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University Student Health Services COVID-19 Pandemic Response: A Program Evaluation

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Abstract

The COVID-19 pandemic began in China in December 2019, and continued to spread globally throughout the following months. The impact of the virus led to Universities nationwide closing their campuses. Strategic COVID-19 master plans were created to ensure that students, faculty, and staff could return to a safe environment for the fall semester. The role of University Student Health Services (SHS) departments became critical.

The SHS team incorporated telemedicine visits along with new policies, procedures, protocols, and guidelines to maximize the safety of the students, faculty, and staff upon their return to campus. This program evaluation focused on the strengths and weaknesses of the master plan for COVID-19 to mitigate its spread on campus as well as identifying recommendations for improvement. Quantitative and qualitative data revealed that the policies, procedures, protocols, and guidelines implemented by SHS did mitigate the spread of the COVID-19 virus on campus. The telemedicine protocol did facilitate medical evaluation of students and mitigated the risk of viral transmission in the clinic. Significant strengths of the master plan for COVID-19 on campus allowed the University to meet their goal to remain open to Thanksgiving Break. Weaknesses were identified indicating that more investigation is needed on mitigation efforts specific to college and university settings, in addition to improved emergency communication techniques to address students, parents, faculty and staff.

Keywords: Coronavirus (CoV), COVID-19, College, University, SARS-CoV-2, SARS, MERS-CoV, pandemic, contact tracing, antigen testing, PCR testing, telemedicine, isolation, quarantine.

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Introduction and Background

Severe acute respiratory syndrome (SARS) is a respiratory illness that can spread from person to person. The Center for Disease Control and Prevention (CDC), reports that the first outbreak of SARS-CoV dates back to 2002, which presented as an atypical pneumonia, and was first identified in Foshan, Guangdong, China (CDC, 2013). The disease gained worldwide attention in February 2003 when the World Health Organization (WHO) was alerted. A global health alert was issued in March 2003. By July 2003, SARS had reached 29 countries, including the United States (U.S.), with over 8,000 probable cases and over 700 deaths (Davis, 2021). "SARS infections seemed to disappear from the global population" in 2004 (Davis, 2021, p. 2). This was the first introduction to the family of coronaviruses (COVs).

Fast forward to December 2012, when the first case of the Middle East respiratory syndrome coronavirus (MERS-CoV) was identified in Saudi Arabia (Bleibtreu et al., 2019). Unlike SARS-CoV which ended two years after its onset, MERS-CoV still persists in the Middle East (Bleibtreu et al., 2019). As of October 2018, 2,260 confirmed cases and 803 deaths have been identified (Bleibtreu et al., 2019). A 2021 update revealed five cases of MERS in the Middle East between January 2021 and March 2021(CDC, 2021). Although MERS-CoV was never declared a pandemic, there have been outbreaks worldwide (Bleibtrue et al., 2019).

On December 1, 2019, the first case of coronavirus disease 2019 (COVID-19), caused by a novel coronavirus (SARS-CoV-2), was reported in Wuhan, China (Liu et al., 2020). The virus began to spread rapidly throughout China. From December 2019 and into the early months of 2020, the virus spread globally, and on March 11, 2020 the WHO declared COVID-19 as a

global pandemic (Cucinotta, 2020). At the time of this manuscript, the COVID-19 pandemic is just reaching its one-year anniversary. Looking back on the past 12 months many interventions were implemented to mitigate the spread of the disease. There are currently over 133 million cases of COVID-19 worldwide and nearly 3 million deaths due to the virus (*WHO Coronavirus (COVID-19) Dashboard* 2021). Mitigation efforts included closing businesses, restaurants, schools and bars, cancelling sports and other activities, social distancing and mask wearing. Colleges and universities across the nation sent all students and employees home for the remainder of the spring 2020 semester. Virtual learning became a part of our daily lives, as day cares, elementary schools, middle schools and high schools all converted to online education. Over the next few months, the U.S. was basically "shut down" in an aggressive attempt at mitigating the spread of the virus. Testing for COVID-19 took months to develop and roll out to the American public. Finally, in the summer and fall of 2020 the testing demand was met and Americans had access to rapid antigen and/or polymerase chain reaction (PCR) cultures to detect the SARS-CoV-2 virus.

Colleges and universities were faced with the enormous undertaking of how to reopen safely. The potential for rapid viral transmission in a congregate setting such as a university campus was concerning. Critical to the master plans of mitigating the spread of COVID-19 on campus were the Student Health Services (SHS) departments located on campuses nationwide.

Our campus wide strategies were implemented to enable students, faculty and staff to return to campus for the fall of 2020. COVID-19 task forces were created to manage different aspects of the virus. These task forces included: (a) health and safety protocols, the director of SHS was a member of this task force dedicated to medical evaluations, telemedicine, COVID-19 testing, contact tracing, isolation, quarantine, protocol development and management of infected

students (b) academic affairs and online learning, dedicated to hybrid learning development and protocols, (c) faculty/staff re-entry, dedicated to safety of faculty and staff on campus (d) housing and auxiliary services, dedicated to the safety of students living on campus and worked directly with SHS regarding isolation and quarantine of resident students in addition to monitoring the safety and well-being of students who were placed into quarantine or isolation on campus, (e) student success, dedicated to ensuring that students would remain in good standing and succeed at the university throughout the pandemic, (f) athletics, dedicated to safety of athletes and worked closely with SHS regarding testing/isolation and quarantine, (g) finance and budget, dedicated to managing university expenditures and finances. From the work of the task forces, the environment on campus changed dramatically. The initiation of mandatory mask wearing, social distancing, virtual meetings and activities all became a part of the daily routine on campus throughout the semester. Because of all of these different strategies implemented by the task forces, the students were able to remain on campus until the Thanksgiving Break which was the goal of the University's COVID-19 master plan. The following is the program evaluation focusing on the strengths and weaknesses, and recommendations for improvement of the policies, procedures, protocols, and guidelines of the COVID-19 pandemic response of a university SHS department located on an urban campus in Southwestern Pennsylvania from August 2020 to November 2020.

Review of the Literature

John Hopkins Nursing Evidence-Based Practice (EBP) (Dang & Dearholt, 2018) was used to complete the literature review. This model was used to evaluate the components of relevant literature surrounding existing master plans for COVID-19 relative to SHS. These master plans included testing strategies for COVID-19, isolation and quarantine strategies,

contact tracing and telemedicine. This model provided a clear path for using evidence to guide practice in order to optimize outcomes (Hanrahan et al., 2019). The stages in the literature review using this framework began with the identification of the clinical practice question which focused on strategies to mitigate the spread of COVID-19 on campus, allowing campus to safely remain open. Literature on COVID-19 was continuously evolving during the time of this project. The CDC was the main source of information that was heavily relied upon throughout the project timeframe.

Four electronic databases were searched, including PubMed, CINAHL, Medline, Google Scholar in addition to expert opinion retrieved from websites including the CDC, Allegheny County Health Department (ACHD), Pennsylvania Department of Health, and the University of Pittsburgh Medical Center (UPMC). Key search words used were: Covid-19, Sars-CoV-2, college or university, isolation, quarantine, covid testing, contact tracing, campus, Covid-19 PCR testing, COVID-19 antigen testing. A total of 14 articles were identified. 11 articles were classified as good or high quality, peer reviewed articles in levels 3 and 5. There were an additional 4 sources classified as level 4- high quality which were the COVID-19 guidelines from the CDC, American College Health Association (ACHA), WHO, and the Allegheny County Health Department (ACHD).

Synthesis of the Literature

Due to the novel nature of the SARS-CoV-2 virus, the literature review was limited, however there were articles that addressed what is currently known about the virus and approaches to address the problem. For example, the American College Health Association (ACHA) provided guidelines in March 2020 advising colleges and universities on how to prepare for COVID-19. Plans for preparedness varied between colleges and universities based on

size and resources. The guidelines provided useful recommendations for effective triage of potentially infected individuals, planning committees, staff education and training, isolation, personal protective equipment, environmental infection control, campus preparation and COVID-19 task forces (ACHA, 2020).

Early detection via COVID-19 testing was imperative in mitigating the spread of the virus and expediting the isolation or quarantine protocols, therefore, adequate testing capability was vital. Rapid testing leads to reduced viral transmission and early treatment for infected individuals. In addition, rapid quarantine of contacts of infected individual also leads to reduced transmission of COVID-19 (Liu, 2020). Different types of testing were researched according to sensitivity and specificity, cost and turnaround time for results. Surveillance testing, mass testing and testing symptomatic students along with their close contacts was undeniably one of the most important aspects of the mitigation. The emergence of adequate testing for COVID-19 on the university campus was a critical component of the master plans.

The ACHA also "…prepared guidelines to help college health staff and campus administrators prepare for coronavirus disease" (ACHA, 2020, p.1). Local and state public health agencies also provided guidance and coordination of resources in the fight against COVID-19. The recommendations were intentionally broad, and each individual institution would need to customize their specific plan according to their institutions size, location and demographic (ACHA, 2020).

The CDC served as a major source of information related to COVID-19 guidelines and protocols. They provided interim guidance directed to Institutions of Higher Education (IHE) which was updated periodically. The CDC advised the sharing of relevant information with local and state health departments. Collaboration with local health departments

via entering the names of infected individuals into Sara Alert, aided in preventing viral transmission and protecting the community as a whole (CDC, 2020).

ACHD provided guidance for local healthcare providers to assess symptoms of COVID-19 including fever, cough and shortness of breath (ACHD, 2020). They also provided guidance for persons under investigation (PUI), management of exposed individuals, specimen collection, environmental infection control and personal protective equipment (PPE).

Multiple options for diagnostic testing for COVID-19 with limited research was a challenge for health care providers. Options included antigen testing, molecular PCR testing and antibody testing. The literature illustrated RT-PCR is the gold standard for COVID-19 detection (Diez-Sampedro, 2020). The literature also reviewed the nasopharyngeal (NP) swab collection using the Abbott ID Now test which was the instrument used during the fall 2020 semester (Ravi, 2020).

Four comparative studies were identified. In the first study, Fox (2021) reported a response to a COVID-19 outbreak on a university campus in Indiana. The university in Indiana reported an outbreak of 371 confirmed cases during one week in August 2020. “Contact tracing identified several large, off-campus parties where masking and physical distancing guidelines were not followed” (Fox, 2021, p. 119). The university implemented a transfer to remote learning for all undergraduate classes for a two-week time period. On campus nonessential activities were minimized and students who lived off campus were not allowed to come to campus for those two weeks unless requiring a visit at campus health services (Fox, 2021). Screening tests were implemented for asymptomatic students and automated diagnostic testing based on symptoms, without evaluation by a provider, was initiated. Through the many interventions, this university did successfully complete the semester as planned. The second

study was reported by Wilson (2020) on a university campus in North Carolina. A total of 670 lab-confirmed cases over a three-week period in August, were confirmed (Wilson, 2020). Positive cases were identified and the university transitioned to online learning. Resident students were all required to go home. This study addressed the importance of enhanced mitigation efforts in the congregate setting such as reduced density of on-campus housing, mask requirements and increased testing availability (Wilson, 2020). The third study reported by Bharti (2021) discussed the mumps outbreak at Penn State University in 2017. This university utilized testing, contact tracing, quarantine and isolation to mitigate the spread of mumps on campus. The fourth study reported by Candrilli & Kurosky (2019), discussed a meningococcal outbreak on a university campus. This university, along with the local public health department utilized contact tracing and mass vaccination clinics to mitigate the spread of meningitis on campus. The authors recommended the development of vaccine and chemoprophylaxis policies and guidelines for future outbreaks (Candrilli & Kurosky, 2019).

Program Evaluation Theory

The sociotechnical model used to assess the impact of technology on this program evaluation was the Actor-Network Theory (ANT). "The core ontological claim of ANT is that reality is composed of *networks:* systems of associated things that act on and are acted on by each other" (MacMullin et al., 2020, p. 251). ANT theory is the study of how people or groups or organizations interact with each other inside their network. This was evident in creating a master COVID-19 plan on any college or university campus. It is important to understand that human interaction with technology, such as utilizing telemedicine or completing COVID testing is very important, however the technology *itself* is equally important to the success of the network.

Telemedicine was incorporated into the plan of care at many college and university SHSs to mitigate the spread of the virus on campus. “The use of technology to practice medicine has become a critical mainstay of adolescent health to carry out recommended physical distancing, decrease the risk of exposure to the virus by patients and providers, and continue to provide life-saving care, around the world” (Evans, 2020).

The use of the HIPAA Zoom platform is a main source of communication with the students and provides audio-visual telecommunication with their providers. Information systems are vital in healthcare, however according to ANT, technology alone does not make up an information system because it includes human and non-human actants (MacMullen et al., 2020). Testing for COVID-19 illustrates the connection between technology and social interactions. Without technology, the needed testing would not be available, however the social interaction required to perform the testing is critical. These different interactions between human and nonhuman actants are necessary for the network to succeed.

Although the COVID-19 virus has been humanized by many, it is not a living actant. This theory proves that nonhuman actants are as critical, if not more so, than human actants. The presence of the COVID-19 virus has changed the lives of many people, despite being nonhuman. “In essence, a practitioner or researcher using ANT as a theoretical lens is far more concerned with following actants of emergent importance through their actions, rather than deduced subscription to actants they *think* will be of future importance” (McBride and Tietze 2019).

Program Evaluation Framework

The W.K. Kellogg Foundation (WKKF) program evaluation was chosen for this project. This approach to program evaluation "…is an effective management tool to both inform strategy development and track the progress and impact of strategy implementation" (WKKF, 2017). Program evaluations lead to learning opportunities which impact change and improve the quality of care that patients receive. This project utilized the three main types of evaluation: performance monitoring, process evaluation and outcome evaluation. Performance monitoring was completed to ensure that program activities were accomplished and any problems with activities would be detected. Process evaluation identified strengths and weaknesses of the efforts during the timeframe of the project and outcome evaluation determined whether the desired outcomes were achieved and if they could be replicated in the future. All three types of evaluation were critical because the activities were planned to be replicated in the spring semester of 2021. Stakeholders were identified and a logic model was created to clearly identify planned activities and measurable outcomes. This will be discussed in more detail below.

Description of Project

The purpose of this program evaluation was to analyze the effectiveness of the policies, procedures, protocols and guidelines implemented by university SHS to determine if these strategies achieved the overall goals of mitigating the spread of COVID-19 on the university campus, allowing the campus to remain open until Thanksgiving break, November 24, 2020. The Aims and objectives identified for this program evaluation included:

1. Evaluate the effectiveness of the testing policies, procedures, protocols and guidelines initiated by DUHS regarding COVID-19 testing strategies.

a. Monitor daily lab confirmed positive COVID-19 cases.

b. Monitor data from randomized and surveillance testing completed on campus to determine prevalence of COVID-19 at two distinct time periods throughout the semester.

2. Evaluate the protocols for contact tracing and utilization of isolation rooms on campus and quarantine rooms off campus to ensure safe capacity.

a. Daily Monitoring of contact tracing protocol to rapidly identify and quarantine close contacts of positive COVID-19 cases.

b. Monitor daily use of Isolation and Quarantine rooms to determine room availability at all times.

3. Evaluate student utilization of telemedicine visits completed at DUHS during the project timeline.

a. Monitor number of telemedicine visits completed at DUHS during project timeline.

b. Create and distribute survey to students who completed a telemedicine visit to assess student perception and satisfaction.

Overview of Methodology

Program Evaluation

Performance monitoring, formative and summative evaluations were utilized in this program evaluation. A systems-oriented model approach emphasizing a holistic method was employed to account for the many university elements, all of which are interconnected to achieve desired outcomes. In the past, a university consisted of stable, limited connections. The COVID-

19 pandemic created a complex and dynamic situation, causing overlap between departments which used to be entirely separate.

As shown in Table 1, the inputs for the logic model were the stakeholders which included the University employees, faculty, staff, students, parents and diagnostic companies. Certain stakeholders helped to develop the logic model components, primarily the employees and members of senior leadership who were part of the COVID-19 task forces for the University. They were instrumental in identifying the questions to be answered in this program evaluation which included:

1. Did the policies, procedures, protocols, and guidelines regarding various testing strategies mitigate the spread of the COVID-19 virus on campus?
2. Did the policies, procedures, protocols, and guidelines regarding isolation and quarantine mitigate the spread of the COVID-19 virus on campus?
3. Did the policies, procedures, protocols, and guidelines regarding contact tracing of exposed individuals mitigate the spread of the COVID-19 virus on campus?
4. Did Telemedicine facilitate medical evaluation of students and mitigate the risk of viral transmission in the clinic?
5. Did Duquesne University remain open and did students remain on campus until Thanksgiving Break?
6. What strengths and weaknesses did the program evaluation identify?
7. What recommendations for improvement can be implemented?

Activities include COVID-19 testing, isolation, contact tracing, quarantine and telemedicine. Outputs were the measurable results of the above activities. Initial, intermediate and long-term outcomes included the successful mitigation of viral spread on campus shown

through results of various testing strategies, successful isolation of infected individuals, rapid quarantine of close contacts and increased usage of telemedicine.

Table I

Logic Model

	Activities	Outputs	Outcomes		
*Duquesne University Health Service Director/Providers/ RNs/Additional Staff *Duquesne University Students *Duquesne University Staff/Faculty *Duquesne University Administration/ Senior Leadership *Residence Life Staff *Medline Industries *Quest Diagnostics	*Move from In-Person to Virtual (Telemedicine) visits *Randomized Testing for COVID-19 *Surveillance Testing for COVID-19 *Isolating students +for COVID-19 *Quarantine close contacts of +COVID-19 case *Abbott-ID Now Rapid COVID-19 Testing *SARS-CoV-2 PCR Testing *Develop TMPQ survey through Qualtrics	*Total # of completed Telemedicine visits *Results of Telemedicine Perception Questionnaire (TMPQ) *Results of randomized testing *Results of surveillance testing *Number of students isolated *Number of students quarantined *Number of students testing positive for COVID-19	*Maintain low prevalence of COVID-19 through mitigation efforts on campus *Increase awareness of Telemedicine *Increase awareness of COVID-19 symptoms *Increase awareness and importance of mitigation efforts *Submission of Findings to Administration/ COVID-19 Dashboard	*Maintain low prevalence of COVID-19 through mitigation efforts on campus *Offer face to face or virtual medical evaluation based on student preference *Maintain awareness of COVID-19 symptoms *Maintain awareness and importance of mitigation efforts *Submission of Findings to Administration/ COVID-19 Dashboard	*Maintain low prevalence of COVID-19 through mitigation efforts on campus *Continue patient preference for face to face vs virtual medical evaluations *Maintain awareness of COVID-19 symptoms *Maintain awareness and importance of mitigation efforts *Publication of the Duquesne University Health Services COVID-19 Pandemic Response

Note: Adapted from "Understanding and Applying Program Logic Models," by J. McDavid, I. Huse and L. Hawthorn, 2019. *Program Evaluation and Performance Measurement: An Introduction to Practice*, p. 55, copyright 2019 by SAGE Publications, Inc.

Setting & Population

The setting for this program evaluation is a private, urban Catholic university located in southwestern Pennsylvania dedicated to full and part time, graduate and undergraduate students within a self-contained 49-acre hilltop campus. Fall 2020 statistics show 8,848 students enrolled at the university. Historically, SHS provided care to all full-time students living on or off campus. However, due to the COVID-19 pandemic, SHS also began seeing part-time students for COVID-related symptoms only. There were 437 enrolled international students however the majority of those students remained in their home country due to the pandemic. Approximately 20-30 international students were on campus. There were 3,066 resident students living on campus during the project timeline. See Appendix A, Figure A1 for more detail. The risk of viral transmission in the congregate setting was of high concern. Therefore, the implemented strategies targeted this specific population in order to mitigate the spread of the virus on campus.

Implementation Plan

The SHS developed COVID-19 policies, procedures, protocols and guidelines based on the information from sources noted above (see Appendix B). They were piloted in the summer of 2020 with the few students who were on campus, primarily athletes who returned to campus early. Limited timeframes created a time-sensitive situation with university re-opening in the fall 2020.

As a result of this pilot study, changes were made as appropriate and were adopted into practice for the fall semester. This Plan, Do, Study, Act (PDSA) cycle would repeat itself throughout the semester as new knowledge about COVID-19 would emerge. Updating the feedback loop and bringing new findings to the table led to frequent reappraisal of the body of

evidence in order to update protocols, policies, procedures and guidelines throughout the semester (Buckwalter et al., 2017).

The university opened for the fall semester offering the option of a hybrid learning approach. Students were given the option to take their classes remotely, continue face to face instruction or choose a combination of both learning options. Undergraduate faculty members either worked remotely or in person. Faculty for online programs were instructed to remain at home and taught remotely. Essential personnel including SHS staff, residence life staff, cleaning and maintenance personnel, food service staff and campus police were on campus throughout the semester.

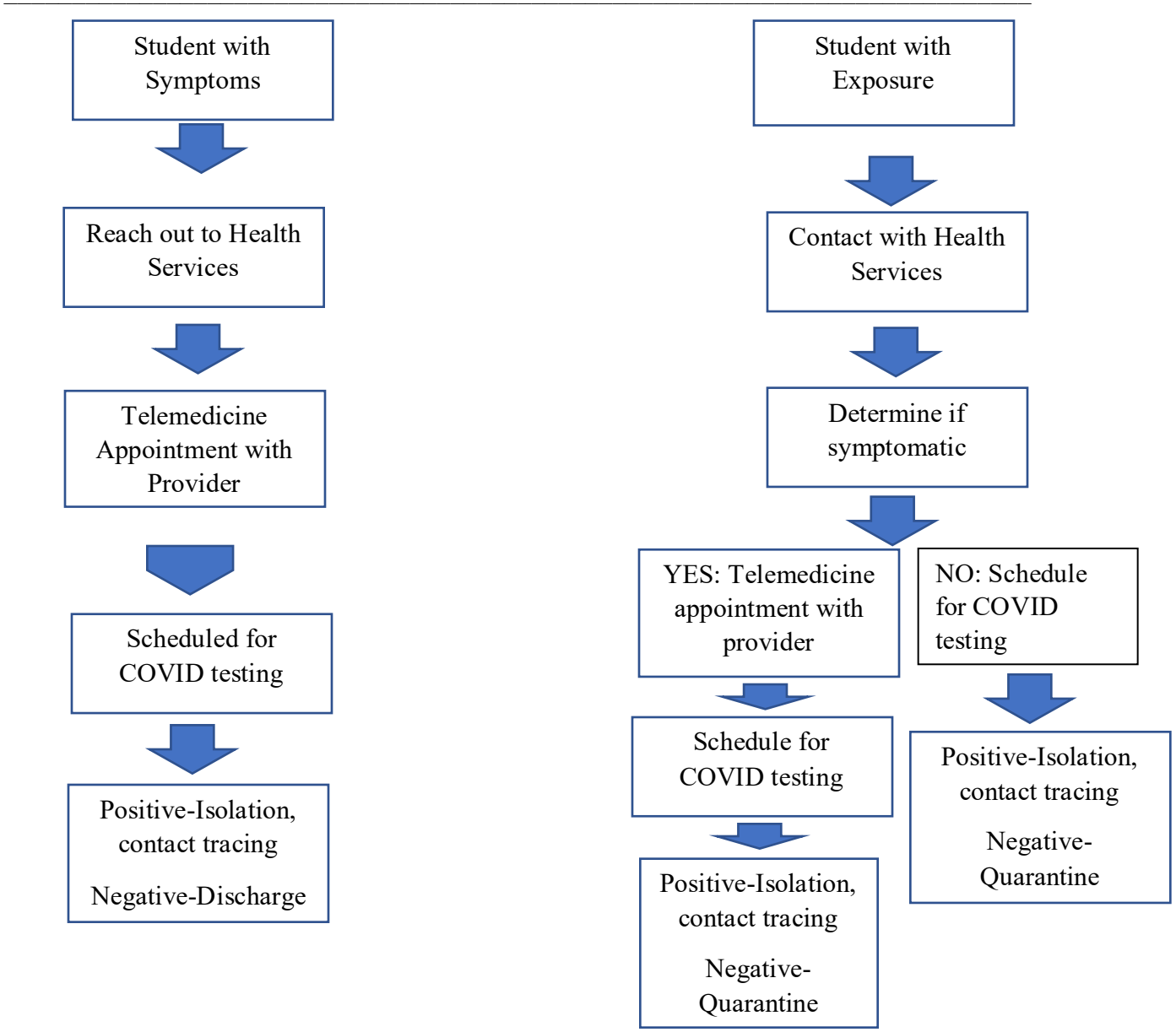
Between August 24, 2020 and November 24, 2020, a daily health screen would be completed by all students, faculty and staff on campus. This information would be uploaded into the university's gateway communication (DORI) portal. The daily health screen asked whether the student, faculty and staff were experiencing any of the following symptoms:

1. Do you feel sick?
2. Is your temperature (measured by a thermometer) above 100.4 degrees F?
3. Do you have a sore throat?
4. Do you have a headache?
5. Do you have a cough or shortness of breath?
6. Do you have any unexplained muscle aches or fatigue?
7. Have you recently lost your sense of taste or smell?
8. Have you recently had any new gastrointestinal symptoms such as diarrhea?
9. Do you have congestion or a runny nose?
10. Have you experienced nausea or vomiting?

Any employee who answered "yes" to any of the symptoms on the daily health screen would instructed to contact their primary care physician or health care provider for consultation and follow the advice that was provided. Students who answered "yes" to any of the symptoms on the daily health screen were instructed to contact SHS and triaged by a registered nurse (RN) who would schedule them with a telemedicine visit with a provider according to the triage protocol in Figure 2:

Figure 2

Duquesne University Health Services COVID-19 Decision Tree



All students presenting for evaluation of acute illness would phone SHS and *not* present as a walk-in patient. Telemedicine visits could be arranged with SHS providers based on the telemedicine triage protocol and student preference. All persons entering SHS would be required to wear a medical (procedure or surgical) face mask. Cloth masks were not sufficient.

Phone triage followed a specific protocol. The Triage RN asked all patients the following questions:

1. Have you responded "yes" to any question on the Duquesne Daily Health Screening?
2. Have you been notified of, or do you know yourself to be in close contact with a person diagnosed with COVID-19 in the past 14 days?
3. Are you in close contact with a person waiting for the results of a COVID-19 test?
4. Do you have a fever or symptoms compatible with a viral respiratory infection?
5. In the past 48 hours, have you developed any of the following symptoms: Temperature greater than 100.4 Fahrenheit, cough, shortness of breath, sore throat or runny nose? Fatigue, loss of appetite, muscle aches or headache? Loss of smell or taste? Nausea or Diarrhea?

If the patient was determined to *not* have any symptoms, but was identified as a close contact, testing would be scheduled and the patient would be placed into quarantine and follow the SHS COVID-19 quarantine protocol.

If the student was determined to have COVID-19 related symptoms, the RN would schedule the student for a telemedicine visit. The provider would assess the student and schedule for rapid covid testing in the SHS. The beginning weeks of the semester was a time in which

staff at SHS were determining the reliability of the Abbott ID-NOW COVID PCR rapid testing. Until the rapid testing was considered reliable, students meeting CDC symptom-based criteria were considered *probable COVID-19* based on any combination of the following criteria and would be placed into isolation for 10 days from the date of symptom onset:

Clinical Criteria:

- At least TWO of the following: fever, chills, rigors, myalgia, headache, sore throat, new olfactory and taste disorder
- OR, ONE of the following: cough, shortness of breath, difficulty breathing
- OR, Severe respiratory illness with EITHER clinical or radiographic pneumonia or acute respiratory distress syndrome (ARDS)
- AND, no alternative, more likely diagnosis

Laboratory Criteria:

- Confirmed-Detection of SARS-CoV-2 by PCR
- Presumed-Detection of specific antigen or antibody in applicable specimen

Epidemiologic Linkage:

- Close contact with; confirmed, probable, or clinically compatible person with linkage to confirmed
- Travel to or residence in area with sustained, ongoing community transmission
- Member of risk cohort

Testing

SHS medical providers would order testing on patients with any illness compatible with COVID-19 such as a viral respiratory infection and included the following symptoms: (a) fever over 100.2 Fahrenheit, (b) cough and/or shortness of breath, (c) acute pharyngitis, (d) runny nose, (e) fatigue, (f) anorexia, (g) myalgia, (h) headache, (i) loss of taste or smell, (j) nausea, (k) diarrhea and/or (l) unexplained hypoxemia. SHS providers would also evaluate for high risk situations including: (a) students who were notified of positive contact with lab confirmed or presumed COVID-19 case, (b) students who are completing clinical rotations in any healthcare institution, (c) students aged 65 years of age or older and (d) students with underlying conditions including immunosuppression, chronic lung disease, severe obesity, diabetes, cardiac, kidney and liver disease. Symptomatic and high-risk students would complete rapid point of care (POC) testing. Based on the result of the POC testing, consideration for isolation and/or quarantine would be made. Students with positive POC testing would be placed into the COVID-19 isolation protocol. Students could return home to isolate or if they lived greater than 200 miles from campus, could isolate in the designated isolation floor on campus. Negative rapid POC test results were confirmed with a PCR sent to an outside laboratory.

All students receiving send-out PCR testing were presumed positive for COVID-19 and would follow the COVID-19 isolation for persons under investigation (PUI) until results are received. Students who were considered a close contact, but did not have any symptoms compatible with COVID-19 would still be placed into the quarantine protocol for 14 days from the date of last exposure to the positive case. Students would be permitted to return home to quarantine or those students who lived greater than 200 miles from campus, could quarantine at

the designated quarantine area for University students which was located in one of the local hotels.

Data Management Plan

Data collection for this program evaluation began on August 24, 2020 when the majority of students returned to campus for the fall semester. Performance monitoring was initiated and focused on the established protocols created by SHS in the previous months leading up to the fall semester.

A mixed-methods approach to data collection evaluated both quantitative and qualitative data. The quantitative data included: (a) the number of positive COVID-19 cases on campus, (b) the number of students placed into isolation or quarantine, (c) the results of the randomized and surveillance testing and (d) the number of telemedicine visits at SHS. This data was collected daily and entered into an excel spreadsheet. SHS and Residence Life would collect data on the utilization of isolation and quarantine rooms on and off campus. This data would be entered into an excel spreadsheet for analysis and export into the University COVID-19 dashboard. All data would be de-identified. Regular monitoring and analyzing of structure, process and outcomes would be completed through the University dashboard and weekly COVID task force meetings. Stakeholders would also be able to visualize data on a daily basis on the University's COVID-19 website.

The qualitative data would be collected through a Qualtrics survey with questions designed to assess student's perception about the telemedicine process. (See Appendix C). The Telemedicine Perception Questionnaire (TMPQ) survey included 13 true or false questions about different aspects of telemedicine. This information could identify whether students appreciated

having the option of telemedicine visits to provide recommendations to the current telemedicine protocol.

Program Evaluation Results

The following information was collected for the program evaluation within the specific timeframe of August 24, 2020 through November 24, 2020 to evaluate the outcomes of the policies, procedures, guidelines, and protocols involved in the SHS COVID-19 response. Data from the randomized testing which was completed in September 2020 was collected via an internal lab portal between the electronic medical record and Quest Diagnostics. The results from Quest were electronically sent to the portal and SHS reviewed each result and documented the 719 negative tests and 5 inconclusive tests out of the 724 total tests. There were zero positive tests from the randomized testing event. The 5 inconclusive tests were retested and all were negative.

A mass testing of on-campus students took place in October 2020. A total of 2719 students were tested. Of those students, 2616 students were negative and 34 students were positive. Of those 34 students, 12 were determined to have previous COVID infection in the last 90 days and were not counted as new infections, bringing the total of new infections from the mass testing to 22. This data revealed a 0.008% positivity rate.

Clinic data was collected on a daily basis from August 24, 2020 through November 24, 2020. In the SHS clinic, there was a whiteboard which divided the students into sections: Section 1-Isolation IN, Section 2-Isolation OUT, Section 3-Quarantine IN and Section 4-Quarantine OUT. The whiteboard was color-coded according to where the student would be entering or being released from isolation and quarantine. For example, designated dorm on

campus, home, hotel, or the on-campus apartment complex. Outside communication with ACHD who informed us of students who tested positive for COVID-19 from testing off campus was also documented on the whiteboard in addition to students who would call SHS and self-report a positive test. Throughout the daily shifts, names were added to each section accordingly. At the end of the day, that data was entered onto an excel spreadsheet and uploaded into the cloud content management platform called BOX. From BOX, the Marketing and Communications Department would upload the data onto the University dashboard. During the project timeline, SHS performed 1,199 rapid COVID-19 tests of which 137 were positive. SHS also sent 780 COVID-19 PCR tests to Quest of which 43 were positive for a total of 1,979 COVID tests performed at SHS during the project timeline of which 180 were positive which revealed a positivity rate of 9%. There was a total of 55 presumed cases of COVID using the symptom-based strategy at the beginning of the semester. The symptom-based strategy was discontinued on October 5, 2020 after the reliability of the rapid tests was confirmed. The total number of positive covid-19 cases within the project timeline was 296 however that included self-reports and ACHD emails.

Data from Isolation and Quarantine was collected by SHS through the whiteboard and excel spreadsheets and through the Office of Residence Life (ORL) who also utilized an excel spreadsheet. Cumulative data from Fall 2020 semester revealed that 209 resident students in total were isolated. Sixteen students isolated at their residence in the apartment complex on campus, eight students who were already in quarantine at the hotel who then converted to positive completed isolation in the hotel. Four of these students left the hotel to complete isolation at home. Seventy-nine students isolated at home and 106 students isolated in the on-campus dorm

facility. Sixteen of these students left the dorm to finish isolation at home. Therefore, 6.8% of resident students were isolated during the project timeline.

The total number of students quarantined during the project timeline were 583. Thirty-three students quarantined at the apartment complex on campus, 175 students quarantined at the hotel, 374 students quarantined at home and one student quarantined at the on-campus dorm facility. Therefore, 19% of resident students were quarantine during the project timeline.

October was the busiest month for isolation and quarantine. The busiest weeks were the weeks of October 11th and October 18th with 22 students entering isolation each week and 29 students entering quarantine each week. There were 48 students who were in quarantine or isolation at least two times and one student was in three times. Thirty of these 48 students were athletes. The dorm and the hotel maintained open rooms throughout the project timeline and did not have to turn students away due to max capacity at either location.

The revised telemedicine perception questionnaire (TMPQ) was developed in the Spring 2021 in order to evaluate qualitative data about the student's perception about telemedicine (see Appendix C). The survey was developed through the Qualtrics system and consisted of 13 questions asking students about their experience of telemedicine through SHS. A total of 803 surveys were emailed electronically to students with 180 responses completed, or a 22.4% participation rate. This was valued data because SHS was planning to continue telemedicine visits in the spring 2021 semester and beyond. Seven of these questions provided pertinent information regarding the sustainability of telemedicine. Overall, telemedicine was perceived as a benefit to students. 84.44% of students stated that telemedicine was convenient, 89.44% stated that telemedicine saved them time, 60.77% of students would like telemedicine to continue in the future, 82.22% of students feel that telemedicine can improve their general health, 82.78% of

students felt that their privacy was protected, and 70% of the students perceived the telemedicine process as easy. Findings suggest that although the majority of students perceive telemedicine as a benefit and would like virtual evaluations to continue, there is a need for in-person visits to also continue. SHS determined from the findings that they will give all student the option of virtual or in-person visits on a case by case basis.

Recommendations

This program evaluation revealed significant strengths of the master plan for COVID-19 on campus, allowing it to remain open through November 24, 2020. Further studies on viral pandemic preparedness and mitigation efforts on campus are needed, however the University should maintain the established policies, procedures, guidelines, and protocols developed for the COVID-19 pandemic. This should include all mitigation procedures, the established telemedicine protocols, the pre-established isolation and quarantine areas on campus, the established task forces with multiple stakeholders with a focus on including healthcare providers that are actively practicing and possess knowledge of evidence-based practice (EBP). Since Telemedicine will likely remain as a healthcare delivery platform on campus after the pandemic has ended we must continue to ensure care is available and consider any student populations who may not have access because of inequalities in our health care systems (Evans, 2020).

In general, the development of disaster triage protocols for any college or university should be created prior to the threat of a pandemic. Areas for strengthening the COVID-19 response or any emergency situation at the University would include identifying communication techniques to address students, parents, faculty and staff regarding new protocols and guidelines. Virtual town hall meetings with students, parents, faculty, and staff could be initiated to answer questions and concerns throughout the semester allowing for communication and transparency of

what is happening on campus. Updating the University dashboard technology to provide comprehensive pandemic information including the number of identified positive cases, isolation/quarantine status, vaccination compliance, and overall campus positivity rate would also support improved communications and encourage student adherence to mitigation strategies.

Additional recommendations to strengthen the University's COVID-19 response would include the creation of a policy which would limit off-site testing. This would prevent delays in reporting as well as delays in contact tracing of these individuals to further mitigate the spread of COVID-19 (Fox, 2021).

The final recommendation would be for every university to have a prepared disaster triage protocol using an ethical framework. This would ensure that the decisions and strategies are reasonable, open and transparent, inclusive, responsive and accountable (Perry, 2020).

Conclusion

The University achieved its main goal for campus to remain open until Thanksgiving Break. All three of the Aims were accomplished and the implemented strategies did mitigate the spread of the virus on campus. The implemented strategies proved to be sustainable in the Spring 2021 semester. Changes in CDC guidelines will continue to affect universities nationwide moving forward, however the strengths of the COVID-19 master plan can adjust accordingly and allow for students to once again enjoy the many attributes a campus has to offer as our nation attempts the challenges of returning to "normal".

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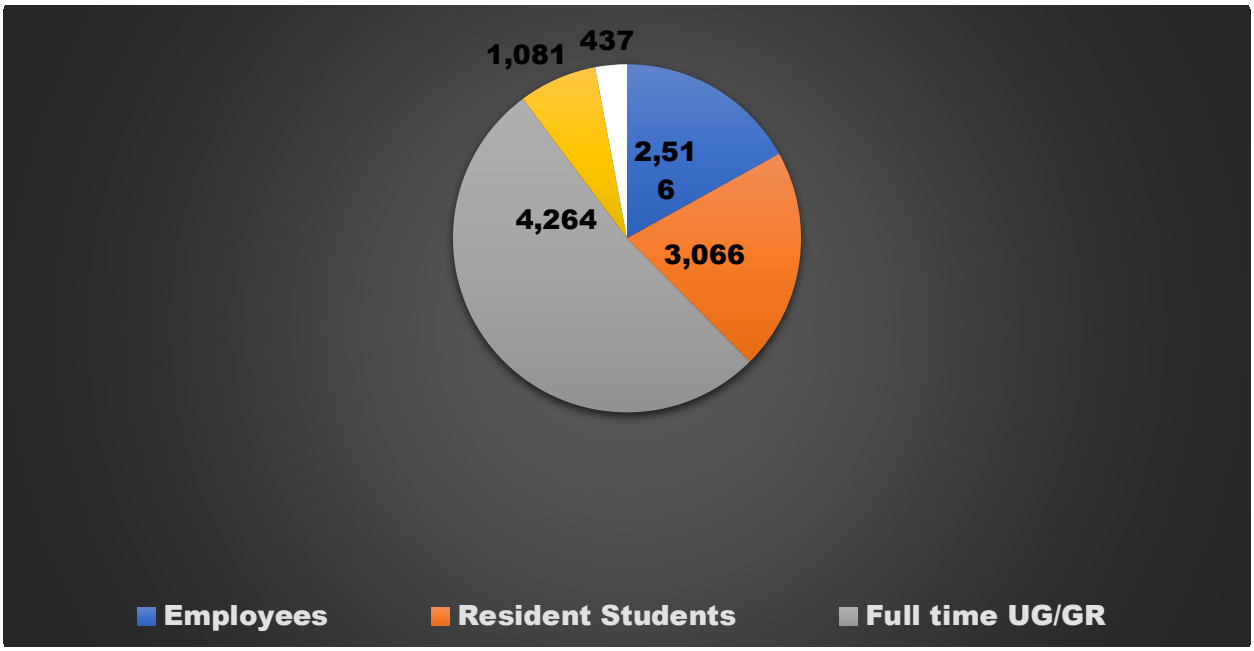
Appendix A, Figure A1

Student Enrollment, Fall 2020.



Note: This enrollment data includes part-time and full-time graduate and undergraduate students. The white area represents international student.

Appendix B

Development of COVID-19 Protocols, Spring/Summer 2020

DUHS COVID-19 Triage RN Protocol (CDC, 2020)
DUHS COVID-19 Phone Triage
DUHS COVID-19 Hotline Protocol
DUHS COVID-19 Scheduling Protocol
DUHS COVID-19 Telemedicine Protocol
DUHS COVID-19 Provider Evaluation Protocol
DUHS COVID-19 Specimen Collection Protocols
DUHS COVID-19 Webpage Updates
DUHS COVID-19 Isolation Protocol (ACHD, 2020) (CDC, 2020)
DUHS COVID-19 Quarantine Protocol (ACHD, 2020) (CDC, 2020)
DUHS COVID-19 Asymptomatic Screening Internal Protocol (CDC, 2020)
DUHS COVID-19 Hotline/Email Staff Schedule
DUHS COVID-19 Medical Clearance Letter
DUHS COVID-19 Contact Tracing Protocol (ACHD, 2020) (CDC, 2020)

Appendix C

Telemedicine Perception Questionnaire-Revised

Adapted from the Telemedicine Perception Questionnaire (TMPQ)

1. A healthcare provider can get a good understanding of my medical problem over the phone or computer.
2. Telemedicine can violate my privacy.
3. The use of necessary equipment seems difficult to me.
4. I can be as satisfied talking to the healthcare provider over the phone or computer as talking in person.
5. Telemedicine can improve my general health.
6. I do not like that there is no physical contact during a telemedicine visit.
7. Telemedicine is a convenient form of healthcare delivery for me.
8. Telemedicine saves me time.
9. Telemedicine will be a standard way of healthcare delivery in the future.
10. Telemedicine can be an addition to the regular care I receive.
11. A healthcare provider cannot examine me over the phone or computer as well as in person.
12. Telemedicine makes it easier for me to contact the healthcare provider.
13. I would like to continue to use telemedicine visits in the future for my healthcare needs.

Note: Adapted from the Telemedicine Perception Questionnaire – Revised. Retrieved from PsycTESTS. https://dx.doi.org/10.1037/t22311-000. Copyright 2020 by the American Psychological Association.