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Trends in COVID-19 Infections during Four Surges in Bexar County, Texas

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Abstract

Background: Bexar County, Texas has experienced four COVID-19 surges during the pandemic. This study investigates trends in COVID-19 infections over the course of pandemic. The objective is to describe the association of COVID-19 infection cases with changes in testing availability, masking, distancing policies, and occurrence of public holidays during the surges.

Methods: Cases occurring since May 26th, 2020, until March 31st, 2022, comprise this analysis. Case data were obtained from the Texas NEDSS database. Aggregate hospitalization data were obtained from STRAC (Southwest Texas Regional Advisory Council) for Bexar County hospitals. Analyses were conducted using R-Studio and Excel. Demographic statistics, percentages, case fatality rates were computed.

Results: Average age (34 years), female gender (52%), Hispanic ethnicity (69%), residing in the Southern zip codes of Bexar County, and negative vaccination status were associated with the four COVID-19 surges. During all surges, test positivity, hospitalization and mortality rates all increased. Surges coincided with the major public holidays.

Conclusion: These findings highlight the association COVID-19 infections with implementing and loosening restrictive policies, along with sociocultural events and public holidays in Bexar County, Texas. Preventative efforts promoted safer behavior and decreased the COVID-19 infection on majority of days during the pandemic except closer to public holidays when a high infection rate was observed in the form of surges.

Public Health Significance: Preventative efforts at the local governmental level along with voluntary compliance with restrictive COVID-19 policies by Bexar County Residents are necessary for decreasing community infection and widespread disease.

Keywords: COVID-19; Surge; Trends; Holidays; Bexar-county; Policy-decision

Abbreviations: COVID-19: Coronavirus; SARS-COV-2: Severe Acute Respiratory Syndrome Coronavirus 2; JBSA: Joint Base San Antonio; NEDSS: National Electronic Disease Surveillance System; STRAC: Southwest Texas Regional Advisory Council; WHO: World Health Organization

Introduction

Coronavirus (COVID-19) infection caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-COV-2), originated in Wuhan, China in December 2019 and spread to the United States in January 2020 [1]. On February 2020, confirmed cases of Coronavirus were identified among a group of Diamond Princess cruise ship passengers who were quarantined at the Federal facility at JBSA (Joint Base San Antonio) Lackland [2]. The initial origin of community spread in Texas remains unclear as testing capacities across the state were limited and not much was known about the novel coronavirus infection. The Texas

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Department of State Health Services reported the first non-cruise ship positive COVID-19 case on March 4, 2020, in Fort Bend County [3]. Since then, Texas has been severely impacted by COVID-19 pandemic.

The World Health Organization declared COVID-19 a global pandemic on March 11, 2020 [4]. During the pandemic, rates of infection, hospitalization, and case mortality all increased in Texas and individual counties implemented and evaluated their own responses. This paper examines trends in COVID-19 infections in Bexar County, Texas, during the four surges and highlights associations with public holidays, testing availability, masking, social distancing policies, and vaccination.

Methods

Cases occurring from May 26, 2020, through March 31, 2022, comprise this analysis. Case data were obtained from the Texas NEDSS (National Electronic Disease Surveillance System) database. Aggregate hospitalization data were obtained from STRAC (Southwest Texas Regional Advisory Council). STRAC maintains the regional trauma system. COVID-19 tests included public, commercial, and military lab results reported to the San Antonio Metropolitan Health District and recorded in NEDSS. Analyses were conducted using R and Excel. Descriptive statistics including percentages and Case Fatality Rates (CFRs) were computed.

Results

Bexar County, Texas, has experienced four COVID-19 surges during the pandemic. Surges coincided with major public holidays. During all surges, case numbers, weekly positivity rates, hospitalization and mortality rates increased. In aggregate, 552,192 cases and 5,689 deaths (CFR, 1.0%) were reported during the surges. Demographic characteristics indicated an average age of 34 years, 52% female gender, and 69% Hispanic ethnicity among cases with available ethnicity data. Cases tended to concentrate in the Southern zip codes of Bexar County. Negative vaccination status was associated with COVID-19 surges. Timeline Events (Appendix 1) and specific reports for the individual surges are detailed below:

First Surge

This surge started on May 26, 2020 (one day after Memorial Day), peaked on June 29, 2020, (close to July 4, 2020, Independence Day holiday) and ended on September 8, 2020 (one day after the September 7, 2020, Labor Day holiday).

Timeline Events

Due to increases in COVID-19 cases, on June 27, 2020, "Stay Home" alerts were issued [5]. On June 29, 2020, restaurant dining capacity was reduced to 50% occupancy [5]. On July 2, 2020, mandatory mask and face covering orders were executed across Texas as cases surged and public gatherings of more than 10 people without government approval were prohibited and fines were implemented for non-compliance with the executive order [5,6].

Surge 1 (Cases=55,741; Deaths= 1,171; Crude CFR = 2.1%)				
	Date	Number	Weekly Positivity Rate	Hospitalizations (7-day average)
Start	05/26/2020	62	4.3%	87
Peak	06/29/2020	1,723	23.1%	1,074
End	09/08/2020	162	7.6%	304

Anticipating an increase in cases over Labor Day (September 7, 2020), an emergency alert was issued on September 4, 2020, warning residents to stay safe on Labor Day weekend [5,6]. However, since the surge was not observed for Labor Day, unlike for Independence Day, on September 21, 2020, all restaurants (except bars), gyms, retail stores, museums, and offices (except bars) were allowed to increase capacity to 75%, which was up from previous 50% occupancy [5, 6].

Second Surge

The second surge started on October 2, 2020 (close to October 12, 2020, Columbus Day holiday) persisted through December 24, 2020-January 3, 2021 (Christmas and New Year's holidays) peaked on January 4, 2021 (just after the New Year's holiday) and ended on March 14, 2021 (Spring Break holidays).

Surge 2 (Cases= 145,754; Deaths=2,101; Crude CFR=1.4%)				
	Date	Number	Weekly Positivity Rate	Hospitalizations (7-day average)
Start	10/02/2020	150	6.1%	196
Peak	01/04/2021	3,255	20.4%	1,398
End	03/14/2021	148	2.5%	216

Timeline Events

On October 3, 2020, the San Antonio Metropolitan Health District (Metro Health) offered no-cost testing sites and expanded COVID testing services to the asymptomatic individuals [7]. On November 13, 2020, more than one million COVID-19 cases were reported by Texas and the test positivity rate exceeded 10% during the month of November 2020 [5,6]. Due to the increase in COVID-19 cases, a Thanksgiving weekend curfew was issued (effective November 26 – November 30, 2020, and "Stay Home" alerts were sent out [5,6]. On December 14, 2020, the first dose of COVID-19 vaccines (Pfizer) was given [8]. On December 23, 2020, Metro Health offered COVID-19 vaccines to eligible individuals and provided information on vaccine sites [9,10]. The surge persisted through the Christmas and New Year's holidays (December 24, 2020 - January 3, 2021).

On January 9, 2021, mass vaccination sites were opened at the Alamodome in San Antonio [11]. On January 18, 2021, a record-breaking number of hospitalizations were observed in Bexar County [9]. On March 10, 2021, Texas Lifted the statewide mask mandate while many counties questioned if it was too soon to do so [11]. On March 29, 2021, Texas opened vaccines to all adults [11]. On April 29, 2021, the cumulative Texas COVID-19 death toll surpassed 50,000 [11].

Third Surge

The third surge started on June 1, 2021 (following May 31, 2021- Memorial Day), peaked on August 9, 2021, and ended on November 2, 2021 (close to October 31, 2021, Halloween).

Surge 3 (Cases=99,273; Deaths=1,439; Crude CFR=1.4%)				
	Date	Number	Weekly Positivity Rate	Hospitalizations (7-day average)
Start	06/01/2021	144	1.3%	144
Peak	08/09/2021	2,125	16.9%	1,267
End	11/02/2021	176	1.6%	200

Timeline Events

On June 5, 2021, masks were no longer required on Texas public school campuses [11]. However, on June 28, 2021, the Delta variant emerged as the most transmissible virus identified since the beginning of pandemic and even fully vaccinated peo-

ple were encouraged to wear masks due to the surge in delta variant of COVID-19 [11].

On July 13, 2021, the COVID-19 positivity rate jumped to 11.2% in Bexar County [11]. On August 3, 2021, due to continuous increases in COVID-19 cases, the COVID-19 risk level in Bexar County increased from 'low' to 'severe' and was 'worsening' within one month [11]. On Aug 10, 2021, the county judge issued an executive order requiring masks in all Bexar County facilities [11]. On Sep 7, 2021, with continued masking policy implementation, the Bexar County positivity rate dropped to 7.6% and the COVID-19 risk level was considered 'moderate" [11]. On Oct 19, 2021, with sustained preventative efforts (masking and social distancing policy implementation), the Bexar County COVID-19 positivity rate dropped to 2.1% and on November 2, 2021, the county COVID-19 risk level was considered 'low" [11].

Bexar County officials contemplated how to manage the COVID risk during the upcoming Thanksgiving 2021 holidays. On November 19, 2021, COVID boosters were approved for all adults and urged particularly for ages 50+ [11]. On November 29, 2021, the Omicron variant posed a 'very high' risk of infection as per WHO warning, following which on Dec. 6, 2021, Texas reported its first case of the Omicron COVID-19 variant [11]. On Dec. 9, 2021, Texas created a hotline for employees to report workplaces requiring COVID-19 vaccination [12] and on the same date the CDC expanded booster recommendation to include everyone aged 16 and older [13].

Fourth Surge

The fourth surge started on December 13, 2021 (after the Thanksgiving holidays November 25-28, 2021), persisted through December 24, 2021 - January 3, 2022 (Christmas and New Year's holidays), peaked on Jan 10, 2022 (after the New Year's holidays) and ended on February 23, 2022.

Surge 4 (Cases=219,894; Deaths=656; Crude CFR=0.3%)				
	Date	Number	Weekly Positivity Rate	Hospitalizations (7-day average)
Start	12/13/2021	350	2.5%	203
Peak	01/10/2022	10,513	38.2%	958
End	02/23/2022	201	4.9%	448

The rates of infection, hospitalization and deaths began to rise by the first week of January 2022. The highly infectious Omicron subvariant XBB 1.5 that was immune evasive became dominant in the U.S and was more transmissible than the previous Delta variant [14].

Timeline Events

In December. 13, 2021, the first two cases of COVID-19 Omicron variant were reported in Bexar County [15]. On December 14, 2021, the cumulative COVID-19 death toll in U.S was reported to be 800,000 while next day on December 15, 2021, Bexar County celebrated, its one-year anniversary of COVID-19 vaccine administration; however, the COVID-19 death toll in the U.S surpassed 800,000 [16]. On December 21, 2021, Texas man was reported the first person to die from Omicron variant in the U.S [17]. On December 23, 2021, COVID-19 isolation recommendation was shortened to 10 days for health workers testing positive and were advised to return to work after 7 days of being asymptomatic and testing Negative [18,19]. On December 27, 2021, the Texas Department of State Health Services announced that the monoclonal antibody supply to fight Omicron variant was 'exhausted' in San Antonio and other regional infusion centers [20]. On December 27, 2021, the COVID-19 isolation recommendation was shortened to 5 days [21].

January 2022 was the month with the highest U.S daily average cases when compared to any country globally [22]. On January 11, 2022, U.S reported approximately, 1.35 million COVID-19 cases in a day thereby breaking previous record of 1.03 million cases on January 3, 2022, with a seven-day moving average for new cases tripling in two weeks to over 700,000 new infections in a day [22]. On January 14, 2022, updated CDC guidelines were implemented on masks to emphasize fit, comfort and consistent wear [23]. On Jan 19, 2022, the Biden administration purchased one billion COVID-19 test kits and created an online portal where people could order free at-home testing kits through the U.S postal service [24]. On January 31, 2022, FDA approved the Moderna vaccine for all people aged 18 years and older [25].

Pandemic Completion Events

On January 11, 2023, the COVID-19 public health emergency was renewed by the Biden administration, amidst a winter surge related to highly transmissible Omicron subvariants [26]. On January 31, 2023, President Biden announced the end to COVID-19 emergency declarations would occur on May 11, 2023 [27].

Discussion

COVID-19 was the first global pandemic to occur in a hundred years (since the 1918 Influenza pandemic), and Bexar County, Texas had to prepare resources and mobilize vaccines, medications, clinic, and staff to address the needs of the residents. The results of this study are consistent with other studies that reported state governments' usage of protective policy mandates (including social distancing, lower mobility, mask use, and high vaccination uptake), were associated with lower COVID-19 infection rates [28-33]. Similar trends were reported across many U.S counties emphasizing the important associations of higher vaccination rates with lower mortality rates [34-36]. Effectiveness of preventative strategies like social distancing, masking, and hand washing for reducing the COVID-19 infection were also reported by neighboring counties within Texas [37-39].

Amidst the preventative efforts in Bexar County, COVID-19 case fatality rates dropped substantially from the first surge (2.1%) to the fourth surge (0.3%). In the early days of the pandemic known cases of pandemic occurred more frequently among older residents and individuals with co-morbidities predisposing to poor COVID-19 outcomes than in subsequent surges. Additionally, by the fourth surge many residents in Bexar County were vaccinated or had developed immunity from prior COVID-19 infection. However, on examining the temporal trends during the surges, the causality is difficult to establish since reinfections were observed even among those vaccinated as COVID variants emerged.

Strengths

This is the first study undertaken by Bexar County, Texas, to report on trends observed during the four COVID-19 surges. It utilizes the original data collected and analyzed from Bexar County, Texas, and covers the entire four surge periods since the beginning of the global pandemic. It reports important statistics such as the case numbers, weekly positivity rates and the dates for start, peak and end of each surge. The study also addresses the timeline of events in Bexar County during the four surges.

A lookback into the historical data, a few years from now, will make this study unique and memorable during the pandemic. Study results and conclusions will also help health departments to prepare in advance and provide guidance for preventative efforts and policy implementation for any future pandemic.

Limitations

During all surges, case numbers, weekly positivity rate, hospitalization and mortality rates increased; However, Metro Health had no direct control over data accuracy and completeness. There was the problem of missing data and out of county cases that were attributed to Bexar County, which may have overestimated or underestimated the reported statistics. Hospital data obtained from STRAC did not distinguish between Bexar County residents, and patients residing in neighboring counties brought in for treatment. Additionally, absolute causality and temporality of association or trends for increased cases due to social events, holidays and policy mandates could not be definitively established amidst the surges, reinfections, and emergence of covid variants.

Conclusion

This study investigated trends in COVID -19 infections over the course of pandemic, in association with the changes in testing availability, masking, social distancing policies, and occurrence of public holidays. The study findings highlight the confluence of implementing and loosening restrictive policies, along with major sociocultural events and public holidays on COVID-19 infections in Bexar County. Preventative efforts appear to have promoted safer behavior and decreased the COVID-19 infection on most of the days during the pandemic except closer to public holidays when a high infection rate was observed in the form of surges.

Author Statements

Public Health Significance

Preventative efforts at the local governmental level along with voluntary compliance with restrictive COVID-19 policies by Bexar County residents are necessary for decreasing community infection and preventing COVID-19 surges.

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