Title: COVID 19 Hotspots And Vulnerable Populations Identified By Area Deprivation Index Mapping

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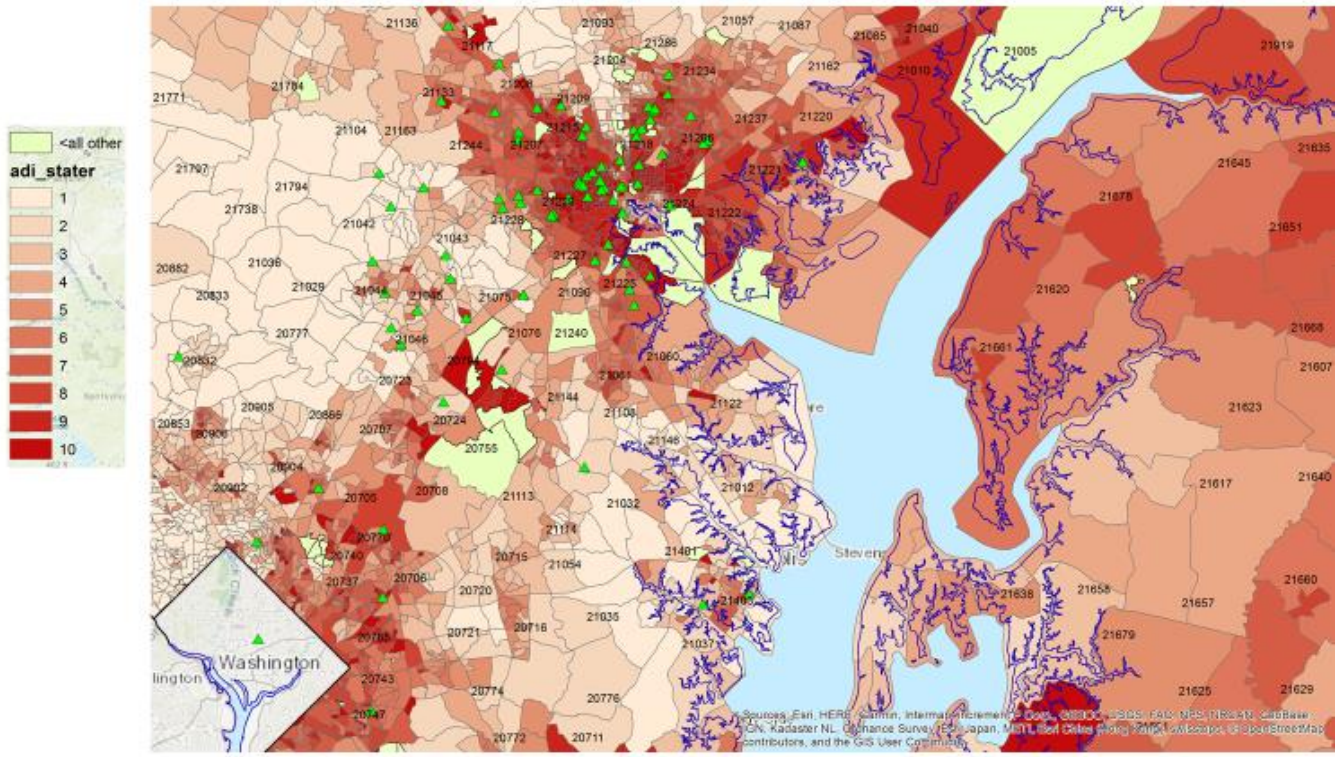
The COVID 19 pandemic has challenged us to reconfigure our academic offices and business model. From being a vibrant, busy family practice and immediate care with 35,000 patients, we are down to a steady trickle of tele-video and telephone encounters. There is a need for targeted outreach to patients who need our help the most. We decided to utilize the Area Deprivation Index (ADI) to identify patients who were most likely to need us. The ADI is a composite index consisting of several key indicators to reflect the multi-dimensional character of a community's socioeconomic status.[1,2] The ADI includes elements such as, poverty, education, unemployment rates, crime, home ownership, median home value, median rent, household crowding, education, and access to a telephone or motor vehicle. Such an index provides a robust method to identify patients who may need additional resources during the COVID 19 pandemic and we decided that we would identify patients who lived in the highest ADI locations to plan patient outreach.

In order to develop an evidence-based strategy targeting the most vulnerable COVID 19 patients, the population health section of the department started compiling data on all COVID 19 tested patients and their hospital utilization. Epic electronic health records data were extracted daily and correlated with data from the Maryland health information exchange (CRISP). As we accrued data, there are multiple opportunities to produce trends, cut the data by race, age, ADI and outcomes. For ease of sharing, aggregated number of COVID 19 tested patients by office site, quarantined physicians/staff, and personal protective equipment data was placed on a dashboard, and shared daily with leadership, faculty and residents. Figure 1.

Figure 1: University Family Medicine COVID 19 analytics Dashboard

A second strategy was to identify vulnerable patients by plotting each patient's 9-digit zip code on an ArcGIS map, color coded by Area Deprivation Index (ADI) to identify individuals with COVID 19 who are vulnerable during the COVID 19 pandemic as illustrated in Figure 2.[1,2] Patients living in ADI 8-10 are more likely to live in multi-family homes, to have multiple chronic disease,[3,4] to have low health literacy, to lack broadband connectivity and computers, and to have low capability to engage in telemedicine. Elderly patients are more likely to lack smart phones, thereby limiting engagement in telemedicine altogether. The digital divide is especially poignant when old systems breakdown during COVID 19 pandemic, and patients who are technology savvy become the beneficiaries of the re-designed primary care practice. There is disproportionate impact on the elderly, the computer illiterate, those unable to use smart phones and households with no broadband access and those living in high ADI zones.

Figure 2: COVID 19 positive patients mapped by Maryland Area Deprivation Index and patient zip code[5,6]



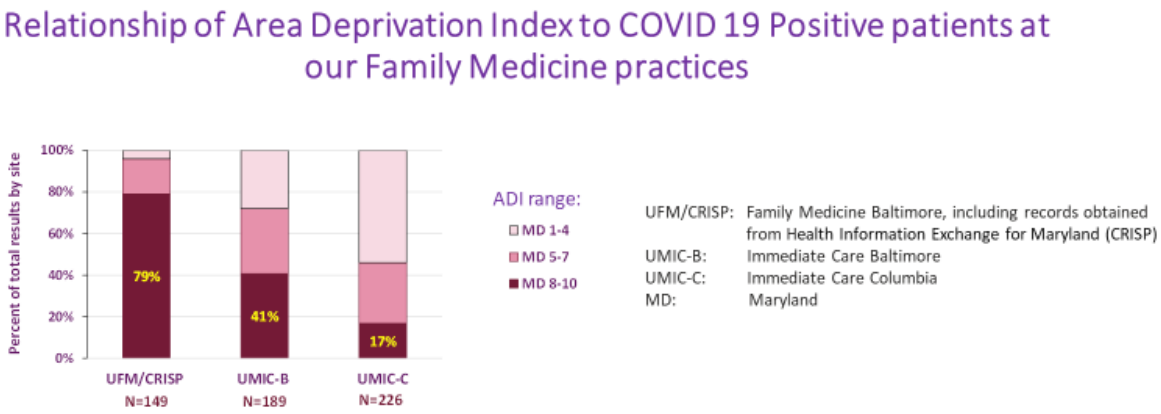
The Area Deprivation Index (ADI) is based on a measure created by the Health Resources & Services Administration (HRSA) over two decades ago for primarily county-level use, but refined, adapted, and validated to the Census block group/neighborhood level by Amy Kind, MD, PhD and her research team at the University of Wisconsin-Madison. It allows for rankings of neighborhoods by socioeconomic status disadvantage in a region of interest (e.g. at the state or national level). It includes factors for the theoretical domains of income, education, employment, and housing quality. It can be used to inform health delivery and policy, especially for the most disadvantaged neighborhood groups.

ADIs for individual state are provided in deciles from 1 to 10 for each individual state. The state deciles are constructed by ranking the ADI from low to high for each state alone without consideration of national ADIs. Group 1 is the lowest ADI (least disadvantaged) and 10 is the highest ADI (most disadvantaged). University of Wisconsin School of Medicine Public Health. 2015 Area Deprivation Index v2.0. Downloaded from https://www.neighborhoodatlas.medicine.wisc.edu)/ 11/22/2019.

On further review of our data and the maps, it is evident that COVID 19 positive patients cluster in the zip codes with ADI 8-10. Clustering maybe due to multi-family homes, apartment buildings with higher density of

population, higher susceptibility to novel Coronavirus, low health literacy, the inability to properly quarantine in smaller apartments, and the inability to isolate COVID 19 positive patients. Using the premise of clustering of COVID 19 cases by jurisdiction and ADI predictors, we analyzed our data by office location to further characterize patients in most need of outreach. The Baltimore Family Medicine site has the greatest number of patients in the ADI zip codes 8-10, and up to 30% of those tested using nasopharyngeal swabs are positive for COVID 19 at this site. Figure 3.

Figure 3: Relationship of ADI to COVID 19 positive patients



As a result of these strategies, including the dashboard, mapping patients using ArcGIS mapping and utilizing the ADI, we have successfully identified our practices' most vulnerable patients with COVID 19. In order to meet the needs of our population of patients in need, a partnership between the University of Maryland Family Medicine offices and the University of Maryland School of Social Work developed to establish multiple methods of providing COVID 19 disease information to patients. A COVID Conversations Hotline was established, staffed by social workers to provide an empathetic ear, supporting patients through decisions on isolation, quarantine and informing family and employers, and triaging those patients who will benefit from referrals for counseling or pharmacotherapy for anxiety and depression. In addition to the COVID Conversations Hotline which provides an empathetic ear for callers, and COVID 19 information from the Centers for Disease Control website, we developed eight youtube videos[7] with simple COVID 19 messaging which are freely accessible to our patients and physicians to download in power point for patients.

Future plans: In order to meet the needs of those individuals residing in COVID 19 clusters in zip codes with ADI in the lowest quintile, we are planning to apply for a grant for remote patient monitoring equipment, accompanied by provision of broadband access, to facilitate patient report back to our office utilizing Epic My Chart companion. We are working with our state to utilize a newly rolled out COVID 19 Vulnerability Score for Medicare populations under the auspices of the Centers of Medicare and Medicaid Maryland Primary Care Program, to target our care management efforts to those most in need of medical and social supports. As COVID 19 pandemic marches on, we are adapting to the needs of our most vulnerable patients.

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