POLICY MEMO

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TO: Governor Brian Kemp

DATE: February 27th, 2021

RE: Covid-19 testing; Government support of molecular rapid testing for community surveillance during vaccination rollout

Summary

This policy memo proposes an expansion of state run Covid-19 testing sites to capture the increase of asymptomatic and presymptomatic SARS-CoV-2 infections during the vaccination rollout period. To determine what testing program will complement the latter half of the pandemic, we compared current state-run testing procedures via PCR diagnostic testing to systematic PCR surveillance testing and molecular rapid surveillance testing programs. The molecular rapid surveillance testing program was the most efficient at capturing asymptomatic and presymptomatic cases due to affordability, convenience and turnaround time.

Since the spring and summer vaccination rollout seasons may alter Covid-19 testing outreach and accessibility to the general public, we suggest the Georgia Department of Public Health switch to molecular rapid testing surveillance programs for SARS-CoV-2 detection to more precisely capture remaining SARS-CoV-2 infection in the pre-vaccinated and unvaccinated population.

Introduction

Upon the beginning of the Covid-19 pandemic, the ability of SARS-CoV-2 to spread from individuals who are presymptomatic, symptomatic, and asymptomatic means that diagnosis and isolation based on symptoms alone will be unable to prevent an ongoing spread. Since the COVID-9 pandemic's beginning in February of 2020, very few state or local government community surveillance programs have been developed. As a result, RT-PCR diagnostic testing has become both the most used testing option of local and state health departments (Daniel P. Oran, 2020).

With current vaccine rollout, it is important to be as diligent as ever in eliminating the spread to ensure a swift end to the pandemic. This involves a more proactive approach when detecting cases, both symptomatic and asymptomatic. Before vaccination, speculations have been made that 40-45% of all those diagnosed with SARS-CoV-2 are asymptomatic (Daniel P. Oran, 2020). With an increase of the vaccinated population in the spring and summer vaccine rollout period, it can be expected that there will be both an increase in social, work and recreational activity in the general population; both vaccinated and unvaccinated. Vaccine rollout may cause an increase in the proportion of asymptomatic or minor infection cases compared to 2020 for two reasons. The first being the remainder of the population that is unvaccinated or awaiting vaccination are younger healthy individuals and children, all of which are more likely to have asymptomatic infections (Kronbichler et al., 2020). The second reason is Georgia's use of dual dose vaccines. Individuals can be infected during the time between vaccination periods and up to two weeks after final vaccination, known as the" partial immunity" phase. While these individuals are at risk for infection, most infections present themselves as either asymptomatic or minor infections, resulting in the individual to possibly not get tested and continue to spread. Since information on relative infectiousness in the partial immunity phase is limited, as of February 2021 it is assumed they are infectious.

Policy Options

Since the detection of asymptomatic cases is crucial to stopping the spread of SARS-CoV-2, finding a testing solution that will attract asymptomatic or minimal symptomatic persons who would otherwise not get tested is the primary goal of surveillance programs. Because of the risk for silent spread by asymptomatic carriers, it is imperative that testing programs either broaden their capacity to encourage those without symptoms to get tested via current PCR test or provide a separate asymptomatic testing option as a means of surveillance. This policy compares the current state-run testing program via PCR diagnostic testing to a systematic PCR surveillance testing and molecular rapid surveillance testing programs. Each program uses different types of tests to capture infections in different audiences. PCR testing is the most common test used in the united states, but is often costly, had restricted availability and slow laboratory turnaround time (Sethuraman, Jeremiah, & Ryo, 2020). Current state-run programs rely on PCR testing for those who may have been exposed or are symptomatic. Proposed surveillance PCR testing would function similar to current state diagnostic testing but encourage weekly or bi-monthly testing for those who are not vaccinated. This program has been used successfully at various hospitals as a screening program for patients 2-3 days before the elective procedure is done (Sutton, Fuchs, D'Alton, & Goffman, 2020). Molecular rapid surveillance testing programs would rely on both FDA approved rapid tests as well as RT-PCR tests. For this policy the Abbot BinaxNow card test will be analyzed. Ideally, a rapid test option would encourage weekly or bi-monthly testing of the general asymptomatic population. PCR testing would be utilized under the current guidelines used at state run testing sites, if the individual is symptomatic or has a presumed exposure.

Criteria and Tradeoffs

When analyzing each testing program, the following criteria were considered;

Accessibility:

What population does each program aim to reach and under what circumstances are they eligible to get tested? **Both rapid and PCR testing surveillance programs would be the most accessible testing option available to the public**. Since the main focus of surveillance testing programs is to test as many people as possible, the streamlined program would be available for anyone, specifically targeting those who would not normally get tested i.e. minor symptoms or asymptomatic persons (Lokuge et al., 2021). Current PCR testing programs are open to all, however, such testing programs only encourage those who are either symptomatic or exposed to get tested. To receive a test one must make an appointment well in advance and fill out a screening questionnaire. These barriers would be eliminated in both surveillance programs.

Affordability:

While state programs provide testing free of charge for the public, the cost of each test as well as administration fees, staffing costs etc. are all accounted for by the Georgia Department of Public Health pandemic relief fund and ultimately taxpayer dollars. **Rapid testing surveillance programs were found to be the most cost-efficient program when compared to the PCR based programs**. On average a PCR test, including medical staff, transportation, lab equipment and lab personnel can cost anywhere from $50 to $150 per test (Ravi, Cortade, Ng, & Wang, 2020). The Abbot BinaxNOW costs anywhere from $1 to $5 per test including medical staff (James et al., 2021). A recent cost analysis study that compared various testing strategies found that testing via rapid test at a higher frequency was still more cost effective than traditional PCR testing strategies (Zhanwei Du, 2021).

Efficiency:

How convenient is it for the general public to access such programs? Rapid testing surveillance programs were found to be the most efficient when compared to the PCR based programs. Time taken for the test to be administered and the test turnaround time are the two main factors that are taken into account when analyzing efficiency. On average PCR tests take slightly longer than rapid tests and take about 24-48 hours+ for test results to be returned to the patient (Ravi et al., 2020). The Abbot BinaxNOW currently takes as little as 15 minutes and can be administered anywhere due to the limited equipment needed (James et al., 2021).

Sensitivity and Frequency:

Sensitivity is the most commonly discussed factor when deciding on a testing strategy. *Current* PCR testing programs and proposed PCR surveillance testing programs provide the most sensitive measure of infection; however, the Rapid test option makes up for this trade off in test frequency. While PCR testing may be thought of as the gold standard, live viral culture is actually the gold standard we have for determining if a person has replicable viral infection of SARS-CoV-2. PCR tests have a sensitivity around 92% whereas the Abbot BinaxNOW reports a sensitivity of 64% (CDC, 2021; Sethuraman et al., 2020). While this may seem alarming, it is important to note that the PCR positive threshold is relatively low and often comes back positive for individuals who are in the early stage of infection and late stage of infection, with a limit of detection or LOD as 10^3 cp/ml. Comparatively most rapid tests have a positive threshold LOD as 10^5 cp/ml (Larremore et al., 2020). This is important to note as at 10^6 cp/ml is the threshold at which a person is *infectious* therefore stating the rapid tests are a better indicator of infectiousness would be a more accurate description (La Scola et al., 2020). Relatively, the time between 10^3 and 10^6 cp/ml is a short window and the prospect of frequency makes up for the tests sensitivity, as demonstrated in numerous modeling studies (Larremore et al., 2020).

	Current PCR testing program	Rapid community surveillance	PCR community surveillance
Main goal	Diagnose Covid-19 disease infections in those with probable cause	Diagnose Covid-19 infection in those with and without probable cause	Diagnose Covid-19 infection in those with and without probable cause
Population reached	- Symptomatic - Known exposure	- Asymptomatic/ Presymptomatic - Symptomatic - Known and unknown exposure	- Asymptomatic/ Presymptomatic - Symptomatic - Known and unknown exposure
Test used	- Rt-PCR testing	- Rapid test; example: Abbot BinaxNOW - Rt-PCR testing	- Rt-PCR testing
Efficiency	Not very efficient: 2-3-day results, smaller testing capacity, $	Very efficient: Timely, large testing capacity, cost effective (abbot Binax < $5)	Not very efficient: 2-3-day results, smaller testing capacity, $
Sensitivity	92.1% (95% CI 86.6–95.9) *-general consensus* (Sethuraman, Jeremiah, & Ryo, 2020)	78.6% *-positive viral culture/ infectious* 64.25% *-positive PCR* (CDC, 2021)	92.1% (95% CI 86.6–95.9) *-general consensus* (Sethuraman, Jeremiah, & Ryo, 2020)

Recommendation

After analysis of the three testing strategies for vaccination rollout during spring and summer season, we recommend the molecular rapid testing surveillance program due to its efficiency and ability to capture asymptomatic and those unlikely to get tested. It is imperative the state adapts to changing Covid-19 illnesses now that the vaccine is beginning to permeate society and relieve the disease burden. This program would not only be more accessible to the general public but also be more affordable, user friendly and efficient. Individual organizations and businesses such as universities or long-term care facilities have implemented rapid test surveillance programs with great success. This program adapts to the communities' changing prospective of the pandemic as we begin to hit the 1-year mark. With vaccination rollout, the increase in social activity during the spring and summer months may be inevitable. By giving non-vaccinated Georgians the option to do so responsible may lead to a decrease asymptomatic transmission and the continuation of spread within the unvaccinated community. This program could be implemented in schools with success as a weekly testing option in addition to continued prevention measures.

Projecting the outcomes

If the molecular rapid testing program is implemented it must be accompanied by both a robust public health campaign on the aims of the new testing program as well as efficient and proactive design of the testing facilities themselves. As we have adapted to the pandemic, Georgia testing facilities have become more and more efficient when it comes to the physical drive through testing. This efficiency is expected to be matched with molecular testing program as well as clear instructions for the public to follow so they understand their diagnosis and the capabilities of the molecular rapid tests. Public education is essential is essential when explaining what test to use and for what reason. PCR testing will still be recommended for those in quarantine and for those with probable cause of infection. Rapid molecular testing would be marketed at a convenient way ensure you are not infectious for that day; i.e. promoting responsible socialization.

Conclusion

We have concluded that switching to a molecular rapid testing program is the most cost efficient and accessible option to proactively diagnose the remaining SARS-CoV-2 infections during the vaccine rollout period. Although the reliance of less sensitive molecular rapid tests may be worrisome, we can use this to our benefit by changing the parameters in which we use them. Understanding the rapid tests ability to detect infectiousness complemented by frequent testing, makes these tests a tool for case reduction. By supporting a more acessable and robust testing program, Georgia will be able to take a proactive approach in reducing the number of SARS-CoV-2 infection.

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