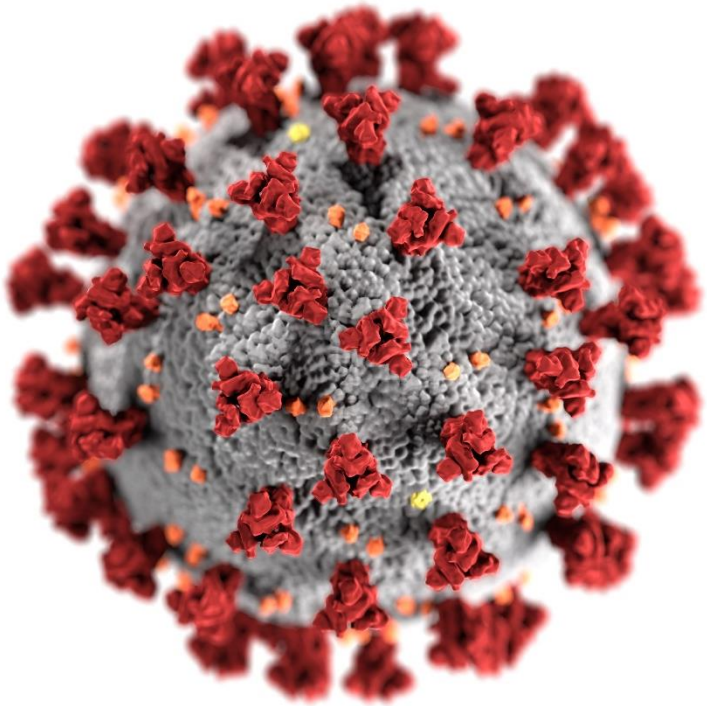
The Science of Masking to Control COVID-19



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Laboratory Assessment of Cloth Masks Effectiveness: Source Control (exhalational) and Filtering Protection (inhalational)

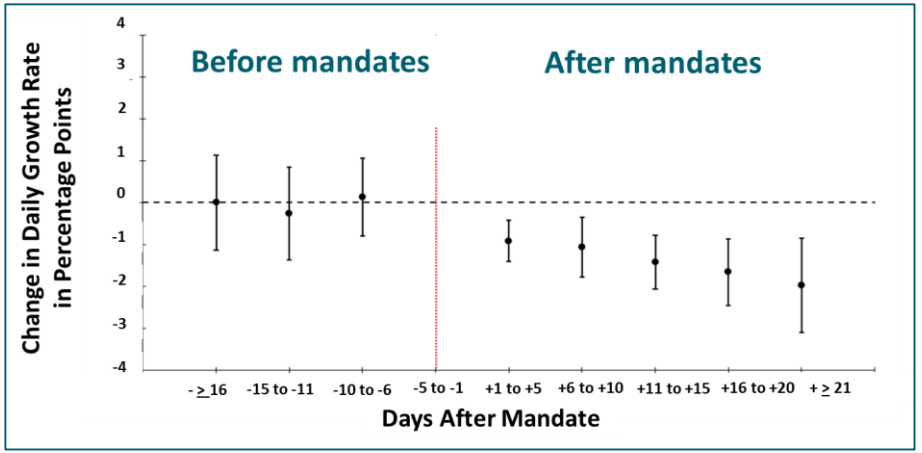
- **Source control (exhalational) to block respiratory particles entering the environment**
  - Multi-layer cloth masks substantially block particles < 1-10 microns
  - These comprise greatest fraction of particles and increase with speech volume
  - Reductions as high as 50-70% with some cloth masks, on par with surgical masks
- **Filtering protection (inhalational) to block wearer from inhaling particles in air**
  - Cloth masks can filter inhaled particles but less effectively than as source control
  - Substantial variation due to experimental design and interpretation
  - Improvements possible with more layers, multiple materials
    - Opportunity for innovation

Multiple Epidemiologic Investigations Document the Effectiveness of Masking

- **High-risk exposure event**
  - Universal masking in hair salon where 2 ill stylists attended to 139 clients; no infections developed in 67 clients subsequently tested
  - Use of face covering onboard the USS Theodore Roosevelt during an outbreak was associated with a 70% reduced risk of infection
- **Retrospective case-control study of exposed contacts**
  - Always wearing a mask before and during high-risk exposures reduced risk of infection by 70%
- **Household surveys**
  - Household mask use before index case developed symptoms reduced infection risk 79%
- **Air travel**
  - With masking, no infections transmitted on multiple flights with infected passengers

Jurisdictional Declines in New Diagnoses Associated With Organizational/Political Leadership Directives for Universal Masking

- **7 published reports examined changes in diagnoses or deaths with mask mandates**
  - MGH Brigham (MGB) System
  - Jena city, Germany
  - Arizona state, United States
  - 15 states*, United States (two analyses)
  - Canada, national
  - United States, national
- **All observed reductions in new COVID-19 diagnoses (n=6) or deaths (n=3) following mandates for universal masking**



* Also included D.C. and controlled for major COVID-19 mitigation policies as time-varying (closure of K–12 schools, county-level or statewide shelter-in-place orders, nonessential business closure, closure of restaurants for dining in, closure of gyms or movie theaters

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The Science of Masking to Control COVID-19: Summary

- **Cloth masks reduce community exposure to SARS-CoV-2**
- **Cloth masks offer both source control and personal protection**
  - The relationship is likely complementary and possibly synergistic
  - Community benefit derives from the combination of these effects
  - Individual benefit increases with increasing community mask use
- **Wearing masks by both the infected and uninfected person gives the uninfected person the most protection**
  - "Masking can protect you and works *best* for *you* when *everyone* does it"
  - "When you wear a mask, you protect others as well as yourself"
- **Universal masking policies can help avert the need for shutdowns**
  - Especially if combined with other non-pharmaceutical interventions such as social distancing, hand hygiene, and adequate ventilation

The Science of Masking to Control COVID-19: References

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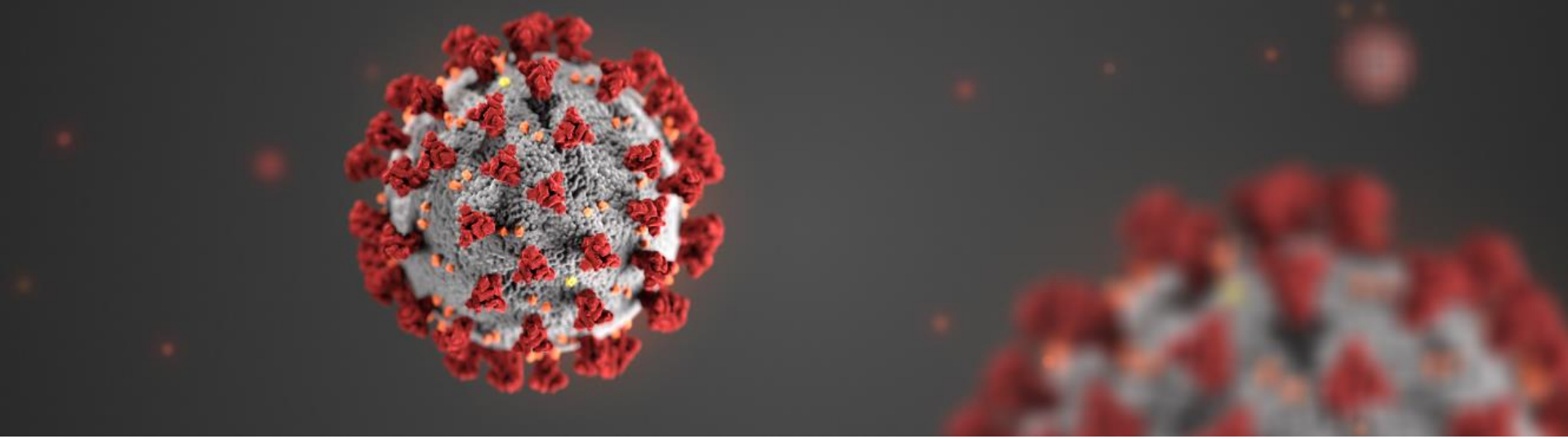

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