

SYNOPSIS

Review of “Outbreak of SARS-CoV-2 Infections, Including COVID-19 Vaccine Breakthrough Infections, Associated with Large Public Gatherings — Barnstable County, Massachusetts, July 2021”

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One-minute summary

- The authors describe an outbreak of Coronavirus Disease 2019 (COVID-19) in Barnstable County, Massachusetts, United States, where a cluster of 469 cases in Massachusetts residents occurred after large public events (July 3–17, 2021). As of July 3, the authors reported that the estimated vaccination coverage (fully vaccinated) among the eligible population in Massachusetts was 69% [source of this estimate is not clear in paper or in cited material].
- **74% (346/469) of cases occurred in those fully vaccinated** (i.e., 2-doses of an mRNA vaccine [Pfizer-BioNTech or Moderna] or had a single dose of Janssen vaccine [Johnson & Johnson] ≥ 14 days before exposure). Breakthrough cases occurred mostly in males (87%; 301/346) and the median age of breakthrough cases was 42 years.
- **The authors reported that 79% (274/346) of breakthrough infections had symptoms consistent with COVID-19.** The most commonly (proportions not reported) reported symptoms were cough, headache, sore throat, myalgia and fever. Hospitalizations occurred in 1.2% (4/346; 0 deaths) of breakthrough cases. The age range of hospitalized patients with breakthrough infections was 20–70 years, and two out of four cases had underlying medical conditions.
- **The median cycle threshold (Ct) value in specimens from 127 vaccinated cases (22.8) was not different from Ct values from 84 unvaccinated/vaccine status unknown cases (21.5).**
- Based on the findings, the authors suggest that **even jurisdictions without high or substantial COVID-19 transmission should consider expanding prevention strategies including masking for indoor settings regardless of vaccination status.**

Additional information

- 85% of all cases were in males and the median age of cases was 40 years (range: <1–76 years). Five cases required hospitalization and no deaths were reported. One hospitalized patient (50–59 years) who was unvaccinated had underlying conditions. Self-reported exposure locations among cases included densely packed indoor and outdoor events at several settings including bars, restaurants and homes. Overall, 74% (346/469) of patients reported symptoms consistent with COVID-19.
- The 14-day average COVID-19 incidence on July 3 was zero cases per 100,000 persons per day in residents of the town in Barnstable County, and by July 17, the 14-day average incidence was 177 cases per 100,000 persons per day.
- The proportion of breakthrough cases that received the Pfizer-BioNTech vaccine was 46% (159/346), Moderna (38%; 131/346); and Johnson & Johnson (16%; 56/346). The proportion of the general population of Barnstable Co. that were fully vaccinated with the Pfizer-BioNTech vaccine was 56%; 38% for Moderna; and 7% for Johnson & Johnson. The median time from completion of ≥ 14 days after the final vaccine dose to symptom onset was 86 days (range: 6–178 days).
- 89% (119/133) of all cases in which sequencing was attempted were infected by the Delta variant, while 1% (1/349) was infected by the Delta AY.3 sublineage and 10% (13/469) could not be sequenced.
- **Mitigation measures employed by the Massachusetts Department of Health in Barnstable County included:**
 - broad testing of people who were a close contact of case connected to the cluster (regardless of vaccination status);
 - recommendations for mask use in indoor spaces (regardless of vaccination status);
 - deployment of mobile testing and vaccination units; and
 - information outreach to residents, visitors and tourism-sector workers including messaging in multiple languages.
- **Limitations:**
 - There is likely an underrepresentation of asymptomatic breakthrough infections, due to detection bias
 - The high proportion of event goers that were male was expected, given that the events were marketed toward adult males.
 - The authors acknowledge that further study is currently underway to identify other characteristics among cases; for example, additional demographic characteristics and underlying health conditions including immunocompromising conditions.

- The authors reported cases from an additional 22 states (including secondary transmission), in which people had visited events in Barnstable County (July 3–17, 2021); however, no further details on these cases were provided.

PHO reviewer's comments

- An important variable not reported in this work is the denominator for the total vaccinated and unvaccinated people who attended events where transmission is suspected to have occurred. A denominator would provide the reader with an understanding of the proportion of vaccinated people that were infected (and proportion of unvaccinated people infected). Without these denominators, it is difficult to assess the relative risk for these populations.
- It is unclear if transmission occurred at specific events, as the authors did not report on the phylogenetic relatedness of clinical samples. This analysis would help link infections with specific settings (e.g., indoor versus outdoor; concert vs. house party). Further work on this outbreak is needed to identify risk factors among event goers that potentially contributed to infection (e.g., characteristics of specific settings that may have contributed to transmission).
- The authors do not report on outcomes in partially vaccinated people (e.g., exposure before 14 days since second mRNA vaccine or a single Janssen vaccine). This type of analysis would help readers determine risk of infection along a continuum of populations according to vaccination status. The authors did not know how long ago that these breakthrough cases had been vaccinated (e.g., January versus March versus May) and whether they had received their 2 dose series as indicated in product monograph, 21 days Pfizer-BioNTech and 28 days Moderna since evidence demonstrates that the ideal window for immunity between 2 mRNA vaccines is 28 days.
- While not reported, it would be interesting to know further details on disease severity in vaccinated vs. unvaccinated patients.
- As the time of testing relative to symptom-onset was not reported, it is uncertain to what extent the Ct values observed reflect the course of COVID-19 infection vs. the impact of vaccination.

Citation

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