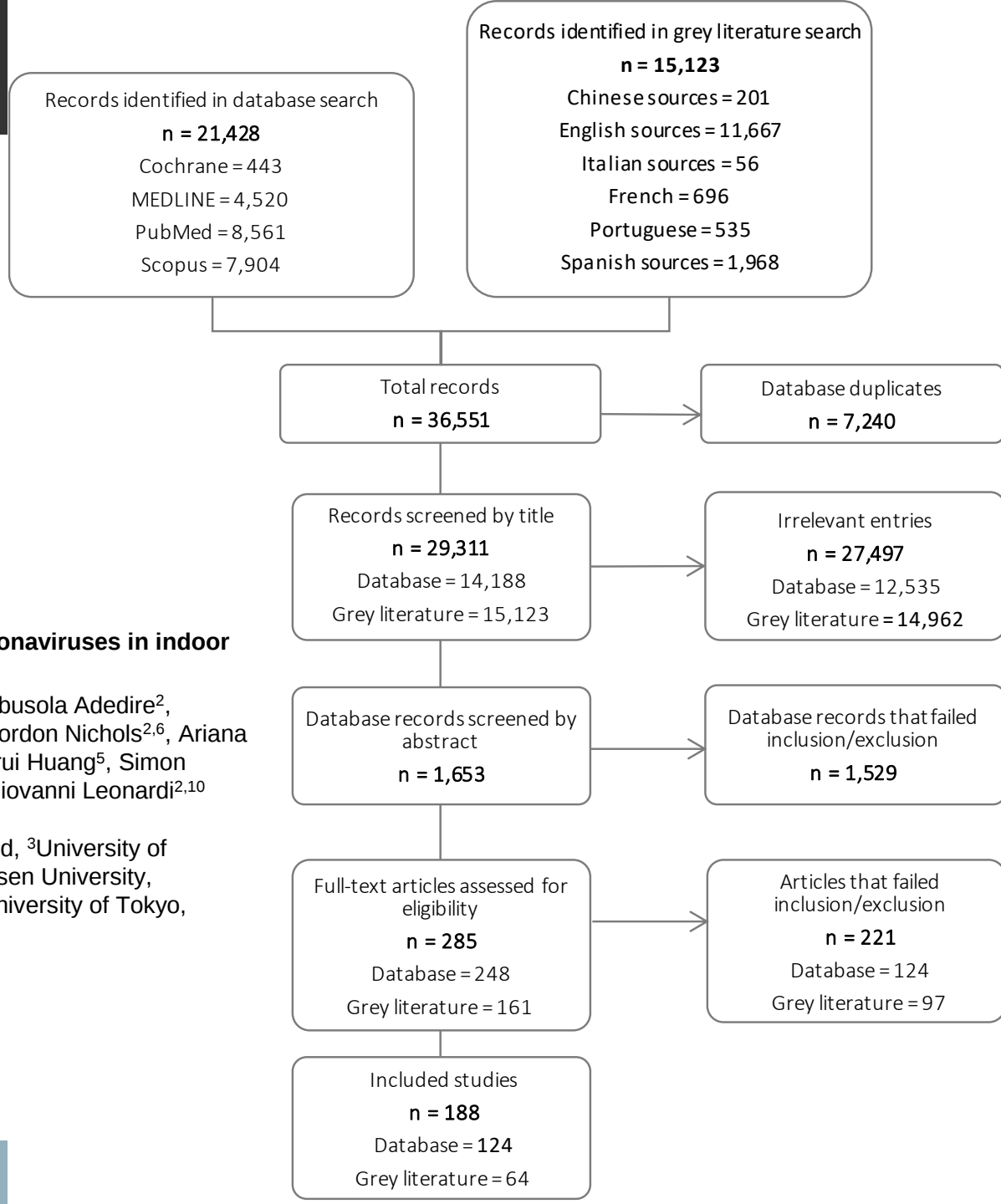


Vardoulakis et al. 2020 (preliminary results – do not copy or distribute)

Airborne transmission of COVID-19 and other coronaviruses in indoor & outdoor environments: a systematic review

Sotiris Vardoulakis^{1,6}, Daniela Espinoza Oyarce¹, Olubusola Adedire²,
Giovanni Lo Iacono³, Paolo Lauriola⁴, Yurong Wu⁵, Gordon Nichols^{2,6}, Ariana
Zeka⁷, Julia Alves Menezes⁸, Rhavena Santos⁸, Cunrui Huang⁵, Simon
Haberle¹, Masahiro Hashizume⁹, Prashant Kumar³, Giovanni Leonardi^{2,10}

¹Australian National University, ²Public Health England, ³University of
Surrey, ⁴Italian National Research Council, ⁵Sun Yat-sen University,
⁶University of Exeter, ⁷Brunel University, ⁸Fiocruz, ⁹University of Tokyo,
¹⁰LSHTM



How do we determine what we know?

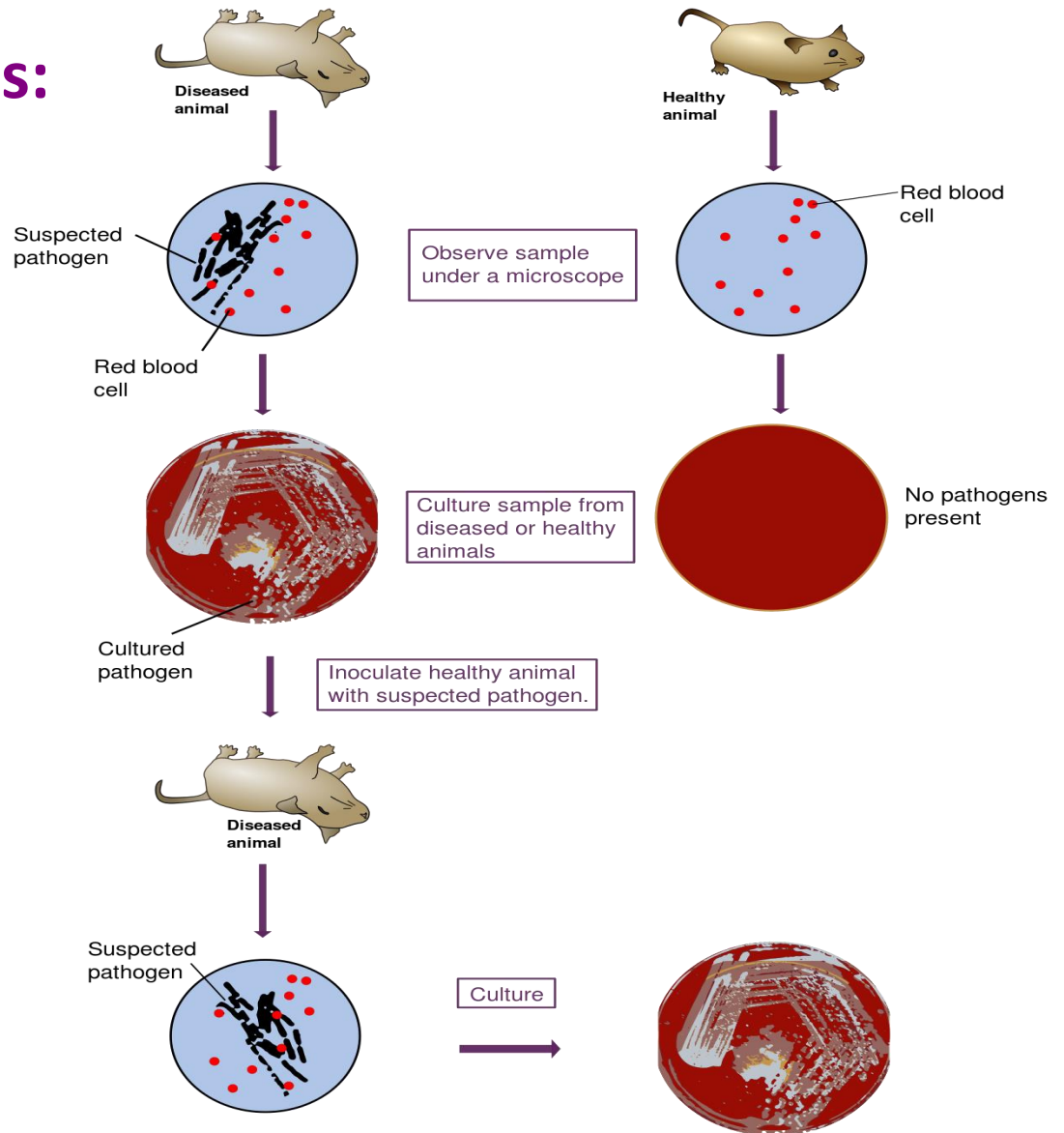
Henle-Koch Postulates:

① The microorganism must be found in abundance in all organisms suffering from the disease, but should not be found in healthy organisms.

② The microorganism must be isolated from a diseased organism and grown in pure culture.

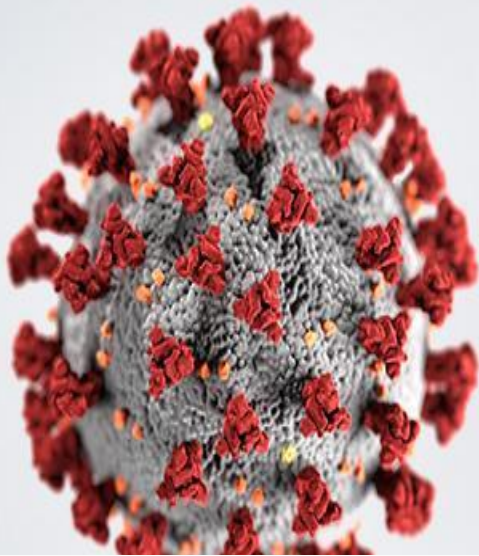
③ The cultured microorganism should cause disease when introduced into a healthy organism.

④ The microorganism must be reisolated from the inoculated, diseased experimental host and identified as being identical to the original specific causative agent.



Are there analogous criteria for airborne transmission?

- Collection of particles (in a particular size fraction) in air containing exhaled breath from a COVID-19 patient.
- Demonstration of viral RNA in the collected particles, matching the genotype of the patient's virus.
- Culture of virus to demonstrate that it is viable.
- Documentation that the collected virus causes disease in an animal model or cytopathic effects in a cell culture system.



Please keep in mind...

- Your comments are on the record and may be attributed to you. All comments made reflect individual insights, not the position of the National Academies.
- This workshop is not part of a consensus study and will not produce consensus findings, conclusions, or recommendations.

Agenda Overview

Day 1

Framing and Background:

- COVID-19: Public Health and Scientific Challenges
- Workshop Goals and Framework
- Importance of Understanding The Role of Airborne Transmission in COVID-19
- Aerosols and Transmission of Respiratory Viruses 101

Critical Questions:

- CQ1: What size particles are generated by people and how do they spread in air?
- CQ2: Which size particles are infectious and for how long?

Day 2

Critical Questions:

- CQ3: What behavioral and environmental factors determine personal exposure to SARS-Cov-2?
- CQ4: What Do We Know About the Infectious Dose and Disease Relationship for SARS-CoV-2?

Reflection and Syntheses: Identifying Opportunities and Gaps on the Path Ahead

From Particles to Populations

Implications for Disease Control