

Four Years of CHEER: Cost and QALY Savings of a Free Nurse-run Walk-in Clinic Serving an Uninsured, Predominantly Spanish-speaking Immigrant Population

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Abstract: Non-emergent visits to emergency departments by uninsured patients impose unnecessary costs on both patients and safety-net institutions. We evaluated the health and economic impacts of providing free, walk-in care to low-income, uninsured adults—most of them Hispanic—at a free clinic between January 2013 and December 2016. Providing access to health care services for uninsured patients at Clínica Esperanza/Hope Clinic reduced emergency department expenditures in Rhode Island by approximately \$448,875 (range: \$410,377-\$487,375) annually and may have also reduced future health care costs for this population by more than \$48 million (\$12,034,469 annually) over the four-year evaluation period. For every \$1 in funding for walk-in clinic operation, delivering free care provided a return on investment of \$71.18 (range: \$70.95-71.40) in health care value. Providing access to non-emergent walk-in care at the more than 12,000 free health care clinics nationwide may save billions in ED costs while improving the health of uninsured individuals.

Key words: Medically uninsured; models, nursing; health care disparities; emergency room diversion; cost-benefit analysis; health equity.

Clínica Esperanza/Hope Clinic (CEHC) serves a low-income, predominantly Hispanic neighborhood of Providence, Rhode Island (Olneyville), providing free culturally and linguistically attuned health care services to the uninsured. Around the time that CEHC was established, the rate of uninsurance for non-elderly adults (ages 18-64) in Rhode Island was estimated to be 11.8%.¹ Despite the net positive impact of the Patient Protection and Affordable Care Act (ACA), thanks to which an estimated 20 million non-elderly adults (ages 18-64) gained health insurance,² nearly 50,000 Rhode Islanders³ and more than 27 million individuals in the U.S. remained uninsured after its enactment. A significant proportion (20%) of these individuals remain ineligible for ACA coverage because of their immigration status.⁴

Numerous studies have established that uninsured individuals in urban settings, who have limited access to primary health care providers, use the emergency department (ED) for non-urgent health needs.⁵⁻⁷ One consequence of limited access to care is that an estimated 13.7 to 27.1 percent of all ED visits in the United States are non-emergent and could be sufficiently addressed at an alternative ambulatory care center. Unnecessary ED visits are also a problem for insured patients. Nationally, diverting non-emergent patient visits from the ED to ambulatory care centers could save \$4.4 billion in annual health care spending.⁸ Locally, the Rhode Island Department of Health (RIDOH) has estimated that \$90 million in avoidable health care expenditures can be attributed to unnecessary ED visits.⁹

Nurse-run walk-in clinics in free health care settings that are staffed by volunteer health care providers and administrators may provide one potential model to reduce the impact of this problem. There are more than 1,000 free clinics in the U.S., of which approximately 50% provide some type of urgent care to uninsured individuals.¹⁰ The Clínica Esperanza/Hope Clinic Emergency Room Diversion (CHEER) clinic is a

nurse-run ambulatory care center for (only) uninsured patients, featuring walk-in appointments and short wait times. It has served as an alternative to the ED for a low-income, predominantly Hispanic population in Providence since 2012.

The CHEER clinic is a valuable source of ambulatory healthcare for adult uninsured patients experiencing non-emergent medical conditions. An evaluation of the CHEER program during a pilot period demonstrated a positive return on investment in terms of ED visits avoided and in terms of the value of chronic disease diagnosis, prevention, and treatment (measured in Quality Adjusted Life Years [QALY]).¹¹

Free clinics expand access to non-emergent ambulatory health care for the uninsured at the national level, and while they reduce ED-related health care spending, they also improve the health of the uninsured. We seek to evaluate the economic impact of the CHEER model to support the current literature of free clinics as valuable sources of safety-net care across the country. This report calculates the impact of free, walk-in healthcare in the context of out-of-pocket costs, ED visits, and QALYs for the predominantly Spanish-speaking, low-income uninsured patient population served by the CHEER of Clínica Esperanza/Hope Clinic in Rhode Island, between 2013 and 2016.

Methods

The CHEER model. All services offered at CHEER are provided free-of-charge, regardless of income level. Detailed information on the development of the CHEER model and operating procedures can be found in the in a previous report published by Bicki et al. and the Supplemental Methods section.¹¹

CHEER clinic eligibility. Potential patients are eligible for CHEER if they are: (1) age 18 or over (or emancipated), (2) lack health insurance or cannot afford to access care, (3) lack a primary care provider, and (4) not experiencing

a medical emergency (such as trauma, deep tissue lacerations, drug or alcohol intoxication, heart attack, stroke). *Navegantes* and volunteers help refer clients that do not meet these criteria to other sources of care, including the ED if necessary. The number of CHEER visits is capped at eight total patients per day, and patients who cannot be accommodated are held over and included in the evening clinic if openings are available, or asked to return the following day.

Staffing the walk-in clinic. CHEER is staffed by nurses and clinical volunteers (international medical graduates and local specialty clinicians) who operate under established clinical care protocols. Under the direction of the Nurse Manager (a Registered Nurse), volunteer clinicians provide treatments for non-emergent medical conditions, such as urinary tract infections and sexually transmitted diseases and initiate treatment for diabetes and hypertension. The Medical Director (a locally licensed, volunteer MD) reviews all patient encounters by CHEER clinicians, abnormal laboratory reports, and diagnostic imaging reports using the electronic medical record (EMR) system. The clinic is also staffed by *Navegantes*, who are bilingual advanced community health workers and medical interpreters that provide peer education on healthy lifestyles and chronic disease management. The combined efforts of no more than 12 staff members, a core group of approximately 20 volunteer clinicians and founders and approximately 250 active volunteers, have maintained clinic operations for more than ten years, demonstrating the sustainability of the CHEER clinic and its parent Free Clinic over a significant period of time.

Return on investment. To determine the relative impact of CHEER on the health and economic well-being of the patient population, we quantified the relative value of CHEER services in terms of out-of-pocket patient costs avoided through diverted ED visits and in terms

of QALY saved by providing access to preventative, diagnostic, and treatment services at CHEER. We calculated the return on investment (ROI) of CHEER using the same methodology previously used by Bicki et al. for CHEER clinic.¹¹ The ROI calculation reflects the health care value returned for each dollar invested in CHEER, based on QALY saved and ED visits diverted.

QALY saved. Using the method previously described by Bicki et al.,¹¹ which was derived from a similar study conducted by the Boston Family Van,⁷ we assigned a Clinically Preventable Burden score (CPB) (range: 1-5) to selected preventative services provided by the CHEER clinic. The CPB score indicates an estimated range of QALY saved by the service. The QALY is a measure used to determine both the quality and quantity of life lost to a disease; one QALY is equivalent to one year of life in perfect health.¹² Therefore, higher CPB scores reflect services which are more cost-effective in their impact on patient mortality and morbidity. Clinically Preventable Burden scores were originally defined in 2001 by the National Commission on Prevention Priorities and were updated in 2017 by the HealthPartners Institute.¹³ Each score corresponds to a range of QALY saved for a cohort of four million individuals. We adjusted the scores for this analysis by determining the average of each range and calculating the QALY savings for an individual subject. Since the upper bound of QALYs was not provided for a CPB score of 5, we used the lower bound as our estimate. We defined codes for each service in the electronic health record system used by CEHC (eClinicalWorks) and used these codes to aggregate the number of CHEER patients receiving each service during the four-year study period (2013-2016). We multiplied this number by the QALY value associated with the CPB score of the intervention. While there is no universally accepted dollar value of a QALY, we conservatively estimated the value of each QALY

to be \$50,000, based on similar evaluations published in the literature.¹⁴

ED diversion. To estimate the number of CHEER patient encounters that may have resulted in ED visits if patients had not obtained care at CHEER, the CHEER nurse reviewed each CHEER visit and determined whether the patient's chief complaint when reporting to CHEER could be classified among the top fifteen causes of potentially preventable ED visits reported by the RIDOH for R.I. patients in 2014.⁹ These causes included: upper respiratory infection, low back pain, abdominal pain, urinary tract infection, headache, neck sprain, fever, alcohol abuse, teeth problems, face injury, dizziness, anxiety, sore throat, backache, and chest pain. We counted the number of CHEER visits that included any of the above except for alcohol abuse, facial injury, and anxiety (which were not common causes of CHEER visits).

A 2013 study demonstrated that the average cost of an ED visit associated with one of the top ten outpatient conditions for an uninsured patient was \$1,178.¹⁵ The operating cost of CHEER clinic is \$170,602.50 per year, based on average annual costs during the period 2013 to 2016. These costs represent roughly 35% of the costs of operating the parent clinic, since the parent clinic performs a range of services (nutrition classes, outreach in the community) that are not provided at CHEER. During the four-year time frame, there were an average of 995 visits to CHEER each year (a total of 3,978). The average CHEER clinic cost for a single patient visit is therefore calculated to be \$172. We can infer that CHEER reduces the potential ED costs by approximately \$1,006. Since we have no means of knowing whether patients or hospitals cover the cost of this care (hospitals may offset potential profits by claiming the full cost of uninsured patient ED visits as charitable care), these savings can only be described as \$1,061 in "health care costs saved" for each patient diverted from the ED to the lower-cost CHEER clinic.

In a recent Patient Satisfaction Survey, 41% of CHEER patients responded "yes" and 20% responded "maybe" when asked if they would have gone to the ED if the CHEER clinic had not been an option that day. To define a conservative estimate of the health care costs saved due to CHEER visits, we made the assumption that 41% of all CHEER visits would otherwise have been ED visits.

Results

During the study period (January 2013 through December 2016), 2,312 unique patients were treated at CHEER, of which 1,234 (53%) were female and 1,078 (47%) were male. Patients attending CHEER clinic were predominantly immigrants from Central and South American countries and the Caribbean and were younger, on average, than patients seen in the CCC. They listed one of 20 different countries as their country of origin, the top 10 of which are shown in Figure 1A. The comparative age distributions of CHEER patients, CCC patients, and the R.I. population are shown in Figure 1B.¹⁶ More than 75% of CHEER patients indicated that their primary language was not English; approximately 60% of patients spoke Spanish as their primary language. Additional primary languages commonly listed by CHEER patients included Haitian Creole, Arabic, and Portuguese.

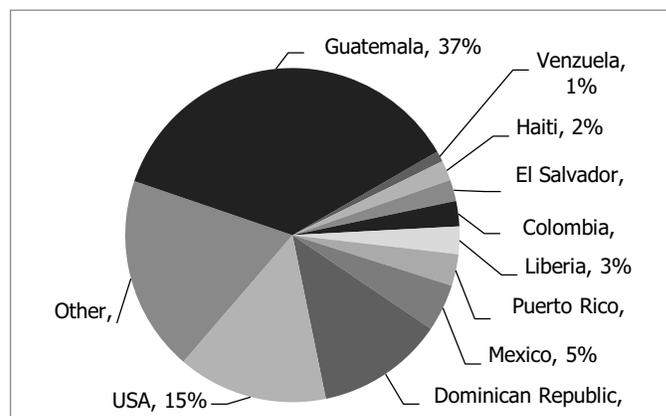


Figure 1A. Countries of origin of the CHEER patient population. The category "other" includes patients from less common countries such as Chile, Panama, Senegal, Egypt and Costa Rica, as well as those who refused to report their country of origin.

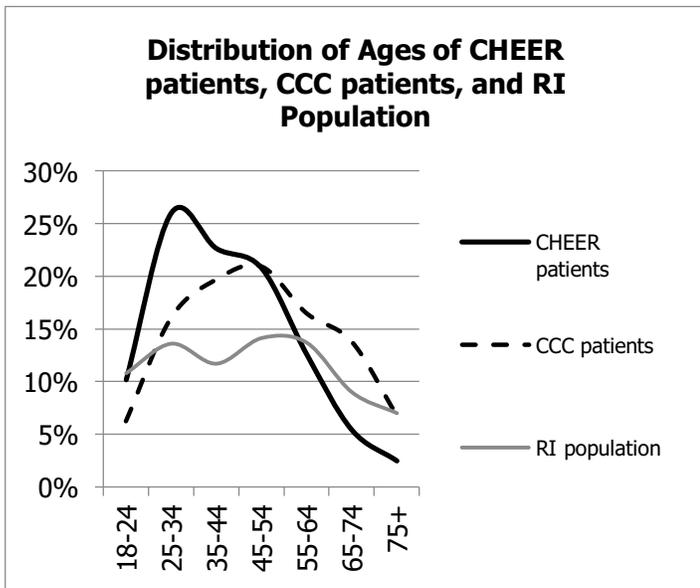


Figure 1B. Age distributions of CHEER patients, CCC patients, and RI population.

Providers routinely screen for chronic illnesses during CHEER walk-in appointments. As shown in Figure 2, the prevalence of diabetes, hypertension, and hyperlipidemia was higher among the 799 patients seen in CCC during 2016 than among the 1,116 patients seen in CHEER during that time, likely because CCC patients tend to be older than CHEER patients. Patients from both clinics had a lower prevalence of hypertension and hyperlipidemia than the general R.I. population, but had a higher prevalence of diabetes, which is consistent with the predominantly Hispanic population at CEHC and CHEER.¹⁷ Patients that are diagnosed with a chronic illness during a CHEER visit are enrolled in the clinic’s continuity of care clinic (CCC) – a separate program, with a budget that can be differentiated from the CHEER costs described in this article. CCC provides patients with chronic illness with access to regular, quarterly visits and health/nutrition education programs.

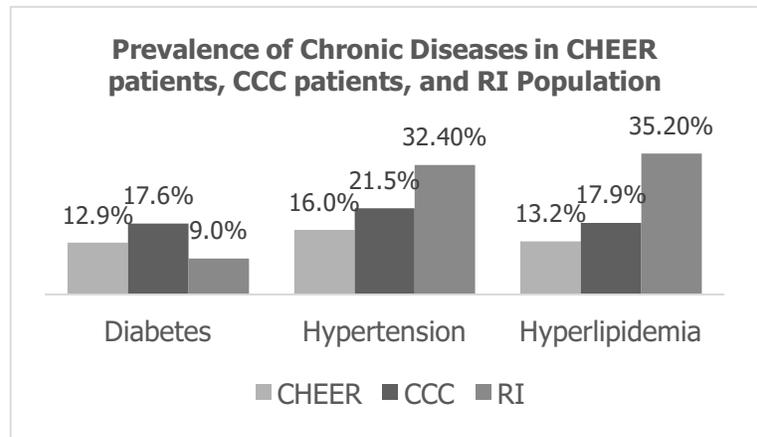


Figure 2. Prevalence of chronic diseases among CHEER patients, CCC patients, and RI population.

QALY saved. Preventative services provided at CHEER saved nearly 1,000 QALY over the four-year study period, for an average of \$12,034,469 in QALY-related cost savings per year. Detailed calculations for each of the interventions that are associated with a CPB score and included in the QALY calculation are provided in Table 1.

Based on these findings, we estimate that CHEER services returned \$69.54 in QALY value per dollar invested by providing diagnosis, treatment and prevention to walk-in patients, regardless of their chief complaint. These are real savings, as patients who are identified as having obesity are referred to *Vida Sana*, the CEHC-based program for healthy lifestyles, or to the DPP program at CEHC (these programs are funded separately). Patients who have non-specific complaints are frequently identified as having one or more significant chronic diseases, such as diabetes or hypertension, of which they were frequently previously unaware. Thus, access to CHEER and routine health screening in the walk-in context identifies undiagnosed chronic diseases and opens a door to continuity of care.

Service	CPB Score	QALY saved per treatment	Patients treated 2013-2016	Total QALY saved	QALY saved per year	Average costs saved per year
<i>Obesity screening and counseling</i>	5	0.17500	2274	397.95	99.49	\$4,974,375
<i>Diet and physical activity counseling</i>	5	0.17500	253	44.28	11.07	\$553,438
<i>Hypertension screening</i>	4	0.11125	2219	246.86	61.72	\$3,085,797
<i>Influenza vaccine (adult)</i>	4	0.11125	496	55.18	13.80	\$689,750
<i>Cholesterol screening</i>	4	0.11125	955	106.24	26.56	\$1,328,047
<i>Colorectal screening</i>	4	0.11125	630	70.09	17.52	\$876,094
<i>Alcohol misuse counseling</i>	3	0.03250	885	28.76	7.19	\$359,531
<i>Chlamydia screening</i>	3	0.03250	122	3.97	0.99	\$49,563
<i>Breast cancer screening</i>	3	0.03250	290	9.43	2.36	\$117,813
<i>Total</i>					240.69	\$12,034,406

Table 1. QALY and cost savings due to preventative services provided at CHEER.

ED diversion. For the study period, we identified 1,937 CHEER visits that may have resulted in potentially preventable ED visits if patients had not been able to visit CHEER (see Table 2). Forty-nine percent of CHEER visits fall under this classification, which remains proportional to the number of CHEER patients who would have used the ED had CHEER not been able to address their non-urgent health care need (49%) reported in a previous survey of CHEER patients, conducted by Bicki et al., and similar to the 41% of patients reporting that they would have used the ED in our more recent internal survey.¹¹

By multiplying the number of visits by the average costs saved per ED visit diverted to CHEER clinic, we estimate that an average of \$410,377 (conservative estimate) to \$487,375 (liberal estimate) in health care costs were avoided per year by diverting patients from the

ED. These costs may have been waived by the local ED and claimed as uncompensated care, an expense that may have been reimbursed by the state or federal government. While the total amount of uncompensated care is only a fraction of the overall uncompensated care budget, these savings resulted from an investment of approximately \$170,000 per year in free health care at CEHC. The return on investment, in terms of ED costs saved, is considerable: \$1.64 (range: \$1.46 to \$1.81) saved per dollar invested.

Total ROI. When ED diversion and QALY value savings are combined, CHEER services saved a total of \$12,548,478 per year (or more than \$48M over the four-year study period) and returned an average of \$71.18 per \$1 of funding (range: \$70.95-71.40) from January 2013 through December 2016.

CHEER visits for common preventable ED complaints per year	484
Upper respiratory infection	85
Back pain	66
Abdominal pain	50
Urinary tract infection	111
Head/neck pain	45
Chest pain	65
Teeth problems	6
Dizziness	58
Cost of an outpatient ER visit	\$1,178
CHEER expenses per year	\$170,603
Personnel	\$129,211
Utilities/operational	\$36,797
Supplies	\$4,595
Number of CHEER visits per year	995
Cost of a CHEER visit	\$172
Costs saved per diverted ED visit	\$1,006
Average ED diversion cost savings per year	\$448,876
Conservative estimate	\$410,377
Liberal estimate	\$487,375

Table 2. Cost savings due to potential ED visits prevented by CHEER.

Discussion

The Clínica Esperanza/Hope Clinic Emergency Room Diversion clinic has continued to reduce ED visits by uninsured patients using the clinic, while connecting these patients to continuity of care and health education programs. This is particularly important for the population of patients served by CEHC, most of whom are Hispanic and who have high rates of undiagnosed diabetes and other chronic diseases. Thus the value of CHEER to the city of Providence and the state of Rhode Island is likely to be significant (although difficult to estimate in terms of actual cost savings), since the clinic serves a population that has limited access to care and a high burden of chronic disease. Therefore our estimate of "ER costs saved" is likely to be an underestimate for the actual value of the CHEER intervention, as it does not include the impact of lost wages and economic instability

that may be attributed to chronic illness in this low-income population.

Although we are not able to track the behaviors of non-CEHC patients, we can compare ED usage of CEHC patients with a comparable group of patients who do have access to insurance. In a parallel study (not yet published), we have obtained ED data for 2016 from the Executive Office of Health and Human Services of Rhode Island and found that the rate of ED visits for Medicaid patients was 602 per 1,000 patients, with 239 of these visits defined as "potentially preventable." A comprehensive chart review of CEHC charts for the same time period, revealed the rate of ED use for CEHC patients to be 239 per 1,000, with 147 per 1,000 being "potentially preventable." This 62% reduction in preventable ED visits is likely to be attributable to the availability of free walk-in care for CEHC patients at the CHEER clinic.

Uninsured adults of all racial and ethnic backgrounds are 1.40 times more likely to experience premature mortality when compared to those who have insurance,¹⁸ and are more likely to experience long-term adverse outcomes known as health disparities.¹⁹ Hispanic and African-American minority groups have not experienced the same degree of improvement in health care access since the ACA was enacted as non-Hispanic Whites.²⁰

Uncertainty in the U.S. health care industry has created a growing need for health care providers and community leaders to provide sustainable, accessible options for non-emergent health care needs. While uninsured, low-income patients may not be required to pay the full cost of an ED visit themselves, the provision of uncompensated care creates a financial burden for safety-net hospitals.²¹ Furthermore, a patient who visits the ED but does not follow up with a primary care physician does not experience the benefits of primary care, such as proactive prevention and diagnosis of medical conditions.²² Spanish-language interpreters are often underutilized in EDs.²³⁻²⁴ The availability of linguistically appropriate care at the volunteer-run CHEER clinic is another advantage provided by CHEER.

A study by Dranove et al. demonstrated that the burden of uncompensated hospital care decreased after the implementation of the ACA in states that expanded Medicaid.²⁵ The authors of this study later suggested that if Medicaid expansion ceases or is rolled back by the passage of new health care legislation, there will be a considerable increase in the financial burden of uncompensated care on hospitals due to an increase in the number of patients lacking health insurance.²⁶ Should adjustments to the ACA result in higher numbers of uninsured patients, the CHEER clinic model is one that could be expanded to other free clinics as a means of reducing cost of health care for uninsured and underinsured individuals while

improving their connection to a source of health care.

This paper joins a body of literature describing analyses of the provision of primary care at free clinics in an effort to reduce ED usage among uninsured patients. A study in North Carolina found that, for counties with an established free clinic, an emergency department visit for an uninsured individual was 2.5% less likely to be a 'preventable ED visit' than would be found in a county that did not have a free clinic.²⁷ Furthermore, a 2012 study by Fertig et al. found that the costs of non-emergent ED and in-patient care decreased by an estimated \$170 per patient enrolled in a large free clinic in northern Georgia.²⁸ Hwang et al. provided evidence that showed that patients engaging in care at a free clinic in Virginia showed reduced unnecessary usage of the ED, compared with uninsured patients not enrolled at a free clinic.²⁹

Only a few studies have estimated the ROI of free clinics in terms of both ED diversion and QALYs. Whitley et al. found that outreach by Community Health Workers in the Men's Health Initiative had a positive financial impact through increased engagement with primary care, system navigation, and case management.³⁰ However, previous studies that have conducted ROI analyses of providing preventive health care services to uninsured patients in the setting of free clinics have shown lower cost savings than reported here.³⁰⁻³¹ Sanders et al. reported that providing hypertension care at a free community-based clinic resulted in a ROI ratio range of 0.35 to 1.20; Oriol et al. demonstrated a ROI ratio of 36:1 in the context of the provision of care in a mobile health clinic. The unique model at CHEER of offering a "clinic within a clinic" devoted to walk-in treatment of non-emergent conditions rather than on-going primary care provides an opportunity for the provision of a wider range of clinical interventions for a larger number of patients while leveraging existing facilities. In addition, the nurse-run model, operating under physician-

approved protocols, significantly reduces the operational costs of CHEER, enabling the Nurse Manager to be the primary provider in lieu of a full-time physician.

Strengths and limitations. A strength of our study is that we were able to evaluate the impact of free, walk-in health care over four years for a sample of over 2,000 patients. In addition, because our analysis was based on a wide range of primary care services, we were able to analyze the cost savings for more than acute services.

A limitation of our analysis is that the ROI calculation does not include the long-term value of health education services such as *Vida Sana* and Diabetes Prevention Programs, or of transition to long-term primary care in the parent clinic. It is difficult to quantify the value of this follow-up care on the economic stability of this population of patients, and therefore our calculated return on investments may be lower than the true value. An additional limitation of our study is that we cannot directly measure the impact of these services per patient. We assume that the impact of the service is equal across individuals, whereas some patients may be more likely to benefit than others due to greater participation in the programs or better understanding of the materials provided.

Next steps. The initial goal of CHEER was to offer non-emergent care services in order to prevent overutilization of the ED by providing an alternative treatment facility that provided high-quality, low-cost care for non-emergent concerns. In offering this service, CHEER provided a point of entry into all of the services offered at CEHC, providing an added benefit to patients presenting to CHEER rather than to the local ED. The Clínica Esperanza/Hope Clinic is in the process of advocating for a 'pay for success'

social equity investment by local hospitals and the state, to provide long-term sustaining support to the CHEER program.

We have shown that this model is cost-effective and that it improves health care delivery while being adapted to meet the needs of an uninsured immigrant population. The present study did not track long-term effects on ED use by patients who have visited the CHEER clinic, so future studies by CEHC may consider investigating behavioral change. These savings were more easily estimated than other savings, such as future health care costs avoided by future insurers of CHEER patients due to identification and treatment of chronic diseases in the pre-insured (patients who will be eligible for Medicaid under the ACA when they complete the five-year waiting period required for new citizens of the United States). We are currently tracking the ROI of our primary care services, health education classes, and the impact of access to free pre-insured care at CEHC and will report on the substantial savings that can be attributed to these services in separate studies.

The CHEER clinic is supported by grants from foundations and insurers (60% of income), contracts with the local health department and city (30% of income) and donations (10% of income); local hospitals provide in-kind support (free electronic medical record). As demonstrated in this report, the return on this investment is substantial in terms of costs saved, and health care provided to populations affected by health disparities. Support for the expansion of non-urgent care services at the more than 1,000 free clinics that are operating in the U.S. has the potential to reduce health care costs and could have significant impact on the well-being of low-income patients nationwide.

References.

- (1) Chollet, D., Ballou, J., Barret, A., Bell, T. Study of Rhode Island's Uninsured: Current costs and future opportunities. Washington, D.C.: Mathematica Policy Research, Inc. 2010.
- (2) Blumenthal, D., & Collins, S. R. Health care coverage under the Affordable Care Act--a progress report. *New Eng J of Med.* 2014;371(3):275-281.
- (3) Rhode Island Health Information Survey (HIS): Results from 2015. HealthSource RI. 2015.
- (4) Garfield, R., Damico, A., Cox, C., et al. Estimates of eligibility for ACA coverage among the uninsured in 2016. 2016.
- (5) Bradley, C. J., Gandhi, S. O., Neumark, D., et al. Lessons for coverage expansion: A Virginia primary care program for the uninsured reduced utilization and cut costs. *Health Affairs (Project Hope).* 2012;31(2):350-359.
- (6) Kim, T. Y., Mortensen, K., Eldridge, B. Linking uninsured patients treated in the emergency department to primary care shows some promise in Maryland. *Health Affairs (Project Hope).* 2015;34(5):796.
- (7) Song, Z., Hill, C., Bennet, J., Vavasis, A., et al. Mobile clinic in Massachusetts associated with cost savings from lowering blood pressure and emergency department use. *Health Affairs (Project Hope).* 2013;32(1):36.
- (8) Weinick, R. M., Burns, R. M., Mehrotra, A. Many emergency department visits could be managed at urgent care centers and retail clinics. *Health Affairs (Project Hope).* 2010;29(9): 1630-1636.
- (9) Potentially preventable emergency room visits. Rhode Island Department of Health. 2014.
- (10) Darnell, J. S. Free clinics in the united states: A nationwide survey. *Archives of Internal Medicine.* 2010; 170(11):946-953.
- (11) Bicki, A., Silva, A., Joseph, V., et al. A nurse-run walk-in clinic: cost-effective alternative to non-urgent emergency department use by the uninsured. *J Comm Health.* 2013;38(6):1042-1049.
- (12) Glossary. National Institute for Health and Care Excellence. 2017
- (13) Maciosek, M. V., LaFrance, A. B., Dehmer, et al. Updated priorities among effective clinical preventive services. *Annals of Family Medicine.* 2017;15(1): 14-22.
- (14) Evans, C., Tavakoli, M., Crawford, B. Use of quality adjusted life years and life years gained as benchmarks in economic evaluations: A critical appraisal. *Health Care Management Science.* 2004;7(1):43-49.
- (15) Caldwell, N., Srebotnjak, T., Wang, T., et al. "How much will I get charged for this?" Patient charges for top ten diagnoses in the emergency department. *PloS One.* 2013;8(2),e55491.
- (16) Census Bureau. Age and Sex: 2015 American Community Survey 1 Year Estimates. 2015.
- (17) Centers for Disease and Control: Behavioral Risk Factor Surveillance System. Chronic Disease and Health Promotion Data & Indicators. 2017.
- (18) Wilper, A. P., Woolhandler, S., Lasser, K. E., McCormick, D., Bor, D. H., & Himmelstein, D. U. Health insurance and mortality in US adults. *American Journal of Public Health.* 2009;99(12):2289-2295.
- (19) Lillie-Blanton, M., & Hoffman, C. The role of health insurance coverage in reducing racial/ethnic disparities in health care. *Health Affairs (Project Hope).* 2005;24(2):398-408.
- (20) Manuel, J. I. Racial/ethnic and gender

disparities in health care use and access. *Health Services Research*. 2017.

(21) Cole, E. S., Walker, D., Mora, A., et al. Identifying hospitals that may be at most financial risk from Medicaid disproportionate-share hospital payment cuts. *Health Affairs (Project Hope)*. 2014;33(11):2025-2033.

(22) Starfield, B., Shi, L., Macinko, J. Contribution of primary care to health systems and health. *The Milbank Quarterly*. 2005;83(3):457-502.

(23) Ramirez, D., Engel, K. G., & Tang, T. S. Language interpreter utilization in the emergency department setting: a clinical review. *Journal of health care for the poor and underserved*. 2009;19(2):352-362.

(24) Brooks, K., Stifani, B., Battle, H. R., Nunez, M. A., Matthew Erlich, M. A., Phil, M. Patient perspectives on the need for and barriers to professional medical interpretation. *Rhode Island Medical Journal*. 2016;99(1):30.

(25) Dranove, D., Garthwaite, C., Ody, C. Uncompensated care decreased at hospitals in Medicaid expansion states but not at hospitals in non-expansion states. *Health Affairs (Project Hope)*. 2016;35(8):1471-1479.

(26) Dranove, D., Garthwaite, C., Ody, C. The Commonwealth Fund. The Impact of the ACA's Medicaid expansion on hospitals' uncompensated care burden and the potential effects of repeal. 2017.

(27) Hutchison, J. H. North Carolina free clinics: Effective primary care provider for the uninsured. Doctoral dissertation, The University of North Carolina at Charlotte. 2016.

(28) Fertig, A., Corso, P., & Balasubramaniam, D. Benefits and Costs of a Free Community-Based Clinic. *Journal of*

Health and Human Services Administration. 2012;34(4):456-470.

(29) Hwang, W., Liao, K., Griffin, L., & Foley, K. L. Do Free Clinics Reduce Unnecessary Emergency Department Visits?; The Virginian Experience. *Journal of Health Care for the Poor and Underserved*. 2012;23(3):1189-1204.

(30) Whitley, E. M., Everhart, R. M., & Wright, R. A. Measuring return on investment of outreach by community health workers. *Journal of Health Care for the Poor and Underserved*, 17(1), 6-15. 2006.

(31) Sanders, J., Lacey, M., Guse, C. Accrued cost savings of a free clinic using quality-adjusted life years saved and return on investment. *Journal of the American Board of Family Medicine*. 2017;30(4): 505-512.

(32) Oriol, N. E., Cote, P. J., Vavasis, A. P., Bennet, J., DeLorenzo, D., Blanc, P., & Kohane, I. Calculating the return on investment of mobile healthcare. *BMC Medicine*. 2009;7(1): 27.