

Laboratory: From the Shadows to the Front Line

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While typical health care services like laboratory operation have always provided critical support to the provision of health care and public health services, COVID-19 thrust lab functionality and services into the spotlight. In Eastern North Carolina, Vidant Health made significant changes to its lab operations in order to meet growing needs.

Introduction

With a landmass the size of the state of Maryland and a population of roughly 1.5 million people, Eastern North Carolina (ENC) is incredibly rural (Figures 1 and 2). The region's rural nature presents daily challenges for its residents in terms of accessing health care in the right place at the right time, and for health care professionals in terms of finding unique ways to improve patient access. Contributing factors include poverty, transportation, lack of broadband, and high prevalence of chronic conditions. Prevalence and mortality rates of cancers, cardiovascular diseases, and diabetes are far higher and health for all racial/ethnic groups, income brackets, and education groups is poorer in ENC than in the rest of North Carolina.

Compared to the state, in the 29-county ENC region mortality from heart disease is 12.4% greater; cancer 8.3% greater; diabetes 31.4% greater; stroke 18.1% greater; COPD 2.6% greater; unintentional motor vehicle injuries 5.2% greater; and septicemia 1.5% greater [1].

These drivers of health and poor health outcomes create a challenging environment for public health, and COVID-19 testing was no exception.

Vidant Health, a 1447-bed system serving 29 ENC counties, is experienced in serving a population with particular susceptibility to disease and poor health outcomes. The age-adjusted mortality rate in ENC is higher than that of both North Carolina and the United States, with the underserved nature of the population being a key factor. All relevant demographic and socioeconomic indicators that have direct correlations to health status (age, race, income, education levels, etc.) are significantly worse than the state and national averages.

Building Laboratory Capacity to Serve a Region

The evolving nature of the COVID-19 pandemic and a limited number of Emergency Use Authorization-approved tests initially presented significant challenges to conceptu-

alizing a clinically excellent, broad-based, long-term testing strategy in ENC. Vidant's microbiology capabilities and capacities were solely built to address acute needs. Early in the pandemic, as it became clear national laboratories were failing under rising test loads, senior leadership directed Vidant laboratory services to embark on an aggressive expansion in both rapid polymerase chain reaction (PCR) testing as well as high-complexity, high-throughput PCR testing. Further, recognizing that vendors struggled to provide reagent, Vidant substantially diversified its portfolio of testing platforms. By May 1, 2020, Vidant had platforms from Cepheid, Genmark, BD, and Thermo Fisher, representing both rapid (less than 30 minutes) and high-throughput (90 tests per well) testing. Vidant deployed two different rapid testing platforms to all of its hospitals and centralized high-throughput, non-urgent/emergent testing at Vidant Medical Center in Greenville through a robust courier service. High-throughput testing was improved by adding multiple robots to labs to streamline pipetting needs. The diversity of platforms and testing types provided consistent minimum capabilities throughout fluctuations in reagent availabilities, a maximum capacity of 6000 tests per 24 hours, and turnaround times measured in hours even at peak COVID-19 levels systemwide. Simultaneous with building operational capabilities, Vidant developed a robust analytics package to track and trend testing inputs from all service areas to monitor needs for further expansion and provide clinical insights related to hotspots and area prevalence.

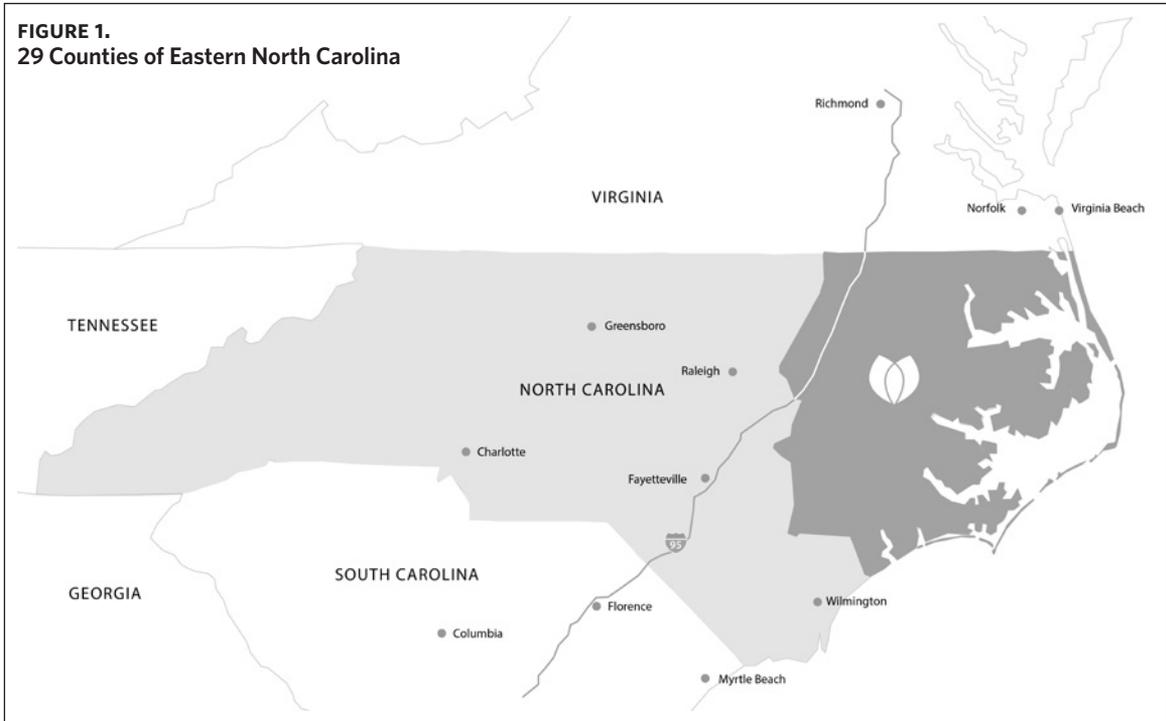
Leveraging Capacity to Serve a Region

Vidant Health's lab technology and capacity allowed it to expand access to testing and understand how the virus was presenting in ENC. As such, Vidant doubled down on our capabilities to increase surveillance with both regional outreach and Greenville-based strategies.

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Outreach to Historically Marginalized Populations

Through a partnership with the North Carolina Department of Health and Human Services (NCDHHS), Vidant Health initiated the COVID-19 Testing of High-Priority and Marginalized Populations (CHAMP) program. The goal of the program was to increase access to no-cost COVID-19 testing for historically marginalized populations. By partnering with local churches, schools, elected officials, health departments, and community leaders, Vidant Health held 141 testing events between July 8 and August 18 across Bertie, Chowan, Duplin, Edgecombe, Halifax, Herford, Lenoir, Northampton, Pitt, and Wilson counties. These 141 events accounted for a significant portion of the NCDHHS goal of 300 events across the state.

During this initiative, an army of dedicated health care workers collected 5380 nasopharyngeal swabs for PCR testing with a median turnaround time under 20 hours. Overall, 383 tests were positive for a rate of 7.1%. Table 1 shows that the positivity rate for asymptomatic persons was 3.5% and for symptomatic persons it was 13.8%; men had a slightly higher positivity rate than women; and the positivity rates for Black and White persons were similar, while that of Hispanic/Latinx persons was nearly double those rates. Tested Hispanic/Latinx persons were a decade younger than either Black or White persons. The highest rates of positivity (ranging from 1% to 13%) were found in ages 13-25 (internal data, Vidant Health). While positive rate for the total population tested is very similar to the broader Vidant Health (7.4%) experience, the younger Latinx population alone had an almost 3-fold higher positivity rate. This is a clear example of how this virus mani-

fest differently in different geography, racial, and age categories.

Vidant provided information to patients without a primary care provider about how to access care, including information addressing any social determinants of health challenges. Further, all patients with positive COVID-19 test results were connected to a home monitoring program through which a registered nurse contacted them daily for up to 14 days to ensure their symptoms were being managed, and to advise if the patients needed additional care.

Greenville Testing Site

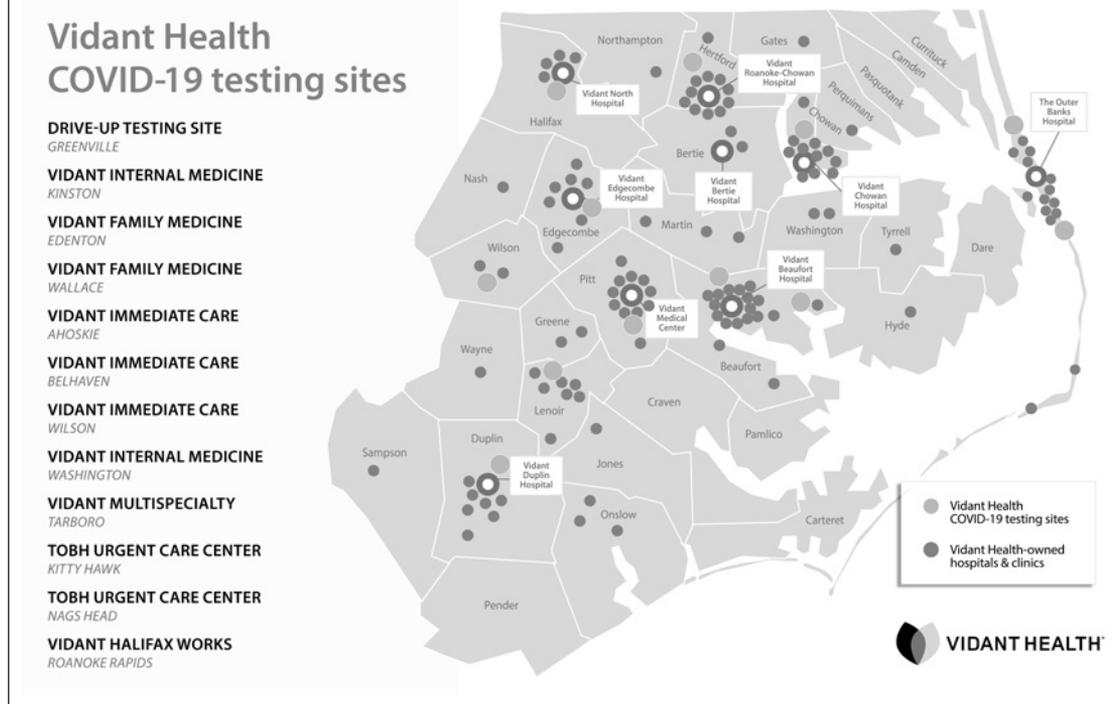
The lessons learned during the summer of 2020, coupled with the increase in positive COVID-19 cases, moved

TABLE 1.
Results of COVID-19 PCR Swabs at 141 Eastern North Carolina Testing Events, July 8 - August 18, 2020

	Tests Conducted	Positive Results	Positivity Rate
Asymptomatic	3,410	120	3.5%
Symptomatic	1,822	252	13.8%
Women	3,197	205	6.4%
Men	2,188	177	8.1%
Black	3,532	214	6.1%
White	1,371	91	6.6%
Hispanic/Latinx	351	68	19.4%

Note. A total of 5,380 nasopharyngeal swabs for PCR testing were conducted for a total of 383 positive results for a rate of 7.1%. Testing events held in Bertie, Chowan, Duplin, Edgecombe, Halifax, Hertford, Lenoir, Northampton, Pitt, and Wilson counties. Source: Vidant Health.

FIGURE 2.
Vidant Health COVID-19 Testing Sites, Hospitals, and Clinics



Vidant Health to open a high-throughput testing location to serve Greenville and the surrounding community. Designed with the capacity to collect 1000 specimens per day, demand quickly pushed the daily collection to over 1500, with people traveling from all over North Carolina and surrounding states. Having a large parking lot available due to a significant increase in remote working, we were able to repurpose the unused space for the good of the community.

Since opening in the fall of 2020, the Greenville testing site has completed over 70,000 specimen collections, with an overall positive PCR rate of 14% through March 25, 2021. Overall, Vidant Health has processed over 430,000 PCR tests. Over the year, positive rates ranged from as high as 22% to as low as 6%.

Regional Testing Locations

Vidant Health's ambulatory arm, Vidant Medical Group (VMG), consists of approximately 500 providers in over 100 locations across ENC. Together, these locations see over 1 million encounters per year and are strategically placed to support a broad geographical rollout for access to COVID-19 testing. From these 100+ locations, 11 VMG sites scattered across ENC adjusted their normal clinic operation to provide safe and efficient COVID-19 specimen collections with a drive-up model. This allowed for the safe separation of patients attending routine visits from those presenting for a COVID-19 test. These locations also allowed ENC residents the accessibility to get tested in their local community versus having to drive to more urban environments.

Going Forward

While COVID-19 has been one of the greatest challenges for medicine and public health in our lifetime, it has also been truly transformational. Cross-industry collaboration has been the key to managing daily challenges. No matter the role that an individual may hold within their organization, everyone has stepped up to serve in a greater capacity. The microbiology tech working at a hospital bench has been thrust into a community setting to help with specimen collection. The clinic-based nurse is now navigating social determinants of health for large groups of individuals. Senior leadership members are directing traffic to allow for safe experiences for all. Security personnel are collecting temperatures of all who enter. These are only a few examples of how it truly takes a village to care for a region, and it is collaboration that will get us all through the next chapter. NCMJ

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1. ECU, Health Systems Research & Development. 29-County Eastern-North Carolina Compared to the Rest of the State, 2016 (revised 05/21/19). ECU HSRD website. <https://hsrd.ecu.edu/regional-health-status/29-county-revised-05-21-19/>. Updated May 21, 2019. Accessed May 18, 2021.