RETURN TO RACING

Guidance on SARS-CoV-2 transmission risk mitigation during running events

Prepared for Running USA

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INTRODUCTION FROM RUNNING USA

As vaccination rates increase and understanding of the virus that causes COVID-19 improves, there is a clear path towards a return to racing. That's the focus of a new white paper for the running industry, which was commissioned by non-profit trade organization Running USA.

Thanks to sponsors the Bank of America Chicago Marathon, Chicago Event Management, P3R and Brooks Sports, the white paper is available to anyone wanting to produce a safe event in 2021 and beyond.

The paper is authored by Dr. Brooke Nichols, a health economist and infectious disease mathematical modeler. Among her conclusions: Given the relatively limited risk of SARS-CoV-2 transmission outdoors, coupled with mitigation measures, it is possible to race safely, with minimal transmission risk. However, during the transition period between a pandemic phase and endemic phase of the epidemic, many mitigation requirements are still required to keep participants, staff, volunteers, and spectators safe.

Running USA is pleased to share this white paper with all running industry events to use as they work toward returning to in-person events and normal operations for the industry at large.

Return to racing: guidance on SARS-CoV-2 transmission risk mitigation during running events

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Section I. Introduction

As vaccination rates increase across the country, and our understanding of SARS-CoV-2 (the virus that causes COVID-19) transmission improves, there is a clear path towards the return to racing. Given the relatively limited risk of SARS-CoV-2 transmission outdoors, coupled with several mitigation measures, it is possible to continue racing while minimizing transmission risk.

Many races have been held domestically during the past several months with as many as 5,000+ participants without any documented transmission events (such as Spartan Jacksonville, FL in February 2021 [6,000 participants], Spartan San Antonio, TX in March 2021 [5,500 participants], and Tough Mudder Atlanta, GA in April 2021 [6,200 participants]). Additionally, a recent race with nearly 5,000 participants in Japan resulted in zero reported cases in the two weeks post-race, suggesting no transmission events occurred during the event.[1] Through these early events and the understanding of the science behind the mitigation of transmission events, there is now a growing body of evidence on how to return to running events safely. Larger scale events (including, but not limited to, Grandma's Marathon, Bix 7, Boston Marathon, Chicago Marathon, Los Angeles Marathon, New York City Marathon) are now being planned for the summer and autumn in the United States.[2,3]

This paper is intended to provide interim guidance on safely operating running events in the time period between the beginning of vaccine rollout in the United States and prior to full epidemic control. As vaccination rates increase across the country, eventually the likelihood of severe diseases and mortality will decline, as will the likelihood of transmission events. However, during this transition period between a pandemic phase and endemic phase of the epidemic, many mitigation requirements are still required to keep participants, staff and volunteers safe in the context of running races.

Understanding the risk of SARS-CoV-2 transmission outdoors

The risk of outdoor transmission has been estimated to nearly 20 times lower risk than indoors- and occurs so infrequently that outdoor transmission (particularly when social distancing or using masks) is rarely described in the medical literature.[4] Recent reports and surveillance work has demonstrated that outdoor transmission comprises as few as 0.1% of all transmission events.[5] The virus spreads through respiratory droplets and aerosols that are released into the air while talking, laughing, coughing, and breathing. Indoors, these droplets remain in the air for minutes to hours. Outdoors, droplets and aerosols are dispersed rapidly, resulting in a lower risk of transmission to others.[4,6]

The risk of transmission at outdoor gatherings is dependent on things such as:

- The amount of time spent in close contact with others
- The number of people at the gathering, and therefore the ability to socially distance
- The use of face masks.[7]

In the context of racing, therefore, adequate mitigation measures at contact points, including registration/packet pick-up, the expo, baggage and gear check facilities, start and finish lines, water points, and restrooms, are the most important in reducing the likelihood of a transmission event.

Section II. Basic science-based guidance for races of all sizes

1. First and foremost, *operate in accordance with all local public health guidance*. If any points in this document are contradictory to local guidance, further discussions should be had to arrive at a resolution. It is important to note that most public health guidance is not written with outdoor races in mind. Therefore, while some local guidance may be applicable, other aspects of the guidance may be flexible when considering the type of event.

2. Reducing the likelihood that participants, staff and volunteers arrive at the event infectious

Health screening questionnaires should be completed prior to arriving onsite at the event (e.g. digitally, the night before) to reduce the likelihood that someone arrives infectious. To incentivize truthfulness in filling out the form, participants should be assured that, subject to the event's preset policies, the registration can be refunded, forwarded to a future race, or of any other accommodations that may be available, in the event of a positive screen. The health screening is not a replacement for social distancing or mask use.[8]

Given that temperature checks in particular have a low probability of detecting someone infectious and create an additional point of contact, they should be avoided.[9]

Special considerations for large events ('large' defined in accordance with current local restrictions) should be considered (**Section V**).

Section III. Broad mitigation measures at the event

a. *Mask/face covering use*

At any point where individuals cannot socially distance or are indoors, masks/facial coverings should be used. Data suggest that a two-layered mask provides adequate protection, and that facial coverings made of single-layered stretchy material (such as a neck gaiter), do not provide protection. It is therefore advised to provide mask information to all participants, volunteers and staff on masks- and, in particular, to note:

I. That if a neck gaiter is used as a mask, then it should be folded in half to provide protection.[10]
II. Bandanas tied once above the nose do not provide sufficient protection and should be avoided.

Surgical masks have been demonstrated to provide greater protection than simple reusable or cloth masks.[11,12] Surgical masks (masks marketed as surgical masks in the United States achieve certain FDA requirements) should be offered to and used by race staff and volunteers due to increased likelihood of coming into close proximity to one another and to participants.

The exception to this is participants during the race on the race course. The World Health Organization does not recommend the use of facial coverings during vigorous exercise given that one meter (three feet) of distance is maintained.[13] Running in groups that stick together for the race should be discouraged by race leadership. In general, because of airflow and dispersion due to being outdoors, as well as the limited duration that any two participants spend near each other on the course, the probability of transmission during racing is strongly reduced.

b. *Social distancing*

When outdoors, one meter (three feet) should be maintained between individuals.[14]

c. *Use of indoor/outdoor spaces*
When at all possible, it is recommended for the full event to take place outdoors, including registration/packet pick-up, food, any pre- and post-race activities. To ensure adequate ventilation, tents with sides that can be removed should be used instead of any enclosed tents.[13] The exception to this is medical tents for privacy reasons. Medical staff should all have surgical masks and gloves.

d. *Sanitizing*
SARS-CoV-2 is primarily spread through the air, but there remains a small possibility of transmitting through surface contact. Sanitizing of surfaces can reduce the small risk of fomite transmission.[15] It should be noted, however, the relatively minimal effect sanitizing surfaces has been shown to have epidemiologically.[16]

Section IV. Specific considerations for each contact point

a. *Registration/Packet Pick-up*
The first point of contact in any race is registration and/or packet pick-up. Ensure participants that arrive have completed a health screening questionnaire before arrival. Efforts to ensure rapid registration are encouraged. Having multiple registration/pick-up areas to alleviate foot traffic or specific registration time slots can help ensure social distancing. Masks should be worn while queueing, and by all staff and volunteers.

b. *Security (where applicable), or additional checkpoints/document verification*
There are two essential principles for security or additional check points for document verification- minimizing exposure while queuing, as well as time spent with the staff member/volunteer for the screening.

Queuing
Keep all queuing for security checkpoints outdoors where possible. If outdoors, keep a minimum of one meter (three feet) between participants in the queue. If indoors, keep a minimum of two meters (six feet) between participants in the queue. Masks should be worn while queuing, and by all staff and volunteers.

Time with staff member/volunteer
During the security or document verification, steps to ensure this can happen as quickly as possible is essential. For document verification, time can be decreased by having the participants use uniform documentation such that the staff member or volunteer can quickly find the essential information. A face covering or mask for participants, and a surgical mask for staff members or volunteers (given their potential repeated exposure), is required. See **Section IIIa** for guidance on masks/facial coverings.

c. *Baggage/gear-check*

Where possible have the baggage/gear check outdoors. Follow the same principles as with security or document verification: ensure enough space for participants to distance while queueing for the baggage/gear check. Participants should wear masks/facial coverings, staff members and volunteers should wear surgical masks. Out of an abundance of caution, it is also recommended for staff members and volunteers to wear gloves when handling the participants' baggage/gear.

The greatest risk of exposure and transmission is likely to be between the staff members/volunteers within the baggage/gear-check tent given the extended duration of time they will spend together. It is therefore also recommended for staff members/volunteers to have enough space provided to be able to maintain two meters (six feet) of distance. The combination of outdoors/open-sided tents, masks and physical distance will strongly reduce the likelihood of transmission.

d. *Restrooms*

Restrooms are one of the few areas in a race setting that, per definition, are indoors (whether truly indoors or in portable toilets). Ensure that people queue for the toilets outdoors, and wear masks while indoors. Sanitizer should be provided at the entrance and exit to the toilet area. If distance can be maintained in the outdoor portable toilet queue, masks are not required.

e. *Start line*

Allowing for adequate social distancing at the start line is recommended (a minimum of one meter (three feet) between participants). This can be achieved through larger starting pens or multiple waves of runners.

Given that distancing at this stage of the event is likely difficult to enforce, all participants should wear a mask/facial covering at the start line, and continue to wear the mask/facial covering for several hundred meters into the race, or when distancing is possible (see **Section 3A** on recommended facial coverings). Encourage participants to keep their masks on them for the finish line.

f. *Water/beverage/food stations on the course*

Food and water/beverage tables can be points of high contact- both between participants and between volunteers/staff and participants.

I. Ensure staff/volunteers are provided surgical masks.
II. Spread out water/food tables at individual stations to avoid gathering
III. Assign volunteers to a fixed table to avoid mixing of all volunteers- thus 'cohorting' the volunteers.
IV. Request that runners drink/eat away from the tables to avoid excessive exposure to staff/volunteers.

V. Volunteers may either hand out beverages, or allow participants to select and grab themselves off of tables.
VI. Given the low probability of food/drink resulting in SARS-CoV-2 transmission, non-prepackaged drinks/food may be used.[17]
VII. For staff/volunteers preparing water and food, WHO guidance should be followed, including sanitizing the hands before any food preparation.[17]

g. Finish line and medal collection

The finish line is another point in the race in which participants come close to each other, staff, and volunteers. Given the increased likelihood of close contact, participants should be provided a mask after they cross the finish line if they do not still have their own on them. When masked, they should then receive their medal and proceed through the finish area. For spectators in the finish area, require masks and at least one meter (three feet) of space between spectators. To avoid crowding, discourage congregating of spectators at the finish line, and instead request that any spectators spread across the course.

Consider increasing the size of the finish area to allow for participants a chance to catch their breath while being socially distanced before putting their mask on and continuing through the finish area. Keep volunteers/staff out of this area.

Specific considerations for handing out of medals and blankets at the finish line (where applicable):

I. If both the medal/blanket distributor and the participant are masked, the distributor may place the medal around the neck of the participant, and may drape the blanket over the shoulders of the participant.
II. If either the distributor or participant are not masked, the medal and blanket should simply be handed to the participant.

h. Expo area: food/beverage, merchandise, sponsor tents

Ensure a minimum of one meter (three feet) of distancing in any outdoor expo area, as well as the wearing of mask/facial covering. Encourage contact-free payment methods.

For food/beverage areas, designate outdoor areas where individuals can distance from one another while eating/drinking.

i. Waste collection

Both on the course and at the expo, volunteers or staff members handling discarded food and beverage items should use gloves. If the staff members or volunteers come into close contact with participants, other staff members or volunteers during any waste collection, then surgical masks should also be worn.

j. Ceremonies

The medal ceremonies at the end tend to attract large numbers of people. Making the ceremonies private, or in a very large outdoor area while encouraging distancing and mask wearing, are ways to overcome this obstacle.

k. Transport to start/finish

Some events will need to make use of different forms of transportation to get to the start line (or from the finish line back to the start line).

All local guidance on the use of respective forms of transportation should firstly be followed. In addition to, or in absence of, local guidance:

I. Where possible, all windows should be opened to ensure ventilation
II. Everyone on the mode of transport (buses, trains, boats/ferries) should wear a mask/facial covering
III. For transport of less than 15 minutes (with or without windows open for ventilation) or greater than 15 minutes (with windows open for ventilation) ensure at least one meter (three feet) of distance between participants
IV. For transport greater than 15 minutes where opening the windows is not possible (e.g. in some types of trains/boats), ensure two meters (six feet) of distance between participants

Section V. Special considerations for large events

Large events come with a special set of additional challenges. Large events need to contend with the additional effect that they may have on the local community in terms of community SARS-CoV-2 incidence and prevalence. The exact size of a 'large' event may vary by city/town/municipality and should be discussed with local officials.

Large events may also attract people from a wide variety of locations (nationally and internationally), potentially bringing people from high SARS-CoV-2 prevalence areas to an area that has low SARS-CoV-2 prevalence. Therefore, while a race hosted and conducted with adequate mitigation measures may prevent transmission events within the race itself, a large influx of participants into a city or community (and use of restaurants, hotels, gatherings, etc.) may have an impact on local transmission more broadly. Additionally, races with large numbers of participants also increase the likelihood that someone is infected at the time of the event. A combination of testing and, if feasible, vaccination are key in disrupting potential transmission in these instances.

Use of testing

There is generally local or state guidance on the use of SARS-CoV-2 testing before entering the respective state. This guidance typically (but not exclusively) requires a negative SARS-CoV-2 test within 72 hours of travel followed by quarantine on arrival (and potential future negative testing to end

quarantine early). These types of mitigation measures reduce the likelihood of the event contributing to an increase in local SARS-CoV-2 prevalence in the days leading up to the event.

Generally, key considerations for the use of testing as part of a mitigation plan for the race itself include timing and turnaround time. There are two primary types of testing including reverse transcription polymerase chain reaction testing (often referred to as "PCR" for short), and rapid antigen testing. Ideally, participants should be tested as close to the start of the race (or as close to arriving at the event) as possible (e.g. within 72 hours prior to the start of the event for PCR testing).

The type of testing strategy to be recommended, and in possible combination with vaccine verification strategies, should be determined on a case-by-case basis in consultation with local public health officials.

Table 1. Considerations for PCR vs antigen testing (table adapted from the FDA)[18]

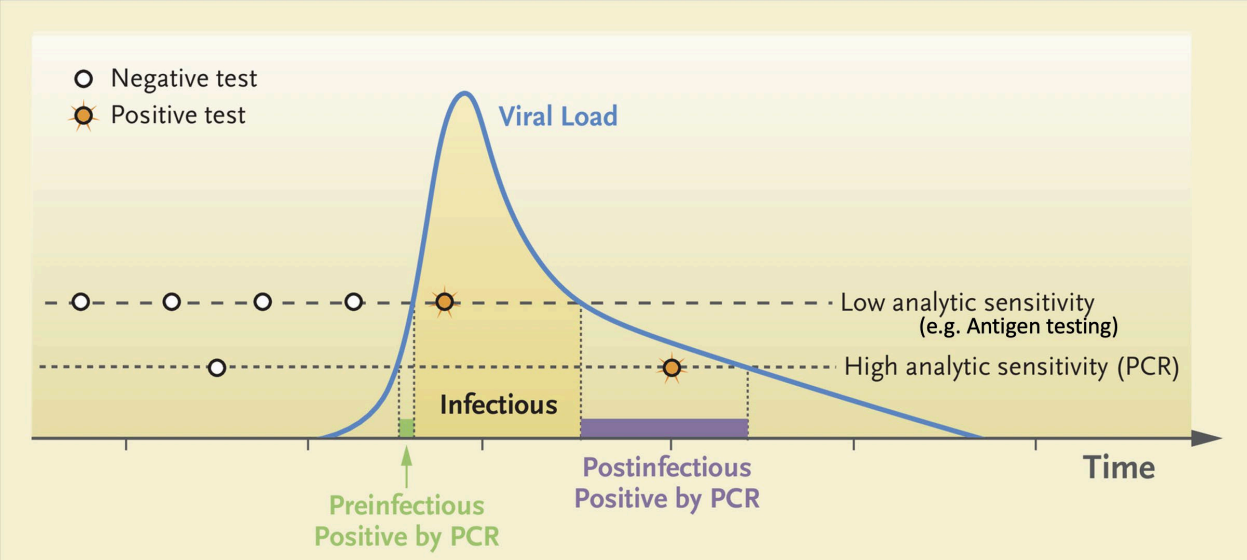
	PCR test	Antigen test
Also referred to as	Molecular test, nucleic acid amplification test (NAAT), RT-PCR test, PCR test, LAMP test, diagnostic test	Rapid test, rapid antigen test, diagnostic test
Type of sample required	Nasal swabs (either shallow or deep) Saliva (some test)	Nasal or nasopharyngeal swab
Throughput	Mass throughput depending on size of the lab	One test at a time
Time to result	Typically 1-3 days depending on laboratory testing capacity	15-30 minutes
On-site human resource considerations for mass events	Can more rapidly collect specimens from a large number of people and send them to the lab for mass processing	May require more human resources as compared to the PCR testing strategy given that each test requires logistics to support the 15–30-minute wait time until the test results*
What does it show	Diagnoses active SARS-CoV-2 infection	Diagnoses active SARS-CoV-2 infection
What it does not show	It cannot show evidence of past infection (unless recently infected)	May not diagnose SARS-CoV-2 infection as early as with the PCR test; cannot detect

		evidence of past infection
Efficacy in diagnosing pre-symptomatic infection	See Figure below and related explanation	

*If considering at-home rapid antigen testing options, this would obviate the need for on-site testing-related human resources, but would require additional considerations such as verification of tests results (such as through the use of video-calling observed testing).

Differences in efficacy of PCR vs rapid antigen testing

During the infectious period, where someone infected with SARS-CoV-2 can effectively transmit to another individual, rapid antigen and PCR tests are similarly efficacious at identifying a positive case. See below figure for illustration of this concept[19]:



Adapted from Mina MJ *et al.* Rethinking Covid-19 Test Sensitivity- A Strategy for Containment. *New England Journal of Medicine*. 2020. 383;22.

The advantage of the PCR test, in terms of efficacy, is the ability to detect pre-symptomatic infections before the infectious period by between 1-2 days (as shown in green in the above figure). For this reason, a negative antigen test 72 hours prior to the event would not be nearly as useful as a negative

PCR test 72 hours prior to the event- given that antigen testing can only diagnose infection once a person is already infectious. If antigen tests are to be used as a primary screening test, the test should be done as close to the event as possible.

For multi-day events, or events with long set-up times, regular testing of employees (every 3-4 days with either type of test) should be considered if they are not fully vaccinated and in an area with ongoing community SARS-CoV-2 transmission.

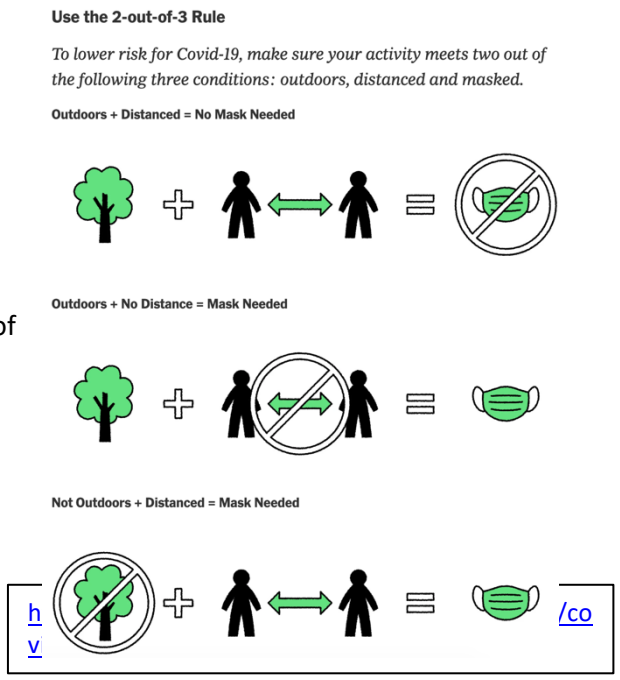
The requirements for testing may start to shift for large-scale events as vaccination rapidly scales up.

Vaccination in combination with testing
A strategy that includes proof of vaccination in combination with a testing strategy can be considered in consultation with local public health officials. In this instance, if there is proof of full vaccination of the participant at least 14 days prior to the event, that may be used in lieu of a negative SARS-CoV-2 test. Over time, this will drastically reduce the need for testing.

In the case of staff members or volunteers, there would need to be proof of full vaccination at least 14 days prior to starting to work on-site in order to use vaccination in lieu of a negative SARS-CoV-2 test.

Conclusion

As the running community returns to racing, reducing the likelihood of SARS-CoV-2 transmission events related to racing is essential to keep participants, volunteers, staff members and the community safe- as well as to ensure the success of the industry in re-starting running events. Following the guidance outlined in this document, and communication with local public health departments, can assist in achieving this goal. In the instance that a specific aspect to a race was not covered here, one can refer to the basic guidance of '2 out of 3': always ensuring a combination of any two of the following three mitigation measures: social distancing, outdoor venue and mask-wearing.[20] By following the '2 out of 3' rule, risk of transmission can be mitigated in most instances.



Section VI. References

1. 5,000 Runners Arriving Safely Home From Nagoya, Japan Gives Encouragement To Runners & Event Organisers Around The World | Scoop News. https://www.scoop.co.nz/stories/WO2103/S00363/5000-runners-arriving-safely-home-from-nagoya-japan-gives-encouragement-to-runners-event-organisers-around-the-world.htm (2021).
2. Bank of America Chicago Marathon. https://www.chicagomarathon.com/.
3. 2021 Updates | Boston Athletic Association. https://www.baa.org/2021-updates.
4. Cevik, M., Marcus, J., Buckee, C. & Smith, T. SARS-CoV-2 Transmission Dynamics Should Inform Policy. *SSRN Electron. J.* (2020) doi:10.2139/ssrn.3692807.
5. https://www-irishtimes-com.cdn.ampproject.org/c/s/www.irishtimes.com/news/ireland/irish-news/outdoor-transmission-accounts-for-0-1-of-state-s-covid-19-cases-1.4529036?mode=amp
6. Mayo Clinic. Safe outdoor activities during the COVID-19 pandemic. https://www.mayoclinic.org/diseases-conditions/coronavirus/in-depth/safe-activities-during-covid19/art-20489385 (2020).
7. Bulfone, T. C., Malekinejad, M., Rutherford, G. W. & Razani, N. Outdoor Transmission of SARS-CoV-2 and Other Respiratory Viruses, a Systematic Review. *J. Infect. Dis.* (2020) doi:10.1093/infdis/jiaa742.
8. General Business Frequently Asked Questions | CDC. https://www.cdc.gov/coronavirus/2019-ncov/community/general-business-faq.html.
9. Viswanathan, M. *et al.* Universal screening for SARS-CoV-2 infection: a rapid review. *Cochrane Database of Systematic Reviews* vol. 2020 (2020).
10. Your Guide to Masks | CDC. https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/about-face-coverings.html.
11. Mask use in the context of COVID-19: Interim guidance. *World Health Organizationo* https://apps.who.int/iris/bitstream/handle/10665/337199/WHO-2019-nCov-IPC_Masks-2020.5-eng.pdf (2020).
12. Leung, N. H. L. Transmissibility and transmission of respiratory viruses. *Nat. Rev. Microbiol.* 1–18 (2021) doi:10.1038/s41579-021-00535-6.
13. Bull, F. C. *et al.* World Health Organization 2020 guidelines on physical activity and sedentary behaviour. *Br. J. Sports Med.* **54**, 1451–1462 (2020).
14. Advice for the public. *World Health Organization* https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public (2021).
15. Wei, J. & Li, Y. Airborne spread of infectious agents in the indoor environment. *Am. J. Infect. Control* **44**, S102–S108 (2016).
16. Xiao, J. *et al.* Nonpharmaceutical measures for pandemic influenza in nonhealthcare settings—personal protective and environmental measures. *Emerg. Infect. Dis.* **26**, 967–975 (2020).
17. COVID-19 and food safety: guidance for food businesses, Interim guidance. *World Health Organization* https://apps.who.int/iris/bitstream/handle/10665/331705/WHO-2019-nCoV-Food_Safety-2020.1-eng.pdf (2020).
18. U.S. Food & Drug Administration. Coronavirus Disease 2019 Testing Basics. *FDA*

https://www.fda.gov/media/140161/download (2021).
19. Mina MJ *et al*. Rethinking Covid-19 Test Sensitivity- A Strategy for Containment. *New England Journal of Medicine*. 2020. 383;22.
20. Parker-Pope T, *New York Times*. https://www.nytimes.com/2021/04/22/well/live/covid-masks-outdoors.html. 2021. Accessed 25 April 2021.