

Is the Mercy Health Promoter a Cost Effective Program?

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Citation

T Swift, P A Clark, J Stout, B McNierney, R Williamson. *Is the Mercy Health Promoter a Cost Effective Program?*. The Internet Journal of Healthcare Administration. 2021 Volume 13 Number 1.

DOI: [10.5580/IJHCA.55852](https://doi.org/10.5580/IJHCA.55852)

Abstract

The purpose of the Mercy Health Promoter (MHP) is to reduce healthcare costs incurred by Mercy Fitzgerald Hospital (MFH) by providing uninsured Hispanic and African immigrant populations with free health screenings within the city of Philadelphia and nearby suburbs. Of the patients who seek treatment at MFH, 16% of those are uninsured, contributing to increased costs borne by the health system due to an uninsured patient's inability to pay for services rendered. In addition to health screenings, which include measurement of blood pressure and blood sugar levels, the MHP has a partnership with the Mercy Ambulatory Clinic (MAC). Through this partnership, the MHP can refer patients at acute risk of illness for further treatment and management of chronic conditions such as hypertension and type II diabetes mellitus. Left untreated, these conditions can put an individual at significantly increased risk of suffering a heart attack, stroke, or end-stage renal disease (ESRD). Utilizing a pharmacoeconomic analysis, we find that the MHP saves MFH \$140,284 per fiscal year while costing the organization only \$21,300 per year including startup costs.

INTRODUCTION

Trinity Health Mid-Atlantic is a regional network of non-profit hospitals that is guided by the principles of strengthening the health of the surrounding communities and creating a holistic healing ministry with compassion and quality healthcare as the unifying cornerstones [12]. One member of the Trinity Health Mid-Atlantic network is the Mercy Catholic Medical Center Mercy Fitzgerald Campus. Mercy Fitzgerald Hospital is committed to serving all inhabitants of Southwest Philadelphia and Delaware County regardless of their ability to pay for medical treatment.

A cursory review of the situation by MFH administrators indicated that 16% of patients seeking treatment at Mercy Fitzgerald Campus are uninsured [19]. In order to reduce the medical costs incurred by MFH, the Institute of Clinical Bioethics (ICB) created the MHP to decrease the number of Emergency Department (ED) visits.

After examining and analyzing the needs of the Philadelphia community a new program was developed by members of the Mercy Hospital Task Force on African Immigration and the Institute of Clinical Bioethics. This new initiative incorporated the successful and applicable aspects of the models examined above while adapting them to the unique resource-poor conditions in the developed world, in

particular the city of Philadelphia. This "Health Promoter" program could serve as a paradigm for other United States hospitals to adapt to the challenges of reducing health care costs, particularly, in areas with many uninsured patients. The "Mercy Health Promoter" was designed to prevent complex diseases and management of chronic conditions through education and observation, with the following goals and objectives in mind:

- Create a community-based program involving a high degree of community participation
- Provide health and nutrition education, monitor patient health and compliance with a prescribed medical course of treatment as well as provide quality health care services by partnerships with other already established organizations in the area.
- Reduce the costs of health care for uninsured or underinsured individuals and demonstrate cost-effectiveness for all members of the partnership (hospitals, health care providers, sponsors of the program, and the members of the community).
- Improve the health of the poor and marginalized individuals of the immigrant and impoverished communities of Philadelphia using education and increased access to primary health care services in the prevention and/or management of illness [11].

Since its implementation, this cooperative effort has involved community members, the Mercy Hospital administration, Mercy health professionals, and the city of Philadelphia. Respected members of the African community

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were selected to serve as Health Promoters in order to ground this initiative in transparency and trust. The program has generated a sense of community ownership, by encouraging the active participation of community leaders to address the wants and needs of their communities through services provided by the Mercy Health Promoters [30].

Many patients do not notice the development of chronic illnesses such as hypertension, dyslipidemia, and diabetes mellitus II since they are asymptomatic illnesses [46]. The purpose of these preventative screenings is threefold: to notify individuals of whether they have developed any chronic illnesses, to monitor the progress of individuals who have already developed a chronic illness, and to educate individuals on how to better control abnormal health findings. Those who are determined to be at risk for acute illnesses are referred from the Mercy Health Promoter to the Mercy Ambulatory Clinic, which is a walk-in medical facility located nearby.

The MAC is designed to treat mild to moderately complex medical conditions such as infections, headaches, chest pain, abdominal pain, nausea, vomiting, diarrhea, and myalgias [41]. If a patient at the MHP screening presents with symptoms indicating that they may be at risk for acute illnesses, they are sent to the MAC. Referred individuals are provided with chest x-ray imaging and a complete blood count panel (CBC) at no charge. The intention is that by identifying these individuals and intervening proactively in their health care, the MAC can reduce the number of costly emergency department (ED) visits from individuals without medical insurance.

The purpose of this paper is to determine whether the MHP is cost-effective for Trinity Health Systems. By evaluating the MHP's ability to identify at risk individuals who report to the ambulatory clinics and receive preventative care, and the extent to which these at-risk individuals report to ambulatory clinics and receive preventive care, we can assess whether the MHP is reducing other costs for MFH.

Individuals who regularly receive primary care have access to preventive services including cardiovascular checkups, influenza vaccinations, and risk factor identification [15,42,47]. Those that do not have regular access, especially uninsured African American and Hispanic minorities, typically experience worse health outcomes than those that do [2,7,22,48]. Therefore, it is essential that we provide such services to these at-risk populations to mitigate future health emergencies.

Figure 1
Key Players

Organization Name	Role	Key Responsibilities
Trinity Health Mid-Atlantic	Health System	Regional Health System that encompasses Mercy Catholic Medical Center: Mercy Fitzgerald Campus
Mercy Catholic Medical Center Mercy Fitzgerald Campus	Individual Hospital	Hospital that serves the uninsured and the immigrant populations of the city of Philadelphia and nearby suburbs.
Mercy Ambulatory Clinic	Ambulatory Clinic	Provides chest X-ray and CBC panel to referred individuals to proactively prevent acute illnesses from developing.
Mercy Health Promoter	Pop-up clinic	Provides basic preventative health screenings to identify high-risk individuals to be referred to the Mercy Ambulatory Clinic.

Risk Analysis

Immigrants, particularly undocumented immigrants, are more likely to be uninsured for two reasons. Firstly, many immigrants hold low-paying jobs that do not provide employer-sponsored health insurance coverage [5]. Secondly, those who are not United States citizens do not have access to state-sponsored programs such as Medicaid [5]. A recent study showed that uninsured adults reported that the largest barrier to healthcare was not having a regular place to seek care such as the office of a primary care physician [5]. This lack of routine medical screening and preventive medicine, which helps to control chronic illnesses in their early stages, leads to higher mortality rates among the uninsured [42]. The MHP is a free clinic that falls into the category of medical safety-net facilities [6]. Prior research has shown that safety net clinics are used predominately by individuals living in extreme poverty, who lack medical insurance coverage, who are non-white, and who are most frequently Hispanic or Latino [6][8].

The individuals being referred to the ambulatory clinic are those who are at risk of suffering acute medical conditions that would result from the chronic conditions with which they present and/or their vital signs captured during the screening process. If unchecked, these conditions could lead to acute events such as a heart attack or a stroke that require emergent intervention. In referring these individuals to the ambulatory clinic, the MHP acts before more drastic, more expensive measures become necessary.

One such group that is at risk is those with uncontrolled hypertension (i.e., hypertension stage II) defined as a blood pressure greater than 140/90 mmHg [44]. Elevated blood pressure readings such as these are particularly dangerous because hypertension is known as the “silent killer.” Often, people do not feel any symptoms when their blood pressure is elevated and therefore do not seek medical attention [46]. However, it is extremely important to be cognizant of elevated blood pressure readings. With each 20-mmHg increase in systolic blood pressure and 10 mmHg increase in diastolic blood pressure, the likelihood that an individual will suffer from a heart attack or a stroke doubles [44].

In addition to development of acute conditions such as a heart attack or stroke, uncontrolled hypertension is one of the leading causes of renal failure, which itself causes a myriad of complications [28]. Renal failure is an extremely costly condition to treat as it requires individuals to regularly receive dialysis that can cost up to \$72,000 a year [18]. However, renal failure can be avoided entirely with adequate management of both hypertension and diabetes [29] [34]. Therefore, it is necessary that individuals with elevated blood pressure readings are referred to the ambulatory clinic.

Another at-risk group is individuals with high blood sugar or hyperglycemia. Although a diagnosis of diabetes corresponds with fasting blood glucose levels of 200 or higher, individuals with blood glucose levels of 100-125 have a condition called prediabetes [4]. Those with prediabetes are more likely to develop diabetes in the future but are typically asymptomatic in the prediabetic range [4]. Since pre-diabetics are likely unaware that their blood sugar is mildly elevated, they require intervention to prevent the progression of diabetes and are referred to the ambulatory clinic.

In addition to those in the prediabetic range, individuals with known diabetes who have blood sugar levels above 120 are referred to the ambulatory clinic. Diabetics who have uncontrolled blood sugar are at risk of developing several complications, both acute and chronic. Some chronic complications include glaucoma, neuropathy, kidney disease, and hypertension as well as more acute complications such as strokes [3]. As a result, it is essential that blood sugar is closely monitored and that diabetics receive treatment when values are out of range.

Financial Impact of Mercy Health Promoter on Mercy Fitzgerald Hospital

Lack of regular preventive healthcare visits can lead to the development of acute illnesses that result in Emergency Department (ED) visits for which the hospital receives no financial compensation [14]. Since individuals without medical insurance have limited access to primary care providers, they tend to use the ED for a wide range of healthcare needs [40].

Prior research shows that early health care intervention for at-risk populations reduces overall healthcare systems costs. A program implemented by the CDC called the Community Health Workers (CHW) program utilizes members of the community to provide health education and outreach as well as limited medical services [10]. The CHW programs located across the United States operate similarly to the MHP in that their goals include reducing healthcare costs, reducing the number of unnecessary hospitalizations with early intervention, and improving the overall health of the communities in which they operate [10]. Specifically, 18 different areas which used CHW programs saw a decrease in ED visits in patients with diabetes due to increased awareness and management of their chronic illness [10].

The CHW program is among others across the country which have been able to decrease ED costs by providing preventative health care services. A nurse-run safety net clinic in Providence, RI, also sought to reduce the number of preventable ED visits. This clinic yielded a \$34 return on investment for each \$1 invested and was able to save \$780,000 that would have been spent on treatment of hypertension and obesity alone [8]. Additionally, a hospital in Houston, TX, was able to save \$4.5 million by preventing ED visits through use of safety net clinics [35]. These studies indicate that safety net clinics can reduce ED visits and therefore reduce costs for hospitals. We seek to determine if the MHP does the same for MFH.

Hospitals generally calculate the cost of treating a patient using a “medical coding” process. Medical coding is the transformation of healthcare diagnosis, procedures, medical services, and equipment into universal medical alphanumeric codes. The diagnosis and procedure codes are taken from medical record documentation and are applied correctly during the medical billing process. In analyses below, we use the average cost of common diagnoses in Mercy Fitzgerald Hospital in 2019 to estimate the avoided cost to Mercy Fitzgerald Hospital due to the services provided by MHP [35] [43].

Through routine monitoring of height, weight, blood

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pressure, pulse oximetry, blood glucose, and cholesterol, the MHP clinicians identify high risk individuals who can be referred to the ambulatory clinics for preventative medical care. In doing so, the MHP decreases the number of ED visits at MFH each year, thereby reducing costs to the hospital.

THE DATA

Data Collection

The following is a brief description of the data collection methods used at the African and Hispanic MHP.

When an individual visits the MHP for the first time, the patient is given an ID number that is associated with his/her data. The ID number consists of date of birth as well as the patient initials in order to protect patient privacy. The patient is then given a card with his/her unique ID number on it, and proceeds to visit each station at the clinic where height, weight, blood pressure, pulse oximetry, blood glucose, cholesterol, and heart rate are recorded.

After visiting each station, the patient presents a volunteer with a card that contains the identification number as well as the recorded vitals for the day. The volunteer will ask the patient if it is his/her first screening, and if so, the volunteer will ask the patient the following general healthcare information:

- frequency of primary doctor visits
- medical insurance status
- pre-existing condition information
- current medication information
- ethnicity
- smoking and drinking status.

This information that is captured by each volunteer is entered into a Microsoft Access interface on a laptop computer. These computers are linked using an encrypted connection via the cloud to an SQL Server database maintained by Saint Joseph’s University’s Institute of Clinical Bioethics that collects all the patient data from all MHP locations. Each patient has a “Patient Profile”, which can be accessed by searching the patient identification number. On returning visits, the patient needs only to present her ID number. Over time, the MHP program builds a profile of patient vital signs.

Figure 2 below shows the data elements captured for each patient.

Figure 2
Data Collected at MHP Clinics

Variable Name	Description	How It Was Measured
Qualitative Measures		
Screen Date	The date that a patient’s health data was recorded, Month/Day/Year	Requested from patient upon arrival to the MHP.
Patient ID	The unique, anonymous identifying factor assigned to each patient, assigned when a patient’s data was first recorded and used again if they came back. Letter at the beginning stands for gender. Ex. F1012456	Requested from patient upon arrival to the MHP.
Date of Birth	Day patient was born Month/Day/Year	Requested from patient upon arrival to the MHP.
Gender	Male or Female	Requested from patient upon arrival to the MHP.
Medical Insurance	Yes if they have it or no if they don’t	“Do you currently have medical insurance?”
Primary Doctor	Yes if they have it or no if they don’t	“Do you currently see a doctor on a regular basis?”
Prior Condition	Yes if they have it or no if they don’t	“Do you have any pre-existing medical conditions?”
Prior Condition Info	What is their prior condition	“If yes, please describe the medical conditions.”
Medication Taken	Yes if they do take it or no if they don’t	“Are you currently taking any medications?”
What Medication Taken	What medication do they take	“If yes, what are they?”
Smoke/ Drink	Yes if they do no if they don’t	“Do you currently smoke, drink, or both?”
Stress Level	On a numbered scale of 0-5	“How would you describe your stress level on an average day?”
Notes	Particular notes on that one patient; includes if they were referred or not.	“Would you like to add any additional information to your profile?”
Reference Number	The unique, anonymous identifying factor assigned to each patient when they are referred for worrying health data	Our on-site residents create this reference number.
Quantitative Measures		
Hours on Feet	How many hours per week the patient is standing up or walking around	“How many hours do you typically spend on your feet per week?”
Exercise Per Week	How many times the patient exercised per week	“How many hours do you spend exercising per week?”
Height	Height in Feet and Inches	Recorded via scale at the MHP.
Weight	Weight in pounds	Recorded via scale at the MHP.
Systolic Blood Pressure	Systolic Blood Pressure	Recorded via sphygmomanometer.
Diastolic Blood Pressure	Diastolic Blood Pressure	Recorded via sphygmomanometer.
Pulse OX	Pulse	Recorded via fingertip pulse oximeter.
Glucose	Glucose Level	Recorded via glucometer.
Cholesterol	Cholesterol Level	Recorded via cholesterol meter.

There were two unique data sets to take into consideration, one for the African MHP and one for the Hispanic MHP. In the African MHP data, we detected a response bias to the questions about smoking and alcohol consumption. Respondents either provided no response to this question or provided responses that were far below average usage rates for the general population [24].

Before the analysis, the quantitative data was edited to remove irregularities. Observations that included missing data on patient ID, date of birth, and other points were deleted. 3.2% of patients from the African MHP and 5% of patients from the Hispanic MHP were removed due to missing data. Significant editing was required to standardize spelling and capitalization. Using the procedures available within JMP statistical software, categorical variables were created within the data to better understand both the qualitative and quantitative data. The new categories are listed below in Figure 3:

Figure 3
New Categories

Category Name	Data Type	Display*	Formula	Why
Number of Visits	Quantitative	1+	Sum of each record of a PatientID	To determine how many times a patient has been to MHP
Age	Quantitative	Categorical; 1-5	Aged 55+ = 1 Age 40- <55 = 2 Age 30-<40 = 3 Age 18-<30 = 4 Age <18 = 5	To better understand the health trends in older and younger populations.
Stress Level*	Qualitative	Categorical; 0-3;	0 is no stress and 3 is the most; If 0 then =0, if 1 then =1, if 2 then=2 otherwise =3	To better understand if stress level is associated with a health factor
Comorbidity	Quantitative	Categorical; 0-2	2 if a patient had >2 prior chronic conditions; 1 if patient =1 prior chronic condition, otherwise 0	To determine how many patients had comorbidity and if chronic conditions affected other health aspects.
High Blood Pressure	Qualitative	Binary	1 if Systolic BP > 120 and Diastolic BP>80; 0 otherwise	To determine if a patient had high blood pressure
High Cholesterol	Qualitative	Binary	1 if Chol > 200; 0 if Chol<=200	To determine if a patient had high cholesterol
Employment Status	Quantitative	Binary	1 unemployed; 0 if employed	To determine if employment is a factor in health data
Referred	Quantitative	Binary	1 if referred; 0 if not referred	To determine if referred patients had different health data than others

*Data Type: Categorical: Organized data into set numerical categories; Binary: Organized Data into either 0 or 1 data point.
 *Stress Level: Even though stress levels were recorded in the Latin population, all answers were 0
 *Employment: Employment wasn't a specific survey question in the African American MHP clinic.

In order to serve the individuals presenting to the MHP more effectively, we evaluate the health information gathered from the patients who participate in these programs. Utilizing the data collected, we can identify high-risk patients at the MHP that are recommended to present the MAC. The criteria for recommendation include findings such as a systolic blood pressure reading greater than 150 mmHg, a blood glucose reading greater than 140 mg/dL, and/or the possession of more than two risk factors including obesity, regular tobacco or alcohol usage, lack of access to primary care, and pre-existing conditions.

Utilizing these criteria over the four-month time period, we recommended 20 patients to the MAC during 2019. Out of the 20 patients we recommended to the MAC, only eight patients showed up. The Clinic staff determined that four individuals had uncontrolled hypertension and one person had uncontrolled diabetes. All these individuals were then started on the appropriate anti-diabetic and anti-hypertensive medications.

ANALYSIS

The primary objective of this study is to conduct a cost-benefit analysis of the MHP. We use a pharmacoeconomic methodology to determine whether the costs of running the

MHP provides an overall financial benefit to Mercy Fitzgerald Hospital [9].

Cost benefit methodology

The primary potential financial benefit of the MHP is the cost savings per person generated through preventative screenings that lead to fewer ED visits by uninsured patients. This metric was calculated for the MHP by adjusting the cost of treatment per person in the emergency department by the likelihood that early prevention would preclude the need for that treatment.

The two means by which the Mercy Health Promoter functions to reduce risk are by identifying silent killers such as type II diabetes mellitus and hypertension and by administering influenza vaccines.

As shown in Figure 5., four patients with uncontrolled hypertension were started on antihypertensive medications and one patient with uncontrolled diabetes was started on antidiabetic medications.

Figure 4
Referral Data from Ambulatory Clinic 3 - Victory Harvest Fellowship International 4 - Saint Francis de Sales School

Patient	Date of Birth	Location	HP Visit Date	MAC Appointment	Diagnosis
Female	8/12/68	Victory ³	10/20/19	11/1/19	Started on HTN Meds
Female	8/7/83	SFDSC ⁴	10/27/19	11/14/19	Started on HTN Meds
Female	5/18/66	NA	NA	11/21/19	Started on HTN and DM2 Meds
Female	2/14/68	NA	NA	3/10/20	Started on HTN Meds

In order to calculate the cost of operating MHP, we captured the initial startup costs associated with establishing an ambulatory clinic at a church, including purchasing the scales and laptops that will be stored at the churches. In addition, there are yearly expenses that include stocking each site with glucometers, cholesterol machines, sphygmomanometers, influenza vaccinations and other supplies that are distributed to the community. As shown in Figure 6, annual operating costs for an MHP are \$11,800 to supply and operate the MHP, plus \$8,000 initial startup expenses, for a total of \$21,300 [Figure 5].

Figure 5
Mercy Health Promoters Yearly Expenditures

MHP Yearly Expenditures	Materials	Expenses
Supplies	Medical, dental, & associated supplies	\$6,000
	Eyeglasses, cases, and accessories	\$1,000
	Baby Boxes - (10) per box \$99.00 & Shipping	\$1,200
Flu Shots	Based on \$50.00- per person (@ 84 vaccines)	\$4,200
	Transportation of flu shots and personnel to distribute vaccinations	\$100
Miscellaneous		
	Rent (Hosted at local Churches)	\$0
Personnel	Voluntary	\$0
Total Yearly Cost		\$11,800
Initial Startup Expenses		
	Dental Chair (1)	\$1,000
	Scales (2) with attached stadiometers	\$500
	Laptops (2) for data collection	\$8,000
Total Yearly Cost with Initial Startup Expenses		\$21,300
MHP Yearly Expenditures	Materials	Expenses

[31]

Next, we estimate the costs and expenses that Mercy Fitzgerald Hospital avoids by providing preventative care to at-risk patients at the MHP rather than treating them in an emergency department once more severe conditions present.

We calculated the total number of people that would require treatment by multiplying the number of patients who presented to the MAC with uncontrolled diabetes by the probability that the person will experience an adverse health outcome such as a myocardial infarction and subsequent cardiac catheterization, cerebrovascular accident, or end-stage renal disease. This was estimated by multiplying column (a) times column (c) of figure 6. The estimate of the total number of people is presented in column (d). Then we determined the total cost of treatment incurred by the hospital by multiplying the occurrence rate by the cost of treatment. This was estimated by multiplying column (d) and column (e).

In order to calculate the costs avoided by the Trinity Health Mid-Atlantic Health System, we multiplied the cost of treatment by the reduction in risk achieved through the Mercy Ambulatory Clinics interventional efforts. This was estimated by multiplying column (f) and column (g). In order to determine the true costs avoided by the Trinity Health Mid-Atlantic Health System, the risk avoidance in dollar values is subtracted from cost of intervention. This

was estimated by subtracting column (h) by column (i). The same methodology was used to calculate the cost savings for individuals with hypertension (figure 7) and for those who received a flu vaccine[1] (figure 8 and 9).

Figure 6
Cost Saving Per Person Gained from MHP Intervention: Diabetes 5 - The Wholesale Average Cost (WAC) for Metformin, an antidiabetic medication, is \$50/month [21]. The total cost of intervention was determined by: cost per month*10 years. This number was discounted back to present using 10 $NPV = \sum (R / [1 + .012]^t) t = 1$

Major Condition	a	b	c	d	e	f	g	h	i	j
	Number of People Observed	Potential Risk	Probability of Occurrence	Total Occurrences	Cost to Treat per person [43]	Total Cost to treat in ED	Reduction in Risk	Risk Avoidance in Dollar Values	Cost of Intervention	Avoided Costs
Uncontrolled diabetes	1	Acute Myocardial Infarction, Discharged alive, with major complications	10% [13]	0.10	\$ 33,853	\$ 5,305	45%	\$ 2,406		
		Cardiac Catheterization	10%	0.10	\$ 118,750	\$ 11,875	45%	\$ 5,387		
		Intracranial Hemorrhage or Cerebral Infarct with major complications	8% [13]	0.08	\$ 54,992	\$ 4,179	54%	\$ 2,257		
		Renal failure major complications	25% [34]	0.25	\$ 51,895	\$ 12,974	36%	\$ 4,671		
						\$ 34,333		\$ 14,720	\$ 5,646 ^a	\$9,074

Figure 7
Cost Saving Per Person Gained from MHP Intervention: Hypertension In treating hypertension, there are a number of different therapies that can be initiated depending on other comorbidities present [25]. Of these, the costliest option based on the average price a patient would pay at a pharmacy before insurance or coupons was chlorthalidone with a cost of \$21/month [20]. The total cost of intervention was determined by: cost per month*10 years. This number was discounted back to present using 10 $NPV = \sum (R / [1 + .012]^t) t = 1$

Major Condition	a	b	c	d	e	f	g	h	i	j
	Number of People Observed	Potential Risk	Probability of Occurrence	Total Occurrences	Cost to Treat per person [43]	Total Cost to treat in ED	Reduction in Risk	Risk Avoidance in Dollar Values	Cost of Intervention	Avoided Costs
Uncontrolled HTN	4	Intracranial Hemorrhage or Cerebral Infarct with major complications	26% [39]	1.04	\$54,992	\$57,192	30%	\$17,158		
		Heart Failure & Shock with Complications	59% [26]	2.36	\$41,243	\$97,332	12%	\$11,680		
		Renal failure major complications	7% [1]	0.29	\$51,896	\$15,050	40%	\$6,038		
								\$34,875	\$9,486 ^a	\$25,398

Figure 8

Cost Saving Per Person Gained from MHP Intervention:
40% Effective Influenza Vaccination

Major Condition	a	b	c	d	e	f	g	h	i	j
	Number of People Observed	Potential Risk	Probability of Occurrence	Total Occurrences	Cost to Treat per person [43]	Total Cost to treat in ED	Reduction in Risk	Risk Avoidance in Dollar Values	Cost of Intervention	Avoided Costs
Influenza	84	Otitis Media & URI without Major Complications	0.27%	0.22	\$22,335	\$5,014	40%	\$2,006		
		Fever & Influenza-like Illness	0.07% [36]	0.06	\$36,541	\$2,150	40%	\$860		
		Respiratory Infection & Influenza-like Illness	0.02% [36]	0.01	\$62,982	\$847	40%	\$340		
								\$3,206	\$4,200	\$994

Figure 9

Cost Saving Per Person Gained from MHP Intervention:
60% Effective Influenza Vaccination

Major Condition	a	b	c	d	e	f	g	h	i	j
	Number of People Observed	Potential Risk	Probability of Occurrence	Total Occurrences	Cost to Treat per person [43]	Total Cost to treat in ED	Reduction in Risk	Risk Avoidance in Dollar Values	Cost of Intervention	Avoided Costs
Influenza	84	Otitis Media & URI without Major Complications	0.27%	0.22	\$22,335	\$5,014	60%	\$3,009		
		Fever & Influenza-like Illness	0.07% [36]	0.06	\$36,541	\$2,150	60%	\$1,290		
		Respiratory Infection & Influenza-like Illness	0.02% [36]	0.01	\$62,982	\$847	60%	\$508		
								\$4,807	\$4,200	\$607

The MHP model generates substantial cost savings. As shown in Figure 5, in one four-month time period, the MHP was able to start four individuals on blood pressure medications, one individual on antidiabetic medications, and dispensed 84 influenza vaccinations last quarter. This enabled the Trinity Health Mid-Atlantic System to save approximately \$35,446^[2] per quarter, or \$141,784 annually. Compared to the \$21,300 it requires to supply and operate the MHP, the Mercy Health Promoter generates a six-fold return on investment, for over a 500% return. In conclusion, the MHP is a cost-effective program that is beneficial for the Trinity-Mid Atlantic Health System.

$$\text{Return on Investment} = \frac{(\text{Gain from Investment} - \text{Cost of Investment})}{(\text{Cost of Investment})} \times 100\%$$

$$\text{Return on Investment: } \frac{(\$141,784 - \$21,300)}{(\$21,300)} \times 100\% = 566\%$$

¹Figure 8 represents the potential cost savings if the influenza vaccine is 40% effective and Figure 9 represents the potential cost savings if the influenza vaccine is 60%

²This estimated cost savings was calculated assuming that the influenza vaccine is 40% effective at preventing

infection.

CONCLUSION

On a yearly basis, the MHP saved Trinity Health Mid-Atlantic a substantial expense. This is further evidence that these types of safety net clinics help hospital systems reduce costs. In addition to the financial benefit, the MHP benefits society by providing care to underserved communities. The MHP provides increased awareness of disease and means of disease prevention, improves quality of life, and ultimately can save lives. Detecting and managing hypertension and diabetes are only a few of the services provided by the MHP. For example, the MHP provides “baby boxes” to assist new and expecting mothers, an eyeglasses station that provides a vision test and eye exam, and a dental station. Collectively, the services offered at the MHP enhance the dignity of life for all who attend.

References

[1]. Albertus, P., Morgenstern, H., Robinson, B., & Saran, R. (2016). Risk of ESRD in the United States. American journal of kidney diseases: the official journal of the National Kidney Foundation, 68(6), 862–872. <https://doi.org/10.1053/j.ajkd.2016.05.030>

[2]. American College of Physicians-American Society of Internal Medicine. No health insurance? It's enough to make you sick [Internet]. Philadelphia: American College of Physicians-American Society of Internal Medicine; 1999 [cited 2018 Jan 4]. 22 p. Available from: https://www.acponline.org/acp_policy/policies/no_health_insurance_scientific_research_linking_lack_of_health_coverage_to_poor_health_1999.pdf [PDF – 451 KB]

[3]. American Diabetes Association. Complications. (n.d.). Retrieved from <https://www.diabetes.org/diabetes/complications>

[4]. American Diabetes Association. Diagnosis. (n.d.). Retrieved from <https://www.diabetes.org/a1c/diagnosis>

[5]. Artiga, S., & Diaz, M. (2019, October 7). Health Coverage and Care of Undocumented Immigrants. Kaiser Family Foundation. Retrieved from <https://www.kff.org/disparities-policy/issue-brief/health-coverage-and-care-of-undocumented-immigrants/>

[6]. Arvisais-Anhalt, S., Macdougall, M., Rosenthal, M., Congelosi, P., Farrell, D. F., & Rosenbaum, P. (2018). A Cross-Sectional Study Evaluating the Use of Free Clinics in Syracuse, NY: Patient Demographics and Barriers to Accessing Healthcare in Traditional Settings. Journal of Community Health, 43(6), 1075–1084.

[7]. Ayanian JZ, Weissman JS, Schneider EC, Ginsburg JA, Zaslavsky AM. Unmet health needs of uninsured adults in the United States. JAMA. 2000;284(16):2061-69

d Brown ER, Ojeda VD, Wyn R, Levan R. Racial and ethnic disparities in access to health insurance and health care. Los Angeles: UCLA Center for Health Policy Research; 2000. 82 p.

[8]. Bicki, A., Silva, A., Joseph, V., Handoko, R., Rico, S.-V., Burns, J., ... Groot, A. S. D. (2013). A Nurse-Run Walk-In Clinic: Cost-Effective Alternative to Non-urgent Emergency Department Use by the Uninsured. Journal of Community Health, 38(6), 1042–1049. doi: 10.1007/s10900-013-9712-y

- [9]. Bootman, J. L., Townsend, R. J., & McGhan, W. F. (1996). Introduction to pharmacoeconomics. Principles of pharmacoeconomics, 2.
- [10]. CDC. (2015). Addressing Chronic Disease through Community Health Workers: A Policy and Systems Level Approach (Vol. 2).
- [11]. Clark, P. and Schadt, S. Mercy health promoter: A paradigm for just health care. Medical Science Monitor. 2 October 2013.
- [12]. Community Health Needs Assessment. (n.d.). Retrieved from <https://www.trinityhealthma.org/about/chna/>
- [13]. Einarson, T.R., Acs, A., Ludwig, C. et al. Prevalence of cardiovascular disease in type 2 diabetes: a systematic literature review of scientific evidence from across the world in 2007–2017. Cardiovasc Diabetol 17, 83 (2018). <https://doi.org/10.1186/s12933-018-0728-6>
- [14]. Enard, K. R., & Ganelin, D. M. (2013). Reducing preventable emergency department utilization and costs by using community health workers as patient navigators. Journal of healthcare management / American College of Healthcare Executives, 58(6), 412–428.
- [15]. Freidberg MW, Hussey PS, Schneider EC. Primary care: a critical review of the evidence on quality and costs of health care. Health Aff (Millwood). 2010;29(5):766-72.
- [16]. Group SR, Wright JT Jr, Williamson JD, Whelton PK, Snyder JK, Sink KM, et al. A Randomized Trial of Intensive versus Standard Blood-Pressure Control. N Engl J Med. 2015;373:2103–16.
- [17]. Han, Y., Xie, H., Liu, Y. et al. Effect of metformin on all-cause and cardiovascular mortality in patients with coronary artery diseases: a systematic review and an updated meta-analysis. Cardiovasc Diabetol 18, 96 (2019). <https://doi.org/10.1186/s12933-019-0900-7>
- [18]. How Much Does Dialysis Cost? - CostHelper.com. (n.d.). Retrieved from <https://health.costhelper.com/dialysis.html>
- [19]. Mercy Catholic Medical Center, Mercy Fitzgerald Campus CHNA Implementation Strategy Fiscal Years 2020 - 2022. (2019). Retrieved from <https://www.trinityhealthma.org/assets/documents/community-benefit/chna-mfc-implementation-2019.pdf>
- [20]. Hypertension medications. (n.d.). Retrieved February 11, 2021, from <https://www.goodrx.com/hypertension/drugs>
- [21]. John M. Eisenberg Center for Clinical Decisions and Communications Science. Medicines for Type 2 Diabetes: A Review of the Research for Adults. 2011 Jun 30. In: Comparative Effectiveness Review Summary Guides for Consumers [Internet]. Rockville (MD): Agency for Healthcare Research and Quality (US); 2005-. [Table], Average Wholesale Prices for Diabetes Medicines. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK63521/table/consdiabmed.t3/>
- [22]. Kaiser Family Foundation. Key facts about the uninsured population. Washington (DC): Kaiser Family Foundation; 2016 Sep 29. 11 p.
- [23]. Lelcūtė, C. M., Grigorescu, E. D., Stătescu, C., Sasclu, R. A., Onofriescu, A., & Mihai, B. M. (2019). Association of Antihyperglycemic Therapy with Risk of Atrial Fibrillation and Stroke in Diabetic Patients. Medicina (Kaunas, Lithuania), 55(9), 592. <https://doi.org/10.3390/medicina55090592>
- [24]. Lavrakas, P. J. (2008). Encyclopedia of survey research methods (Vols. 1-0). Thousand Oaks, CA: Sage Publications, Inc. doi: 10.4135/9781412963947
- [25]. Mann, J. F. (2019). Hypertension: Primary, essential. The APRN and PA's Complete Guide to Prescribing Drug Therapy. doi:10.1891/9780826179340.0192
- [26]. Messerli, F. H., Rimoldi, S. F., & Bangalore, S. (2017). The Transition From Hypertension to Heart Failure. JACC: Heart Failure, 5(8), 543-551. doi:10.1016/j.jchf.2017.04.012
- [27]. National Institute of Diabetes and Digestive and Kidney Diseases. High Blood Pressure & Kidney Disease. (2020, March 1). Retrieved from <https://www.niddk.nih.gov/health-information/kidney-disease/high-blood-pressure>
- [28]. National Institute of Diabetes and Digestive and Kidney Diseases. Preventing Chronic Kidney Disease. (2016, October 1). Retrieved from <https://www.niddk.nih.gov/health-information/kidney-disease/chronic-kidney-disease-ckd/prevention>
- [29]. Neal, B., McMahon, S., & Chapman, N. (2000). Effects of ACE inhibitors, calcium antagonists, and other blood-pressure-lowering drugs: Results of prospectively designed overviews of randomised trials. The Lancet, 356(9246), 1955-1964. doi:10.1016/s0140-6736(00)03307-9
- [30]. Ochasi, A. and Clark, P. Mercy Health Promoter Model: Meeting Needs of Specific Immigrant Communities. Health Progress. March-April 2014.
- [31]. O'Doherty, Theresa. (2019) [MHP Annual Expenditures]. Unpublished raw data.
- [32]. Ortiz, J. R., Neuzil, K. M., Shay, D. K., Rue, T. C., Neradilek, M. B., Zhou, H., Seymour, C. W., Hooper, L. G., Cheng, P. Y., Goss, C. H., & Cooke, C. R. (2014). The burden of influenza-associated critical illness hospitalizations. Critical care medicine, 42(11), 2325–2332. <https://doi.org/10.1097/CCM.0000000000000545>
- [33]. Prischl, F. C., & Wanner, C. (2018). Renal Outcomes of Antidiabetic Treatment Options for Type 2 Diabetes-A Proposed MARE Definition. Kidney international reports, 3(5), 1030–1038. <https://doi.org/10.1016/j.ekir.2018.04.008>
- [35]. Program for uninsured saves \$4.56 million. (2011). Hospital Case Management, 19(9), 134–139.
- [36]. Reid, L. D., & Fingar, K. R. (n.d.). Emergency department Visits involving influenza and INFLUENZA-LIKE Illnesses, 2016-2018 #269. Retrieved February 11, 2021, from <https://www.hcup-us.ahrq.gov/reports/statbriefs/sb269-Influenza-ED-Visits-2016-2018.jsp>
- [37]. Roy, L., White-Guay, B., Dorais, M., Dragomir, A., Lessard, M., & Perreault, S. (2013). Adherence to antihypertensive agents improves risk reduction of end-stage renal disease. Kidney International, 84(3), 570-577. doi:10.1038/ki.2013.103
- [38]. Russell, L. (2010, December 16). Fact Sheet: Health Disparities by Race and Ethnicity. Retrieved April 3, 2020, from <https://www.americanprogress.org/issues/healthcare/news/2010/12/16/8762/fact-sheet-health-disparities-by-race-and-ethnicity/>
- [39]. Seshadri, S., Beiser, A., Kelly-Hayes, M., Kase, C. S., Au, R., Kannel, W. B., & Wolf, P. A. (2006). The Lifetime Risk of Stroke. Stroke, 37(2), 345-350. doi:10.1161/01.str.0000199613.38911.b2
- [40]. Simonet, D. (2009). Cost Reduction Strategies for Emergency Services: Insurance Role, Practice Changes and Patients Accountability. Health Care Analysis, 1, 1.
- [41]. Springfield, MO: Mercy Clinic Advanced Ambulatory Care - National. (2019, September 30). Retrieved November 16, 2020, from <https://www.mercy.net/practice/mercy-clinic-advanced-ambulatory-care-national/>
- [42]. Starfield, B., Shi, L., & Macinko, J. (2005). Contribution of primary care to health systems and health. The Milbank quarterly, 83(3), 457–502. <https://doi.org/10.1111/j.1468-0009.2005.00409.x>

[43]. Trinity Health Mid-Atlantic. 2019. Mercy Costs. [Microsoft Excel spreadsheet]. Conshohocken, PA: Trinity Health Mid-Atlantic. Available from: https://www.trinity-health.org/workfiles/40001_Final.xlsx [20 April, 2020].

[44]. Understanding Blood Pressure Readings. (2017, November 30). Retrieved from <https://www.heart.org/en/health-topics/high-blood-pressure/understanding-blood-pressure-readings>

[45]. Vaccine Effectiveness: How Well Do the Flu Vaccines Work? (2020, January 03). Retrieved November 10, 2020, from

<https://www.cdc.gov/flu/vaccines-work/vaccineeffect.htm> [46]. Why High Blood Pressure is a "Silent Killer". (2017, November 30). Retrieved from

<https://www.heart.org/en/health-topics/high-blood-pressure/why-high-blood-pressure-is-a-silent-killer>

[47]. Xu K. Usual source of care in preventive service use: a regular doctor versus a regular site. *Health Serv Res.* 2002 Dec;37(6):1509-29.

[48]. Zuvekas SH, Taliaferro GS. Pathways to access: health insurance, the health care delivery system, and racial/ethnic disparities, 1996-1999. *Health Aff (Millwood).* 2003;22(2):139-53.

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