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Spring 5-7-2023

### 5-Prong Approach taken by TSU College of Pharmacy and Health Sciences to Mitigate COVID-19

Zuri Dale

Rashid Mosavin

Cynthia Johnson

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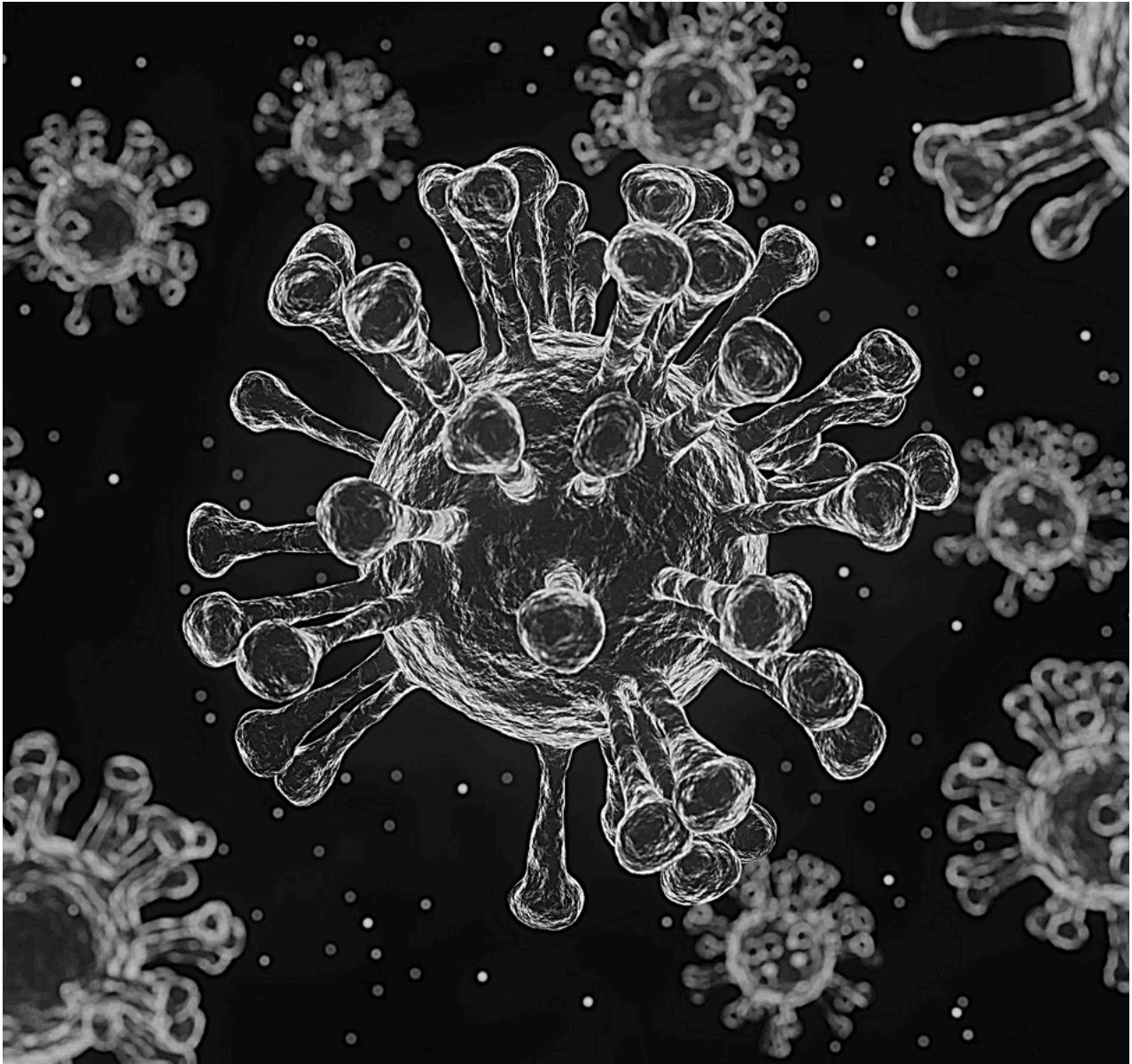


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# TSU COVID-19 IMPLEMENTATION AND RESPONSE

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TEXAS SOUTHERN UNIVERSITY

College of Pharmacy & Health Sciences

# ABSTRACT

In March 2020, the World Health Organization characterized COVID-19 as a global pandemic, an outbreak that covers a high proportion of individuals in a wide geographic area. Since the original SARS CoV-2 strain, several variants have been identified and have the classification of “variant of concern”. These strains may be more contagious, more highly transmissible, and cause more severe illness in comparison to the original strain.

The SARS CoV-2 pandemic challenged universities to adopt to urgent situations, thus forcing most to cease nearly every area of operation and make unprecedented decisions. The Texas Southern University College of Pharmacy and Health Sciences initiated a new comprehensive COVID Prevention Center that utilized evidence-based practices, public health guidance, and increased surveillance to manage exposure and transmission on campus. This review summarizes the five-prong approach taken at the Texas Southern University (TSU) College of Pharmacy & Health Sciences to manage and lead all efforts in our fight against the COVID-19 pandemic on our campus and community.

# INTRODUCTION

Over the course of 2020, the coronavirus disease, (COVID-19), has taken hundreds of thousands of lives, infected millions of people, upended the global economy and cast a dark shadow across our future. As of November 16, 2021, the United States of America stands as the world's No. 1 country impacted by the SARS CoV-2 virus, with 47,145,861 cases and 761,461 deaths (cdc.gov, 2021). Racial and ethnic minorities in the USA, African Americans, Native-Americans and the Latino populations endure disproportionate infection and death rates of COVID-19 (Rossen et al., 2020). These racial and ethnic disparities are more pronounced when measuring the mortality rate in terms of years of potential life lost (Xu, et al., 2021). This coupled with the rapid spread of the Delta variant necessitated swift response to ensure a safe return to campus. TSU was one of the eight HBCU hub schools partaking in the JUST initiative to allow students and staff a safe return to school after the pandemic closure (insert citation). The College of Pharmacy and Health Sciences (COPHS) was tasked with the leading and coordination of a multi-pronged COVID response effort and used JUST project and HERFF funding to support COVID response efforts.

From the onset of the academic year, Texas Southern University mobilized comprehensively. Through the initiation of the COVID Prevention Center (CPC) – an initiative with the aim of increasing health security at Texas Southern University, the COPHS increased collaboration among campus units and expanded campus response capacity. Through the center, we used evidence-based practices, public health guidance and increased surveillance to manage exposure and transmission on campus. Tools to slow the impact of the pandemic were available and our decisions were informed by science and a collective commitment to public health guidance.

Our response strategy is organized around five key priorities:

**Education:** COVID Conversations, weekly campus radio segments, and educational material posted to social media.

**Integration:** Coordination of all campus entities to streamline COVID-19 processes and increase response efficiency. The CPC ensured proper communication of policies and relevant updates to all external and internal stakeholders.

**Testing:** Coordination of campus-wide testing at our on-campus Clinical Laboratory Improvement Amendments (CLIA) certified PCR laboratory. This included the integration of laboratory, testing sites, and electronic health records (EHR).

**Vaccination:** Providing vaccine opportunities, overcoming vaccination hesitancy, and eliminating barriers to vaccination to increase vaccination rates.

**Surveillance:** Coordination of contact tracing, case monitoring, data tracking, genomic sequencing of positive isolates, and case management.

## INTEGRATION

Key actions:

- Coordination of campus services to increase efficiency of response
- Communication with internal and external stakeholders through task force

Immediate action included the development of a comprehensive guide to establish expert leadership and gain trust of campus constituents. As part of this strategy, the COVID-19 Guide to a Healthy Campus community was created with coordination of all campus entities with a goal of establishing a response structure where decision making was guided by science. This guide included input from stakeholders including but not limited to the office of compliance, student services, student health, campus police, human resources, university testing, academic affairs, and residential life and housing.

We recognized that fragmented and limited availability of data posed a delay in targeted response. To ensure transparency and maintain communication with appropriate leaders, the COVID task force was developed to discuss regular reports on the state of campus security. Under the direction of our campus Epidemiologist, these expert-led briefings reported on evidence-based metrics where data were regularly shared around key response indicators. Weekly briefings included tracking toward several performance-based indicators including positive testing, cases, vaccination status, positivity rates, and variant monitoring. This regular engagement with campus leaders allowed us to help guide policy implementation and response.

# TESTING

## Key Actions:

- PCR based analysis with quick turn-around
- In-house CLIA certified laboratory
- Integration of laboratory and testing site

To mitigate the impact of the pandemic on the TSU community and ensure a safe return of our students to campus, we implemented in-house, PCR-based testing with same-day reporting as the first-line intervention strategy to control the spread of SARS CoV-2. Efforts began before the return of students to campus to establish a high-complexity molecular laboratory, fully equipped with a team of clinical lab professionals and industry-leading technology. These efforts were realized through the in-kind and monetary donations made by ThermoFisher Scientific Inc. Just Project and the Bill & Melinda Gates Foundation respectively. At the onset of the academic year, the Covid Prevention Center and the Just Laboratory collaborated to maximize reach and capacity of testing. Fourteen thousand test kits were initially provided through the Just project to the TSU community. Between March 2021 and March 2022, Texas Southern University JUST Project lab analyzed 9,769 clinical tests. Using clinical data, we monitored the variation of test trends over time to help monitor changes in disease incidence and prevalence in our campus community . **Table 1.**

The CareEvolve portal and interface powered the electronic clinical workflow between the campus testing sites and laboratory. Through CareEvolve all clinical tests were ordered, securely transferred to the laboratory through integration with Platform for Science, and results were delivered to patients to be accessed through the patient portal.

# ANALYSIS

## Key Actions:

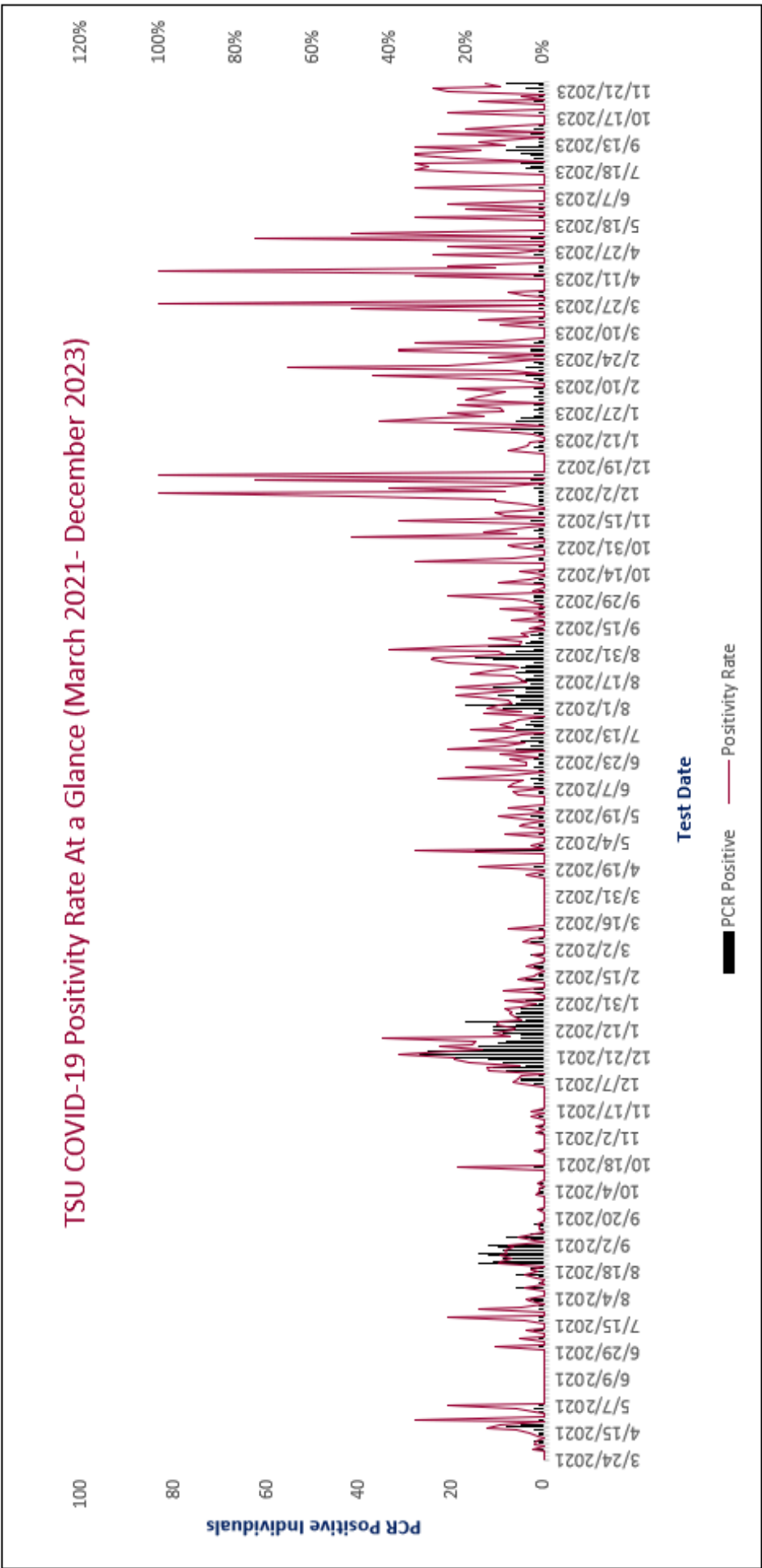
- PCR based analysis with quick turn-around
- In-house CLIA certified laboratory
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The COVID-19 Real-Time RT-PCR Assay using the TaqPath™ COVID-19 Combo Kit Advanced from ThermoFisher Scientific, followed by amplification on the Applied Biosystems™ QuantStudio™ 5 Real-Time PCR instrument was utilized. The operational workflow involves collection of nasopharyngeal samples from students, faculty and staff at one of the two permanent collection sites available on campus or one of the regularly held targeted pop-up collection sites. Samples are collected daily by trained health care professionals and transported in temperature-controlled containers to the JUST COVID Laboratory. Rapid antigen tests are also available however, all campus analytics were based upon PCR data obtained through the JUST Project.

Viral RNA was extracted from each sample using the MagMAX™ Viral/Pathogen II (MVP II) Nucleic Acid Isolation Kit on the KingFisher™ Flex Purification System from ThermoFisher Scientific. Three specific regions of the SARS CoV-2 genome were targeted for multiplex, real-time amplification to detect the presence or absence of the virus in clinical samples. These targets are: spike (S) protein and nucleocapsid (N) protein, and the open reading frame (ORF) regions. The assay and workflow utilized received emergency use authorization from the Food and Drug Administration on March 13, 2020.

Results are generated using the COVID-19 Interpretive Software by ThermoFisher Scientific. Quality control standards dictate that a minimum of one negative Control and one positive Control must be run with each COVID-19 assay batch as well as the addition of an internal MS2 phage control to each individual sample. All positive samples with CT values equal to or below 30 are sequenced using the Illumina flex kit on the Illumina MiSeq Platform. All positive results and variant data are reported to the Houston Health Department.

Table 1. Variation of test trends over time – TSU March 2021-December 2023



# **SURVEILLANCE**

## Key Actions:

- Daily monitoring of clinical data
- Surveillance pooled air testing
- Genomic Sequencing
- Wastewater surveillance
- COVID-19 contact tracing and internal dashboard
- Case management of positive cases

Collecting and analyzing data for daily monitoring is needed to guide the public health response against COVID-19. To that end, we increased our surveillance toolkit beyond clinical testing to include ambient air quality testing, wastewater testing, and genomic sequencing. Air quality testing was conducted using Aerosol Sense, an in-air pathogen surveillance system, that can detect for COVID, Flu A/B and RSV. It was then coupled with PCR technology to identify if COVID-19 was contaminating the environment. Similar to the clinical samples, the results from qRT-PCR are positive, negative or inconclusive based on the signal of three different gene targets in the virus.

The amount of that signal (Ct value) was used as a proxy of the genetic viral load of the sample. This data provided early insight into viral presence to allow for quick decision-making and served as a supplement to clinical testing. The ambient air was regularly sampled from the General Services Building and larger lecture classrooms as requested.

In addition to high transmissibility, the rapid emergence of novel SARS-CoV-2 variants posed another challenge to the local and global efforts to contain the virus. According to the CDC and SARS-CoV-2 Interagency Group (SIG), emerging variants of SARS-CoV-2 are classified into four classes: variants being monitored, variants of interest, variants of concern and variants of high consequence (Janik et al., 2021). Identification of new and emerging variants on campus was conducted using Next Generation sequencing technology on the MiSeq Illumina platform in collaboration the City of Houston Health Department. Variants of concern such as the Delta-B.1.617.2 variant and the Omicron-B.1.1.529 variant which exhibit a drop out of the spike protein-S during PCR amplification and CT values that meet the requirement are re-extracted for sequencing. All sequencing data was reported to the local health authorities in addition to the Covid Prevention Center to enact infection control policies as necessary. Sequencing of positive isolates began May 2021 and all initially sequenced samples were of the B. 1. 1. 7 (Alpha) lineage. By July 2021, B.1.617.2 (Delta) emerged on our campus and by December 2021 B.1.1.529 (Omicron) was the dominant strain impacting our campus community.



Wastewater surveillance was conducted using LuminUltra's Gene Count® in-field qPCR solution to complement our surveillance efforts. While the city of Houston does maintain a wastewater monitoring project, community-level wastewater surveillance at a treatment plant may not capture communities or facilities served by decentralized systems such as prisons, universities or hospitals. Waste-water epidemiology can give up to seven days lead time on clinical cases, therefore we sought to make side-by-side comparisons to our clinical case data. In this way, we were able to make predictions about potential outbreaks in areas on campus. Water samples were collected from university man-holes and analyzed for the presence or absence of SARS CoV-2. Similar to air quality monitoring, these are pooled samples that cannot reliably and accurately predict the number of infected individuals in a community but are rather used as an early indicator that COVID prevalence in an area. We utilized wastewater surveillance to monitor infection trends but recognized its limitations as limits of detection are yet not well established. Samples were collected from several on-campus sites including residential facilities, student center, and some academic buildings.

Contact tracing is a crucial component of our public health toolkit to improve infection control and contain COVID-19. Tracing is conducted on all positive cases and their contacts and is prioritized particularly for our high contact groups such as athletes and those residing in residential life & housing. All positive cases and cases of suspected exposure are assigned to a case investigator and monitored for a period of ten days. Through this case investigation, daily symptoms, preexisting conditions, and vaccination status data were collected. CDC guidelines were used to establish isolation and quarantine protocols. The CPC employed four contact tracers to ensure all cases were identified and isolated within 24 hours. Contact tracing was done utilizing the case management and manual contact tracing pillar of Microsoft Return to School which enabled daily monitoring and cluster identification. Return to School was built on a secure platform that ensured compliance, interoperability, and security of health data. Through this platform, we produced an internal analytics dashboard that supported monitoring and campus opening.

Along with our robust on-campus surveillance efforts, the following internal and external COVID-related factors were used to determine on-campus threat levels. (Table 2)

- Guidance from the Centers for Disease Control and Prevention (CDC), World Health Organization (WHO), and other public health agencies as well as state and local guidelines and mandates.
- Positivity and vaccination rates in local and state communities.
- On-campus positive test rates and contact tracing and campus capacity for, quarantine, and isolation.
- Campus access to appropriate supplies and staffing for infection protection, mitigation, and ongoing operations.

Table 2. Campus threat levels, indicators, and action plan

| LEVEL  | INDICATORS   | ACTION PLAN   |
|--|--|---|
| <p><b>BLUE LEVEL:</b><br/>Limited Concern</p>  | <ul style="list-style-type: none"> <li>• Low off-campus infection rate and increased rate of vaccination. Near-zero incidences of infection on campus.</li> <li>• Majority of the campus community has received an effective vaccine and a plan is established to vaccinate the remainder of the population.</li> <li>• Local and state guidelines permit for reduced social distancing and other pandemic mitigation measures.</li> </ul>   | <ul style="list-style-type: none"> <li>• Campus in-person activities on campus return to pre-pandemic levels.</li> <li>• Prevention and mitigation protocols are gradually lifted.</li> <li>• Most of the staff is working on campus and staffing is at pre-pandemic levels</li> </ul>  |
| <p><b>GREEN LEVEL:</b><br/>Low Concern In-Person Academics and Activities with Mitigation Policies</p>                                     | <ul style="list-style-type: none"> <li>• There is underlying threat of a global pandemic but with low case prevalence on campus.</li> <li>• Vaccination levels within the community are high.</li> <li>• Campus is on track for containment</li> </ul>   | <ul style="list-style-type: none"> <li>• Academics will be taught in person and at full capacity of 100%</li> <li>• Housing will return to full capacity.</li> <li>• Testing, use of PPE, and other mitigation policies will resume to allow for in-person activities</li> <li>• Athletics and other campus events may involve additional safety precautions.</li> <li>• Offices are staffed at full capacity, with flexibility and additional mitigation policies.</li> </ul>  |
| <p><b>YELLOW LEVEL:</b><br/>Moderate Concern Hybrid Academics and Restricted In-Person activities</p>                                      | <ul style="list-style-type: none"> <li>• Rising levels of positive and symptomatic tests but not to the level of capacity concerns in quarantine and isolation housing.</li> <li>• An increasing transmission rate in the local community.</li> <li>• Rigorous testing and tracing programs advised</li> </ul>   | <ul style="list-style-type: none"> <li>• Academics may shift to allow for hybrid learning.</li> <li>• Staffing levels on campus may be limited to allow for in-person and remote work options.</li> <li>• In-person activities are subject to restriction based on the information available at that time from contact tracing and potential sources of the spread. Double masking is encouraged.</li> </ul>  |
| <p><b>ORANGE LEVEL:</b> Elevated Concern.<br/>Academics shifts to remote operations. Only Essential Operations and Personnel on Campus</p> | <ul style="list-style-type: none"> <li>• Isolation and Quarantine housing at Lanier is nearing capacity levels.</li> <li>• Levels of positive tests on campus continue to increase as monitored by the COVID prevention center</li> <li>• Staffing levels are impacted by positives and close contacts.</li> <li>• Stay-at-home orders and/or restrictions at the state or local level. Rigorous testing and tracing programs still advised</li> <li>• All indoor gatherings are limited to 50 individuals.</li> </ul> | <ul style="list-style-type: none"> <li>• Instruction is 100 percent remote for a determined period or for the remainder of the semester.</li> <li>• On-campus students can remain on campus, but students are asked to stay in place {modified quarantine}</li> <li>• Only essential personnel are required to work on campus, but with reduced staffing where appropriate. Other personnel should limit their time on campus. Access to campus and buildings is restricted. Double masking is encouraged.</li> </ul> |
| <p><b>RED LEVEL:</b><br/>High Concern<br/>Fully Remote Operations</p>  | <ul style="list-style-type: none"> <li>• Isolation and Quarantine space is at capacity.</li> <li>• High case prevalence on campus, overwhelming contact tracing and resources to support students.</li> </ul> <p>Stay-at-home orders and/or restrictions at the state or local level.</p>  | <ul style="list-style-type: none"> <li>• Instruction is 100 percent remote for a determined period or for the remainder of the semester.</li> <li>• Access to campus and buildings is restricted.</li> <li>• Resident students are asked to go home if able</li> </ul> <p>Only essential personnel are on campus and with limited staffing.</p>   |

# VACCINATION & EDUCATION

## Key Actions:

- Overcoming vaccine hesitancy
- Eliminating barriers to vaccine access
- Increasing vaccination rates and providing vaccine opportunities.

We executed an aggressive vaccination strategy to address the complexities of vaccination hesitancy. Through partnership with Baylor St. Luke's Medical Center, 30,235 vaccinations were administered between February 2021 and October 2021 on our campus to both the TSU community and the public. Beginning October 2021, we engaged with TruCare Pharmacy to continue to provide vaccination opportunities to staff, students, and the community at no charge and 1153 additional vaccinations were administered between October 2021 and May 2022.

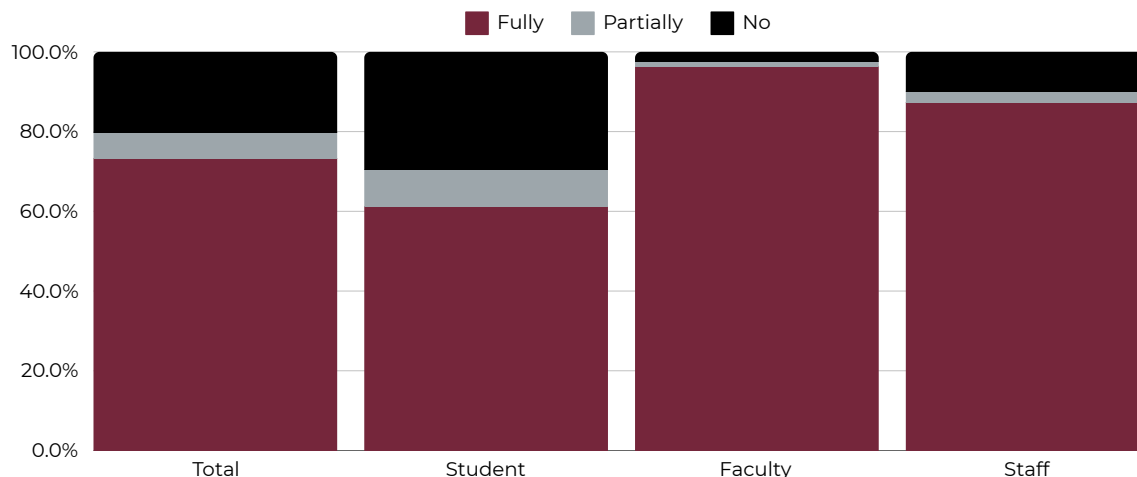
In parallel with providing vaccination opportunities, we worked to directly address the reasons for vaccination hesitancy recognizing that the history of medical distrust was complicated and often oversimplified in our community. Through campus community-based surveys, we learned that the greatest predictor of willingness to vaccinate on our campus was the need for accurate information thus we worked to counter misinformation about the efficacy of the vaccine by ensuring science-based information was readily available to the public. We used data from campus community hesitancy surveys to target interventions that included a series of lectures and COVID conversations to combat misinformation, financial incentive, and a education campaign though radio and social media. A toolkit of social media and press resources, and answers to frequently asked questions, was made available and posted to all campus social network sites in addition to a weekly information segment on the university radio station, KTSU, to continue to combat misinformation.

Tracking vaccination data was critical. We administered a campus status survey in two iterations to monitor our vaccination rates and observed tremendous gains in vaccination rates between August and October of 2021 as we launched a student-centered vaccination campaign that provided a monetary incentive for vaccinations. As of November 2021, we distributed approximately \$85,000 in monetary incentives to encourage our students to vaccinate. Table 3.

**Table 3.** Campus Fall 2021 and Spring 2022 Vaccination status

### Vaccination Status Fall 2021

I have been vaccinated for the virus that causes COVID-19:



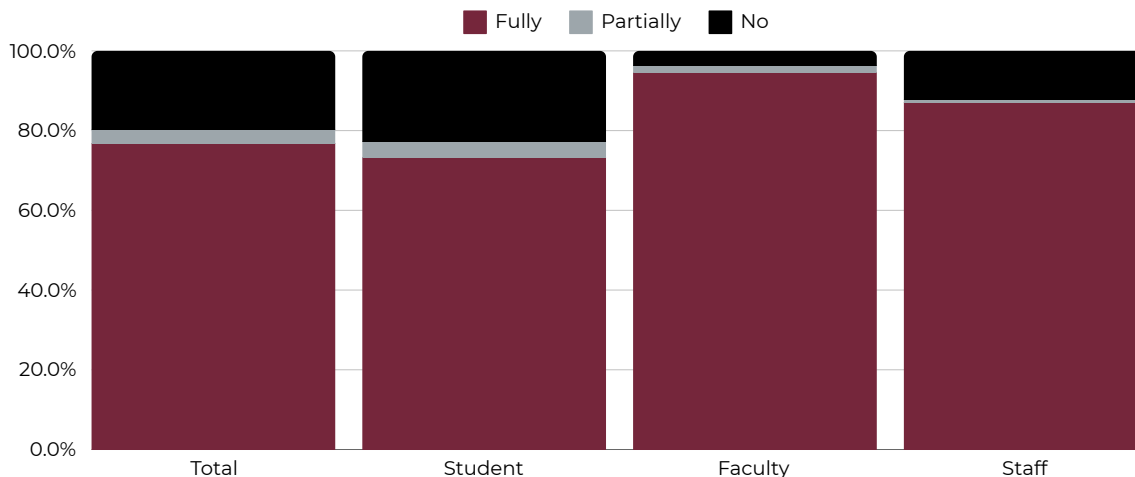
### Vaccination Status Fall 2021

I have been vaccinated for the virus that causes COVID-19:

|             | TOTAL        | STUDENT     | FACULTY     | STAFF       |
|-------------|--------------|-------------|-------------|-------------|
| TOTAL COUNT | 2107         | 1261        | 382         | 464         |
| FULLY       | 1554 (73.3%) | 771 (61.1%) | 368 (96.3%) | 405 (87.3%) |
| PARTIALLY   | 135 (6.4%)   | 117 (9.3%)  | 5 (1.3%)    | 12 (2.8%)   |
| NO          | 428 (20.3%)  | 373 (29.6%) | 9 (2.4%)    | 46 (9.9%)   |

### Vaccination Status Spring 2022

I have been vaccinated for the virus that causes COVID-19:



### Vaccination Status Spring 2022

I have been vaccinated for the virus that causes COVID-19:

|             | TOTAL        | STUDENT      | FACULTY     | STAFF       |
|-------------|--------------|--------------|-------------|-------------|
| TOTAL COUNT | 4153         | 3246         | 335         | 572         |
| FULLY       | 3190 (76.8%) | 2375 (73.2%) | 317 (94.6%) | 498 (87.1%) |
| PARTIALLY   | 140 (3.4%)   | 130 (4.0%)   | 6 (1.8%)    | 4 (0.7%)    |
| NO          | 823 (19.8%)  | 741 (22.8%)  | 12 (3.6%)   | 70 (12.2%)  |

# CONCLUSIONS

This article summarizes the multi-pronged approach taken by the COVID Prevention Center in all aspects of detection, prevention, and surveillance of the COVID-19 pandemic on our campus. As the faculty and administrators in higher education across the country were forced to rapidly convert in-person instruction to an online modality, we focused on creating the tools described in this article to assure the safe return of our faculty, students, and staff to campus. Our partnership with Thermo-Fisher scientific and the generous support of the Bill and Melinda Gates foundation was instrumental in the accomplishment of these efforts.

The COVID-19 pandemic helped shape the future of higher education and there are two elements that made our effort a success. First, we recognize the importance of testing and sequencing as new variants emerged. Second, with the introduction of the vaccines, we understand the importance of getting internal stakeholders and the surrounding campus community vaccinated. Our partnership with St. Luke's Health and the creation of the vaccine clinic in the college with a capacity of 500 vaccinations per day was a great step toward keeping the positivity rates as low as possible. We hope to emphasize the importance of partnerships between academics entities, private firms, and health systems to combat the negative impact of the COVID-19 pandemic on student life and instruction in higher education.

## REFERENCES

1. Rossen, L. M., Branum, A. M., Ahmad, F. B., Sutton, P., & Anderson, R. N. (2020). Excess deaths associated with COVID-19, by age and race and ethnicity—United States, January 26–October 3, 2020. *Morbidity and Mortality Weekly Report*, 69(42), 1522.
2. Xu, J. J., Chen, J. T., Belin, T. R., Brookmeyer, R. S., Suchard, M. A., & Ramirez, C. M. (2021). Racial and ethnic disparities in years of potential life lost attributable to COVID-19 in the United States: an analysis of 45 states and the District of Columbia. *International journal of environmental research and public health*, 18(6), 2921.
3. Janik, E., Niemcewicz, M., Podogrocki, M., Majsterek, I., & Bijak, M. (2021). The emerging concern and interest SARS-CoV-2 variants. *Pathogens*, 10(6), 633.