



Selecting the highest utilizers of health care to live at Envision Community

Introduction

The Envision Community seeks to improve the health of people experiencing homelessness. Research shows that housing improves health in general and this potentially can result in healthcare savings. However, the degree of savings (or loss) depends on selecting residents with conditions exacerbated by homelessness that have a high probability of responding to a housing intervention. This population is likely to maximize the health and economic return on investment (ROI).

The Envision Project has asked for Optum Advisory Services to conduct secondary research to help choose a list of candidates to give to the Coordinated Care process to find a resulting cohort for the Envision Community.

This document details the method Optum believes will create a cohort that will have the most benefit from the Envision community. The method includes identifying the population experiencing homelessness, limiting the cohort by diagnoses exacerbated by homelessness, and then determining the propensity for the members to engage with Envision and HCMC's ability to monitor their health. The Optum team hypothesizes that this cohort will show that Envision community creates significant cost savings and improved health outcomes. Over the course of the study cost of care savings data will be collected and tested at the conclusion of the study to determine the validity of the hypothesis. The methodology to choose the cohort is detailed below.

Criteria for selecting the population experiencing homelessness

The population was based on criteria decided by Dr. Walsh's team and Optum. Initially the target population used the Epic System "Homeless" Flag. *This flag is determined by a member's address (if address is of a homeless facility).* The Optum team is aware that this flag is not used consistently across providers and is likely missing a large population of people experiencing housing insecurity. To identify a more comprehensive and accurate list of homeless people in Minneapolis, we leveraged Optum's "propensity to be homeless" data model.

Due to HCMC's lack of consumer data, the coefficients from the "propensity to be homeless" data model were unable to be applied to the test population. The use case for these coefficients is provided in the recommendation section of this document.

To further limit the test population, a proxy was used on members indicated by the "Homeless" flag instead. The proxy consisted of traits that came from the "propensity to be homeless" data model. The traits included are as follows: Insomnia, Joint/Spine, High Cholesterol – Lipitor, Depression, Skin Irritation or Rashes, Anxiety, Canker Sores, Antidepressant use, Bronchitis/COPD/Emphysema, Diabetes – Insulin, and Hearing Aid use.

Diseases exacerbated by homelessness

Disease characterization was used as a criterion in order to identify and select members of the population who would benefit the most from being a part of the Envision community. The Optum team has identified several diseases directly impacted by homelessness and used these disease diagnoses to rank members on their potential benefit by the Envision community. Research shows housing has a positive impact that on people with these diseases. The research and the rationale on the selected diseases are found below.

Heart Disease

Heart Disease is one of the biggest sources of healthcare costs associated with the homeless population. Numerous studies have shown members of the homeless population die from heart disease at a much higher rate than members of the general population and are admitted to the ER at a higher rate as well.ⁱ



Homelessness contributes to this higher rate by increasing stress and anxiety levels which would increase hypertension levels. Consistent housing would provide a stable environment in which members could better control their health, stress and reduce healthcare costs associated with heart disease.ⁱⁱ

Liver Related Disorders

Liver related disorders are identified as a high priority disease due to the high rates of alcoholism in the population. Housing would provide a setting for continuous care in which rehabilitation can take place and reduce costs for those affected with liver disorders.ⁱⁱⁱ

COPD

COPD is a condition brought on and exacerbated by smoking. Providing housing can place members of the population in a stable environment where they can be more successful in smoking cessation and reduce the health burden of COPD.^{iv v}

Infectious Diseases

Due to the propensity to live in unhygienic conditions, members of the population face increased risk of infectious disease. Infectious diseases incur a high health cost but can be mitigated by providing clean, stable housing and access to care for members experiencing homelessness.^{vi vii}

Diabetes

Diabetes is a disease which requires controlled storage for medications to treat it. Diabetic members of the homeless population lack a safe way to store medications which prevents them from treating their conditions and increases their health costs. Consistent housing could reduce the healthcare costs of diabetic members by providing a stable environment to treat their diabetes.^{viii}

Substance Abuse and Mental Health

40 to 60 percent of the population is estimated to be suffering from some form of substance abuse or mental health. In treating these conditions, a stable environment provided by the likes of Envision is a key to success. Therefore, members of the population afflicted with these conditions would benefit greatly from being a part of the Envision Community.^{ix x xi}

Skin Infections

Skin infections and diseases are conditions directly linked to a lack of practicing regular hygiene. The costs incurred for these conditions by members of the homeless population can be easily reduced by providing consistent housing.^{xii}

Participant Engagement

The final criterion used to limit the population was using proxies to measure member's propensity to engage with the program. In order to measure the program's success it is critical that there is participant buy-in. Optum has criteria that it uses to measure propensity to engage, as follows:

- The presence of a Personal Care Provider (PCP)
- Engage with Behavioral Health
- Continual Engagements with HCMC's system. No large gaps in care over the course of the past 2-3 years. Claims data, health coverage, etc.

Limitations

Data

A large limitation of this study was that Optum was unable to access HCMC data. This prevented Optum from pairing consumer data with HCMC members to use various analytic methods. Additionally, financial data was not provided in time to analyze.

Scope

Over the course of the study, a number of asks were found difficult to complete on a volunteer basis and were thus deemed out of scope. The asks not included: savings prediction model, ranked list of members, and integration of prior created methodologies. The Optum team did not find an effective method to create a savings prediction model. Since there is limited research on the cost savings, it is currently difficult to predetermine savings related to the Envision population. Furthermore, the team was not able to determine the ranked list due to lack of financial data and the inability to run member consumer data through models. Additionally, to not bias the study or incur regression to the mean the team suggests not choosing members based on medical costs. Finally, the team did not have the time to create an methodology integration or validate the benefit of doing so.

Time

During the course of the project, de-identified financial data was not provided. For future engagements this should be looked at more critically.

Recommendations

The rationale provided consists of secondary research and Optum best practices. To create a more complex model the team recommends the sharing of data between Optum and HCMC. This will allow for Optum to match HCMC patients with consumer data, theoretically giving more data points to perform analytics on. Data provided would be run through algorithms to find a member's likelihood to be homeless and propensity to engage. A closer look at these analyses is found in the document appendix.

Finally, a complete study is out of scope. The team advises the Envision team to monitor the total cost of care for those selected compared to a sample test population with similar conditions.

Appendix

Likelihood to be homeless model:

According to the United States Interagency on Homelessness, in January 2018 Minneapolis had 7,243 homeless people.^{xiii} According to the health cost and utilization project, homeless people use the emergency room at three times the rate of the general population.^{xiv} The current number of people flagged as homeless within the Hennepin health system is 3,100. According to the National Healthcare Council for homeless, there are a variety of reasons that someone experiencing homelessness may not disclose this information to their provider, rendering the total number of people flagged in the system, inaccurate.

“Directly asking “Are you homeless?” does not effectively identify homelessness. People without homes may not identify themselves as “homeless” due to stigma, shame, or the thought that a temporary and tenuous living arrangement is “home.” When asked for an address, people without homes of their own often provide one that belongs to a friend, relative, shelter, or church, or is a previous residence. Places where people stay might change daily as individuals and families move between shelter, street, and/or temporary stays with friends or family. It is also possible that bad experiences seeking health care in the past will prevent someone from self-disclosing homelessness for fear of being treated poorly.”

Additionally, it is not required that a provider ask a patient about their living situation.

For these reasons, the team pursued an additional model to determine if someone who has interacted with the health system is experiencing homelessness, but was not captured by the Epic System “Homeless” flag. Optum experts have developed a predictive model that predicts a person’s likelihood to be homeless. This model was created using a logistic regression, based on a population of individuals with an ICD-10 code equal to Z59.0 indicating homelessness in their medical history with twelve continuous months of eligibility with UHC. This population was compared to a random sample of individuals with 12 continuous months of eligibility with UHC and no presence of ICD-10 code Z59.0.

Through analyzing the key similarities in the population identified as homeless through the ICD 10 code, compared to the test population, Optum was able to build a logistic regression model to identify the key indicators that can predict some ones likelihood to become homeless.

The key indicators are based on data sources including:

- Medical Claims
- Rx Claims
- Program Enrollments
- Inbound Calls
- Health Assessments
- Census
- Demographics
- Behavioral
- Psychographics
- Aggregated Credit Data

Hennepin Health does not have access to some of these data sources, primarily the consumer data subsets. This leaves out key predictors such as education and income. Without those two data sources, the next best predictors are less impactful and skew the data. Without those data points, our team is suggesting this team forgo the likelihood to be homeless model. If the team can provide de-identified data to Optum, then Optum can rerun the model including the consumer data points. Through selecting the top 10 percent of people identified through the likelihood to be homeless model, Envision will cast a more accurate net to identify those eligible to become residents. To use this, a proxy was used as noted in the document above, they may be found in the Homelessness Risk Score document.

Propensity to Engage:

Optum recommends that Envision members are additionally selected on their engagement with their health care. This is based on Optum practices and past studies on health intervention programs targeting similar populations, where the success of a program can often be predicted by measuring the participant’s likelihood to engage. ^{xvi}

For the Envision community, someone’s health beliefs can be measured based on their prior preventative health behaviors such as receiving annual wellness visits over the past number of years, or having a behavioral health provider/primary care provider.

To create a more robust model, it is the final recommendation to use Optum’s consumer data and propensity model to find a member’s propensity to engage with Envision.

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- ⁱ <http://www.nhchc.org/wp-content/uploads/2014/06/chronic-disease-combo-hch-conf-es.pdf>
- ⁱⁱ "National Health Care for the Homeless Council, <https://www.nhchc.org/resources/clinical/diseases-and-conditions/cardiovascular-disease/>
- ⁱⁱⁱ https://www.bhchp.org/sites/default/files/BHCHPManual/pdf_files/Part4_PDF/Chronic_Med.pdf
- ^{iv} "http://www.nhchc.org/wp-content/uploads/2014/06/chronic-disease-combo-hch-conf-es.pdf
- ^v <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3797258/>
- ^{vi} Respiratory Infections in the Homeless, <http://www.uwomj.com/wp-content/uploads/2013/06/v78n2.61-65.pdf>
- ^{vii} [https://www.amjmed.com/article/S0002-9343\(18\)31074-X/fulltext](https://www.amjmed.com/article/S0002-9343(18)31074-X/fulltext)
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