Improving Emergency Room Utilization During the COVID-19 Pandemic: A Telemedicine Social Determinants of Health Outreach Approach

Scarlett Austin, Nikos Pappan and Divya Venkat
Department of Medicine, Allegheny Health Network, Pittsburgh, PA, USA

ABSTRACT
High-risk patients over the age of 65, who had chronic medical conditions, and had not yet had a primary care visit within 2020 were identified. A subgroup of patients participated in a survey to assess social determinants of health (SDOH) in the setting of a pandemic. Outcomes of those who participated in the survey, and those who did not participate were compared. Notably, those who were surveyed and lived within zip codes with low socioeconomic status had significantly decreased emergency department visits, which we defined as a discharge from the emergency department without hospitalization, as compared to those who did not receive outreach. Rates of inpatient hospitalization did not differ significantly. These findings suggest that patient outreach to evaluate SDOH during a pandemic leads to more appropriate emergency department and hospital resource utilization. This finding is particularly impactful given the current pandemic, which may place a strain on emergency department, and healthcare resources.

1. Introduction
The conditions in which people are born, grow, play, live, work and age are the foundations of social determinants of health (SDOH) [1]. Between 30% and 55% of health outcomes can be attributed to SDOH [2]. By addressing SDOH, including housing, income, nutrition, care coordination, and community outreach, emergency room visits and hospitalizations are decreased, and healthcare costs are improved [3,4].

Communities in which health outcomes have historically been worse, have felt an increased negative impact of the Coronavirus (COVID-19) pandemic, including low-income neighborhoods, homeless populations, and minority populations such as African Americans and Latino Americans [5–7]. Nationally, 46% of households reported experiencing financial hardships due to pandemic sequelae, and 20% endorsed inability to seek medical care during the pandemic, resulting in a negative health outcome over 50% of the time [8]. Despite literature that depicts the inferior outcomes of marginalized populations due to COVID-19, an adequate response has yet to be defined. To overcome the devastating impacts of a disease like COVID-19, the interplay between the disease, public health, and SDOH must be examined [9]. The goal of this project is to acknowledge the effects of SDOH and their associated hardships during the COVID-19 pandemic and connect patients to resources which may begin to address barriers such as access to food, medications, and health services. We hypothesized that patient outreach during the COVID-19 pandemic would lead to improved outcomes, measured by a significant decrease in emergency department visits and hospital admissions. We anticipated this would be most profound in minority populations, and populations with a low socioeconomic status; both of which have been disproportionately affected by the pandemic.

2. Methods
This quality improvement study occurred in an internal medicine residency primary care clinic located in Pittsburgh, Pennsylvania. This clinic location is uniquely positioned in a low-income neighborhood with significant social determinants of health needs. Data were collected from 23 March 2020, when the stay at home order was initially declared in Pittsburgh, Pennsylvania, until 23 December 2020. Patients were determined to be high risk and eligible for outreach based on the following criteria: age 65 or older, presence of chronic medical conditions, and no scheduled appointments at the primary care clinic in 2020. Of this population, a cohort of 122 patients was...
Table 1. Outreach survey.

| Question                                                                 | Yes | No |
|--------------------------------------------------------------------------|-----|----|
| Are you experiencing difficulty with any of the following due to the COVID-19 Pandemic? |     |    |
| Access to food                                                           |     |    |
| Access to prescription medications                                      |     |    |
| Struggling with mental health                                            |     |    |
| Struggling with physical wellness, such as exercise                      |     |    |
| Struggling with personal care, access to home care                       |     |    |
| Struggling with finances                                                |     |    |
| I am not experiencing any additional difficulty due to COVID-19          |     |    |

called for outreach, and asked to participate in a survey which reviewed barriers they were experiencing as a result of the pandemic (Table 1). Eighty-seven were available and agreed to participate in the survey. The barriers assessed included difficulty with access to food, prescription medications, house hold essentials, confusing with financial issues, mental health, wellness, or care for themselves or others. These barriers were chosen anecdotally based common SDOH physicians face in this clinic with the aforementioned population. Results were recorded.

An observational retrospective data review of all patients’ who met the above criteria was conducted. Patients’ characteristics including demographics, emergency department visits, inpatient admissions, and COVID-19 tests were analyzed. Emergency department visits included patients that presented to and were discharged from the emergency room. Patients who presented to the emergency department and were subsequently admitted were included as inpatient admissions only. Statistical analysis was done using STATA data analysis software. Further analysis of this data cohort was performed by analyzing patient characteristics and need based on zip codes. These specific zip codes were determined by assessing social determinant needs in the clinic patient population as well as proximity to the hospital. The following zip codes were subsequently used in the final data analysis: 15233, 15212, and 15214. This was determined to be a quality improvement project and approved by the Allegheny Singer Research Institute Institutional Review Board.

3. Results

A total of 1,339 high-risk patients were identified based on the above criteria, 122 patients were called for outreach and 87 patients agreed to participate in the survey questionnaire. Of the patients who answered the survey, 59% identified as female, and 41% identified as male. 61% of patients surveyed identified as African American, 35% identified as white or Caucasian, and 4% identified as other or their race was unknown. A breakdown of average demographics for each individual SDOH can be seen in Figure 1.

Over the determined time period, of the 1,339 high-risk patients that were identified, 262 presented to the emergency department for a total of 441 visits, and 149 patients were admitted for a total of 254 admissions. In the group that received outreach, 37 presented to the emergency department for a total of 60 visits, and 30 were admitted to the hospital for a total of 48 admissions.

Patients were identified whose home address was within zip codes 15233, 15212, and 15214. These zip codes are within closest proximity to the clinic and

![Demographics of Individual SDOH](image)

Figure 1. Responses to survey broken down by average demographics.
4. Discussion

This quality improvement project showed a statistically significant decrease in emergency room visits by those who received outreach within specific high-risk zip codes. It did not, however, significantly impact the number of inpatient hospital admissions. Notably, the average household income within these zip codes ranges between twenty to thirty thousand dollars annually [10]. Based on these findings, it can be inferred that by properly addressing social determinant of health needs, we can significantly impact and improve patient barriers to care in a pandemic. In doing so we were able to significantly decrease the frequency of emergency room visits by limiting visits to patients who were critically ill and met criteria for admission. Acknowledging this impactful outcome is crucial to preventing emergency departments from becoming overwhelmed with patients, particularly in the setting of a pandemic when resources may be at or near capacity. Furthermore, the lack of significant difference in hospitalizations demonstrates that those who received outreach used the emergency department appropriately, during times of true medical need, and acute illness.

This project is limited by the sample size of surveys answered. The patient outreach calls were primarily made during the spring of 2020. As the pandemic, and its effects, continue into 2021, it’s possible that the timing of our assessment was premature. The peak of unemployment in the USA occurred in April 2020 [11]; however, household savings may not have been exhausted for weeks to months after this peak, at which point the financial and access barriers may have begun. A future consideration would be to repeat the survey at scheduled intervals or to continue conducting the survey with those who have not yet received outreach at later time points during the pandemic.

A review and evaluation of survey questions should be considered as well. The questions posed were general, with answers anticipated to be a definitive yes or no. They did not delve into the nuances of potential stressors. For example, questions regarding finances could have been phrased in a way that evaluated employment status, expenses, and debt. Moreover, the options for answers could have assessed applicability on a graded scale, rather than definitive yes or no answers. Furthermore, there was no follow-up to determine the receipt and usefulness of the resources provided.

A secondary consideration would be to further narrow the outreach to those who it may benefit the most. Given our data, the most impactful outreach occurred within zip codes with lower socioeconomic statuses. A more targeted approach to patients within low-income groups may be of benefit given our findings. Given that patient outreach does require resources, selecting the patients who would benefit most from patient navigation may lead to the best allocation of resources. To take this a step further, if preventing inappropriate emergency department visits derives significant benefit by preserving resources, and decreasing healthcare usage, there may in turn be a cost benefit. The potential savings by insurance companies and healthcare providers alike could be appropriated towards outreach to selected patients, providing them with resources they may be lacking during a pandemic. Our data suggests this outreach would provide more appropriate use of the emergency department.

Our high-risk patient COVID-19 outreach program that identified SDOH needs and allocated resources showed a statistically significant decrease in emergency room visits based on zip code. This resulted in more appropriate triaging of patients, which assisted in prevention of inappropriate emergency department use. As a result, the healthcare system, which may be strained in the setting of a pandemic, was used in appropriate situations of acute or critical illness requiring hospitalization. We conclude that a targeted evaluation of patient’s SDOH is important in the prevention of inappropriate healthcare utilization. Furthermore, we believe that screening for SDOH with similar questions, even outside of a pandemic, could have an overall benefit of a decrease in total healthcare costs, leading to better patient outcomes.

Disclosure statement

No potential conflict of interest was reported by the author(s).
Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

ORCID

Scarlett Austin  http://orcid.org/0000-0003-0464-4252
Nikos Pappan  http://orcid.org/0000-0001-5381-1008
Divya Venkat  http://orcid.org/0000-0002-8187-3190

References

[1] About Social Determinants of Health (SDOH). Social determinants of health: know what affects health. [Published August 19, 2020; cited 2021 Jan 21]. Available from: https://www.cdc.gov/socialdeterminants/about.html.
[2] Addressing social determinants of health in primary care team-based approach for advancing health equity. [Published 2018; cited 2021 Jan 21]. Available from: https://www.aafp.org/dam/AAFP/documents/patient_care/everyone_project/team-based-approach.pdf.
[3] Taylor LA, Tan AX, Coyle CE, et al. Leveraging the social determinants of health: what works? PLOS ONE. 2016;11(8):e0160217.
[4] Enard KR, Ganelin DM. Reducing preventable emergency department utilization and costs by using community health workers as patient navigators. J Healthc Manag. 2013;58(6):412–428.
[5] Singu S, Acharya A, Challagundla K, et al. Impact of social determinants of health on the emerging COVID-19 pandemic in the USA. Front Public Health. 2020;8:406. Published 2020 Jul 21.
[6] Baggett TP, Keyes H, Sporn N, et al. Prevalence of SARS-CoV-2 infection in residents of a large homeless shelter in Boston. JAMA. 2020;323(21):2191–2192.
[7] Yancy CW. COVID-19 and African Americans. JAMA. 2020;323(19):1891–1892.
[8] The impact of coronavirus on households across America. [Published September 2020; cited 2021 Jan 21]. Available from: https://cdn1.sph.harvard.edu/wp-content/uploads/sites/21/2020/09/NPR-RWJF-Harvard-National-Report_092220_Final1-4.pdf.
[9] Butler-Jones D, Wong T. Infectious disease, social determinants and the need for intersectoral action. Can Commun Dis Rep. 2016;42(Suppl 1):S118–S120. Published 2016 Feb 18.
[10] Team ZAD, ed. zipatlas.com. [Published 2021; cited 2021 Jan 22]. Available from: http://zipatlas.com/us/pa/pittsburgh/zip-code-comparison/median-household-income.htm.
[11] The employment situation - December 2020. Bureau of Labor Statistics. [Published 2021 January 8; cited 2021 Jan 21]. Available from: https://www.bls.gov/news.release/pdf/empsit.pdf.